

An Insight into the *Aphasics*' Language

Its *Diagnosis* with the Sub-Tests of the *AAT* and
Therapy with *LingWare* and *NeuroLing*

Inaugural Dissertation
submitted so as to obtain the Doctor Grade (Ph.D.) in the
Department of Human and Cultural Sciences of
Bergische Universität Wuppertal

Submitted by

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Supervised by

Prof. Dr. J. Jacobs

Bergische Universität Wuppertal
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I hope this paper will open a way to international friendship and co-operation so as to broaden knowledge of aphasia examination and treatment in poor countries where the syndromes of aphasia are often ignored or given a minor importance.

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



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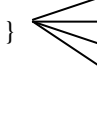
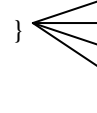
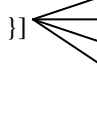
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Labelling of the Disorders

Phoneme labelling

/ /		/1C / /1V /	Substitution of a Consonant(s) or a Vowel(s)
/ Ø/		/1CØ/ /1VØ/	Elision of a Consonant(s) or a Vowel(s)
[+]		[+1C] [+1V]	Addition of a Consonant(s) or a Vowel(s)
[]		[1C] [1V]	Permutation/ Shifting of a Consonant(s) or a Vowel(s)

Morpheme/ Word/ Phrase/ Sentence labelling

/{ }/		/{1M }/ /{1W }/ /{1P }/ /{1S }/	Substitution of a Morpheme(s)/ a Word(s)/ a Phrase(s)/ a Sentence(s)
{ }		{1MØ } {1WØ } {1PØ } {1SØ }	Elision of a Morpheme(s)/ a Word(s)/ a Phrase(s)/ a Sentence(s)
{+ }		{+1M } {+1W } {+1P } {+1S }	Addition of a Morpheme(s)/ a Word(s)/ a Phrase(s)/ a Sentence(s)
[{}]]		[{}1M]] [{}1W]] [{}1P]] [{}1S]]	Permutation/Shifting of a Morpheme(s)/a Word(s)/ a Phrase(s)/ a Sentence(s)
[+]	-----		Addition of unnecessary spoken/written language
{* }	-----		Faulty Inflection / Faulty Morpheme
/{* }/	-----		Faulty Sentence/ Phrase with Morpho-phonemic & Semantic-Lexical ESPA
[(ND)]	-----		No Disorders
[(SF)]	-----		Shared Features with the target Word, Phrase, Sentence, Object & Situation
[(SS)]	-----		Shared Situation with the target Word, Phrase, Sentence, Object & Situation
[(D)]	-----		Disorder/ Deficit
()	-----		Pause
< >	-----		Patient's Response

Epigrams

TO EVERYTHING THERE IS A SEASON AND A
TIME TO EVERY PURPOSE UNDER HEAVEN,
A TIME TO BE BORN AND A TIME TO DIE,
A TIME TO PLANT AND A TIME TO PLUCK UP
THAT WHICH IS PLANTED.

GÄBE ES KEINE SPRACHE, SO WÄRE UNS
WEDER DAS GUTE NOCH DAS BÖSE BEKANNT,
NOCH DAS WAHRE UND DAS FALSCHER, NOCH
DAS ANGENEHME UND DAS UNANGENEHME.
DIE SPRACHE ERMÖGLICHT ES UNS, ALLES DAS
ZU BEGREIFEN. DENKT ÜBER DIE SPRACHE NACH.

General Introduction

Introductory Overview

Impairments inflicted on the organs of speech and language were debated in the 18th century (Gesner 1770). The beginning of a systematic investigation, neurological exploration of the neural impairments and somehow aphasic research was triggered by the 19th century neurologists, Franz Josef Gall and Johann Caspar Spurzheim (1810-1819). They introduced the phrenology term. It was a domain in which the human skull was examined so as to define and localize the functions of the brain areas; it is a linking of human characteristics with the relative size of skull areas. Later on Gall rejected this term and continued his neuro-anatomic research on the parts of the brain. Thus, he founded the study of localization (Gall, 1822-1825). Bouillaud (1825) took over this research and confirmed that the loss of language is caused by lesions to the temporal and frontal lobes. He was convinced that speech and language have their regions in the left areas of the brain. The relationship between the loss of language and the left brain lesions was found by Dax (1865). He established, therefore, the research field of hemispheric dominance. In Germany Nasse (1851) went through the research works of the first half of the century and succeeded in finding and describing certain cases of aphasia, namely, motor, anomic aphasia and agraphia. He was against the research works of Bouillaud. He reported over certain aphasics whose brain lesions did not lie in the frontal lobe and gave certain warnings against attempting to localize speech and language in one particular area.

The above authors paved the way to a classical aphasic research to come later on. These classical aphasic findings were introduced by the works of Broca (1861) and Wernicke(1874). Broca dealt with motor aphasia, however Wernicke focused mainly on sensory aphasia. Both of them emphasized that the syndromes of aphasia lie in different regions of the left hemisphere. Broca's aphasia was particularly localized in the anterior area (Broca's centre) and Wernicke's aphasia was confined to the temporal posterior area (Wernicke's centre). Wernicke found that a sensory aphasia causes disturbances in the understanding of language. He sketched a schema which was built on motor and sensory aphasia. On the basis of these theoretical observations he differentiated between cortical, subcortical and transcortical aphasia. He also postulated the existence of a conduction aphasia which arises from a break in the pathway that links motor and sensory language centres. Later on he changed this schema due to the research works of Lichtheim (1885) that exerted a great influence on it, hence the birth of a Wernicke-Lichtheim schema (See Theoretical Part, Section: 4.5). It became an indispensable basis to the classical aphasic research. Déjérine(1892), Henschen(1920),

Kleist(1934) and other aphasiologists, who adopted the point of view of Broca, Wernicke and Lichtheim, attempted to localize exactly all types of aphasia. They formulated most of the terms that are used today in the domain of aphasiology.

In this context it is worth to mention the works of the English neurologist, Jackson (1866). He observed that only the voluntary and not the involuntary emotional speech is disturbed. He labelled these aphasics' language, which was badly disturbed, as "automatic utterances" which he related to the right non-dominant hemisphere. He pointed that a lesion may arise in a particular region of the brain, but it is not a proof that speech and language must be absolutely localized in this area. As the research scientists worked on language, Steinthal (1871) insisted on the importance of analysing the form and content of language so as to know more about this phenomenon. Pick (1913) must be considered as a milestone in the domain of aphasiology as he pointed to the necessity of involving linguistics in the aphasic research. He described a number of neural and pathological syndromes that are related to the loss of speech and language. Jakobson (1941-1982) worked also in this tradition. He pointed that aphasic language can be better understood and described through the use of the linguistic rules. Marie and Foix (1917) broadened the domain of aphasic research as they had the opportunity to examine the first world war soldiers whose brains were wounded during the war. They confirmed the existence of a Broca's and Wernicke's region and an area between them from which arises a global aphasia if a lesion affects it.

The works of Weisenburg, Mc Bride (1935) and Goldstein (1948) opened the way to a modern aphasic research. Weisenburg and Mc Bride based their works on a neurological and a psychological point of view. Their research on the aphasic patients confirmed that there is no direct relationship between aphasia and the disorders of intelligence. They divided the syndromes of aphasia in expressive, receptive, expressive-receptive and anomic aphasia. This division pushed it through in Anglo-American areas. Goldstein (1948) introduced other aspects in the aphasic research. He mainly emphasised the simultaneous function of the neural substance. This simultaneity is a fusing of different abilities at the same time. It is responsible for high and abstract performances. If it disintegrates though a disease, an accident or a tumour, the patient will be unable to understand abstract concepts. He postulated, for example, that the word finding disturbance is not a memory disorder but rather a disorder of abstract behaviour. The patient understands, for example, a concrete word or sentence, but the moment an examiner or a therapist includes an abstract concept in communication, the patient can not understand the essence of the spoken language.

Brain (1961) submitted a short summary about the types of aphasia that were caused by the second world war. This synopsis can be used as an introduction to an aphasiology of the post-war. Zangwill (1960 & 1969) dealt with the psychological function of the cerebral dominance and psychopathology of the neural impairment. Nielsen (1946), Wepman (1951), Schuell (1964), Geschwind (1965, 1972 & 1974), Kaplan (1962), Howes (1964), Goodglass and Kaplan (1972) made aphasiology flourish in the USA. In Germany Conrad (1949) took the concepts of Marie and started to work on them. He concentrated on the problems of localization, division and examination of aphasia. This tendency is to be continued in the neurological department of Aachen under the supervision and guidance of Poeck (1975). He worked together with certain neurologists, linguists, psychologists and therapists so as to establish the methods with which to examine and treat the syndromes of aphasia and other neurological anomalies.

On the basis of what has been unfolded above a distinction can be drawn between the old and modern aphasic research. These differences can be summed up in the following points: Aphasiology has started to move away from the domains of medicine as linguistics and other scientific disciplines were involved in aphasiological research. The localisation of the types of aphasia has been based on arteriography and recently on the PET-, MRI-, and CAT-scans (See Theoretical Part, Section: 3, pp. 34-35). The focus has been directed to aphasia therapy as the number of patients, who survive after a brain operation, has increased. They must be rehabilitated to overcome their handicaps, hence the diagnosis and treatment of aphasia has become important and necessary so as to confine the disorders and make effective therapy plan.

Aphasia, which is a loss of language, is an impairment to certain areas of the central nervous system. This deficit, that can be classified in different classes, stretches over linguistic processes; other high brain performances remain intact. Aphasiologists have beaten the causes of aphasia down to an accident, in which the regions of language are injured, infections in particular cortical and sub-cortical areas of the brain, or a disturbance of blood supply. Impairments triggered by the syndromes of aphasia will be dealt with in the sections to come.

Theme of the Dissertation

The central theme of this dissertation is the focus on the neural areas of language, disturbances that can be acquired or inflicted on them and use of adequate methods of diagnosis and therapy. The aim of all this is to try to cure, ameliorate or completely eradicate any disturbances that hamper the patients' processing of speech and language. In this context

the relationship between language and the brain will be taken into account; it is a link between neurophysiological aspects and language functions. Neurolinguistics will play a great role in this context because it offers new techniques that give us the possibility to have a view about the way speech and language areas work and how different neural structures participate in the processing of language. The dissertation will also unfold certain aspects about how the patients cope with the unexpected changes of their linguistic abilities, modalities of language (speaking, understanding, reading, writing) and try with a tremendous aspiration to recover from the manifested speech and language disturbances that can be caused by a disease, an accident or a stroke.

Another central objective point of this work is to limit the scope of research, in which particular aphasic data will be involved, so as to deal only with the aphasic disturbances that are found at the level of word and sentence production, as well as perception. Attention will be given to the nature of the aphasic disorders that not only block the finding of the words and the sentences but also prevent the availability and storage of phonemes, morphemes, propositions, words or even clauses and sentences (Blanken, 1989). Due to the restrictions that are imposed by this research work, Dysarthries and psychological disorders are to be left out.

To know more about the aphasic impairments, experimental analysis and evaluation of the data, that will be gathered from the patients' responses, will be indispensable. The data will, undoubtedly, unfold important insights into the nature of the patients' linguistic deficits, the availability of the words (lexicon), the constructions of the sentences (syntax), the place of the propositions (semantic) and the production of speech (phonetic/phonology).

Another approach, to be followed in this dissertation, is to proceed with the use of a diagnostic method with which the speech and language fragments of the individual patients are to be characterised and categorised according to the well-known classes of the Aachener Aphasie-Test (AAT). The aim is to find more about the characteristics of the disturbances, the place where they occur, the severity of the impairment and the testing procedures, as well as the assessment of the patients' competence and performance. These steps are the necessary and primary basis so as to sketch a therapy plan.

After the general overview, in which I will shed light on the brain, its functions and some aspects of language that are required by any diagnosis and therapy, I will apply in the treatment sessions certain computer programs that support aphasia therapy. Introducing these programs in the domain of aphasia therapy raised the following questions: How are the patients responding to the programs? How do they use them? Do they satisfy their

expectations? Do they quicken or slow the therapy process? Are they in a position to ameliorate the patients' communicative capacity?

All these questions will be elaborated in the oncoming sections. As far as the therapists are concerned they should know their patients and certain therapy programs that suit to them. Their presence in any therapy setting, in which computer programs supporting aphasia therapy are involved, is necessary because of the use of a method that sets the patients in virtual and somehow communicative situations. The latter can be transferred, later on, to real life contexts and used as means that should stimulate communication. These procedures can be practised at the end of each therapy setting, where the patients have the possibility to have access to the whole materials, which the therapists have trained with them, so as to test their communicative abilities.

It must be taken into account that during the application of the diagnostic and therapeutic procedures the two words, examiner and therapist are to be included to avoid the use of the first personal pronoun. But how and when did the therapists become aware that the involvement of certain developed PC programs do support the therapy of language?

Involvement of PC programs in the therapy of language

The experiences I made with the research papers that were written on the effect of computer programs that support the therapy of aphasia show that until the nineties there had been a manoeuvring endeavour to prove the positive impact of this type of therapy. A study carried out in the USA by Bracy (1989) has unfolded that over more than 75% of the clinics use a computer in the rehabilitation and therapy of language. Today the number goes up to 100%. In German speaking countries only 30% of the clinics use computer programs for a therapy of language because of the skepsis that has been raised about the use of the computers in the rehabilitation of language.

The institute of Linguistics of Karl Franzen University in Graz organized in April 1995 an international congress with the theme "Language - Therapy - Computer". The congress attracted not only the interests of the therapists and those who worked in this domain but was also visited by person who were affected by the disturbances and their family members. There were many discussions about computer programs that support speech and language therapy. In the congress of 1999 the wide range of the programs, that were to introduced in the lectures and reports of the meeting, was limited. The opportunity was given to other specialists and therapists to present their works. In comparison to the congress of 1995, in which only computer programs supporting language therapy were introduced, the congress of 1999 was

an opportunity in which there was an intensive discussion about the foundation, construction and efficiency of the programs as the therapists involve them in therapy. Today the specialists of this domain are convinced that these programs stand in the therapy domains as useful and efficient means (Roth & Katz, 1998) that can be used to rehabilitate the patients who suffer from speech and language disorders.

Next to the introduction of the programs, the therapists and the impaired persons had the possibility to get to know the programs and practise with them. The practical aspect and use were given a great importance in this congress. Since 1999 these programs of therapy had been constantly developed and ameliorated. This development has been conditioned by the progress in the multi-media PC technology.

Thanks to this new technology, sounds, texts and images are combined and involved in the structuring of the exercises of speech and language therapy. This change in the form and content of the exercises, mainly in their re-combination, answer to the needs, wishes, knowledge, interests and learning ability of each patient. If sounds, texts and images, involved in the programs, do not satisfy the interests of the patients, the attention of the latter will decrease constantly. The aim of this combination is to strengthen the linguistic capacities of the patients and widen the sphere of the linguistic materials to include tasks of training that consist of vocabulary, syntax, articulation and contexts.

Therapists and specialists, who developed the programs of therapy, became aware that speech and language therapy becomes effective if it tends to be close to real life communicative situations. This expectation has been made possible by computer programs supporting speech and language therapy, with which the therapist can train every modality of the patients.

Parallel to computer training, exercises of the programs can be transferred to sheets of paper and used to practise with the patient. On the one hand, this method awakens in the patients the interests to use a computer, on the other hand, it helps them compile a book of exercises to which they can refer if they train with their relatives, friends or close persons who are acquainted with their linguistic abilities and psychological state. The transfer of the exercises - that can be trained at home - from the programs to sheets of paper simplifies and enriches training. In other words the availability of a book of exercises, derived from the tasks involved in the programs of therapy, reinforces the effect of training and contributes to the success of therapy.

Each exercise, used in training, starts with simple tasks in which the intensity of the difficulty increases continuously both in form and content. Simple and compound words as well as simple and complex sentences are trained in the exercises. There are also exercises that are

used to train verbs and elementary syntax, and others in which the patient is required to describe the content of the images. A continually guided work with a PC and a book of exercises increase the patients' concentration, articulation, memory storage and perception of morphophonemic constituents. It stimulates the modalities that are related to the neural pathways of speech and language.

This combination makes a diversified work possible. The experience I made with the aphasic patients has shown that none of them has ever shown any signs of boredom during a therapy session. They were motivated and eager to move to the next task of training.

Computer Communicative Speech Therapy

What is to be understood under computer supported communicative speech and language therapy? In this context the patient must solve an exercise which is given to him/her by a selected computer training program. The job of the therapist in this context is to assist him/her in this task. The exercise consists of a spoken and a written word, a sentence, an image or a situation that must be understood by the patient and on demand labelled by him/her according to the requirements that the therapist sets for a therapy plan. Each patient is required to act through a response. He/she carries out the action and thus experiences through a visual, a textual or a vocal speech/language feed-back whether the answer is correct or faulty. This trivial request and patient's reaction, known also as a stimulus-response constellation, is a situational controlled communication whose aim is to stimulate the network of language and awaken the motivation in the patients so as to use the remains of their language again.

The therapist, who uses this type of therapy, wants to help an aphasic patient to overcome speechless states. It is an aim that can be achieved by a set of programs that consist of various exercises. The therapist assumes that language capacities improve through a guided training. This can be supported by an instrument with which the patients have to interact as it is quite common that learning by doing is very efficient. The selected material of therapy, derived from particular programs that support aphasia therapy, does strengthen this undertaking. In every exercise the movements forward and backward often fulfil a request and contribute to the training of the patients' communicative and cognitive abilities. The aim of this type of therapy is not only to help the patients hear, read, write and understand what is exposed to their perception and reception capacities but also develop a personal strategy so as to process the visual, spoken and written stimuli of a real context and later on work independently.

The target of computer programs that support aphasia therapy is to offer the patients different situations of assistance. Utterances, sentences, words and sounds must be better trained by a

constant controlled repetition and naming. The therapist can help the patients not only in learning the materials of the presented programs but also in providing other exercises that have another content but similar to the ones that were trained in the previous sessions of therapy. These programs of therapy may provide a tangible assistance to the patients if the therapist notices that their use in a session of training has managed to ameliorate their communicative ability. If we make an early generalisation we can say that this type re-training should create a general effect of motivation and a desire to overcome the problems of communication.

After a period of therapy the positive consequence of training can be inferred from the involvement of the patient in a social communicative context. It is a test that shows whether the patient is understood in public. A slight success in this context will help him/her gain self-confidence and express his/her wishes and needs in any situation of communication without any hesitations or fear to be misunderstood.

Therefore communication, in which there is a strong relationship between training, learning and application, becomes to a patient - who suffers from a particular impairment of aphasia - simpler and easier due to the contexts of interaction that are inherent in the selected programs of therapy and the control over the different offered exercises.

This type of therapy training does not take place in a sterile and abstract environment. Each stimulus is imbued with supplementary information of an acoustic and visual nature. The stimulating features of the programs of training are achieved by images, texts and sounds. They have an important role in the planning and administration of therapy and diagnosis. They are elements that assist in the training of the semantic, syntactic and lexical ability of a patient. In each exercise they help the patients not only to bridge the linguistic vacuums, but also to awaken their personal knowledge about the world around them.

Aphasia disturbs both the patients' relationship with their social surrounding and their families. The reason why the patients' friends and families must find other ways of coping with the physical (often with paralysis), mental and psychological (with unexpected depressions and uncontrolled behaviour or with feelings of not being understood by the others) changes of the patients. The new therapy approach, as it will be unfolded later, follows the aims and expectations of the patients and families. The therapy programs, that will be involved in this dissertation, approach the patients with so much discretion so as to help them gain control over their communicative ability and be intelligible to any communicative partners.

Each patient, because of the nature of the disturbances and the uniqueness of his personality, is given a particular attention and consideration. The analysis of everyone's ability is a necessity and a prerequisite to any therapy procedure. The ability of speaking, understanding and learning is the primary target to which the tasks of the exercises of therapy are directed. The tasks are expected to satisfy the needs and wishes of each patient. The visual, pictorial and acoustic elements, that are presented to the patients as a material of therapy, create an exciting climate of pleasure in a setting of therapy.

Computer training programs such as LingWare and NeuroLing, that can be used to treat the patients who suffer from the syndromes of aphasia, have all one aim; the establishment of the patients' communicative ability. In these programs, linguistic and neurological well-founded and tested therapy concepts are embedded in systematic programs ran on a computer and used gradually to train the remaining linguistic abilities of the aphasic patients. From this particular therapy results a number of advantages, for instance, the combination and re-structuring of the exercises, that are different from each other, and finally the documentation of trials, errors and results of each exercise.

Many patients are very enthusiastic about this new method of training. It gained a great acceptance by the therapists and patients. The patients, who deal and use the computer as an instrument of training and who have acquired the ability – despite their handicaps – to operate a device of a high complexity, describe the experience they have been doing with a computer as a unique and a satisfactory experience. This instrument helps and motivates them in many situations to continue their aphasia therapy.

The therapists, who have a sense of responsibility, are convinced that the role of a therapist can not be replaced by the use of an MPC. The latter represents instead a suitable mediator in the therapy process. The computer supporting therapy training is in a position to generate a supplementary motivation in the patients and support them in their audio and visual learning processes. According to scientific observations and investigations, computer programs that support language therapy trigger in the aphasic patients astonishing thrusts of excitement and a high learning motivation because of the audio-visual stimulation that are made possible by the use of a multi-media PC.

The computer gives the patients the possibility to take part in learning situations. It helps some of them, who have coped with it so easily, produce an appreciated performance, hence achieving a particular self-confidence through their success in active learning situations. These computer training programs, on which the elaboration will be widened in the experimental part, also improve the perception ability of the patients and set them in divers

communicative situations. Thus, the effects of aphasia can be reduced and in some cases thoroughly ameliorated through constant and intensive therapeutic sessions. Moreover the aphasics are instructed to develop strategic ways of expressing their wishes and needs so as to cope with the impairments that are caused by aphasia. What are the causes of the syndromes of aphasia? and how are they classified?

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Theoretical Part

1 – The Cause and Classification of Aphasia

In Germany statistics prove that in every two Minutes at least one person gets a stroke. The number of those who are affected goes beyond 250 000 persons in a year (Stern 26, 1992 S.112). More than one third of the affected die within the first thirty days. Most of the survivors must learn to live with their handicaps. The chance to get a quick and complete recovery differs from one person to the other. Some never recover if their whole language areas are badly damaged. A stroke is therefore the frequent cause for the disturbance of many people's communicative capacity. It is followed by skull-brain injuries, brain tumours and infections (Leischner, 1981&1987). Thus, the brain shows impaired blood vessels and damaged tissues. Due to these impacts, the communication of the affected unfold different types of language disorders; among them we have the various syndromes of aphasia, which means the loss of speech. The whole brain will not be equally affected by the damage. Certain areas will be badly hit than the others. It must be noted that a syndrome of aphasia appears after a complete acquisition of language. It must not be mixed up with speech disturbances which arise from psychological disturbances, deaf-mute states or trauma.

As it was mentioned above and in the introduction, aphasia arises from a brain damage caused by a heart attack, a disease or an accident. In many observed cases of aphasia the patient's left hemisphere shows traces of impairment to the nervous system, especially to those in which language areas lie. Aphasias are then speech and language disturbances. They differ from speaking disturbances known as dysarthrophonies or dysarthries that can have the same cause as aphasia. On this scale, aphasia is a damage to the central nervous system in which different language components such as syntax, phonetic, phonology, lexicon and semantics are affected. These disturbances can often spread to reading and writing abilities. However, dysarthries are disorders that occur along the vocal tract without or with a partial impairment to the central nervous system. They are often accompanied with disturbances to the voice, speaking melody and speech rhythm. Dysathries may accompany aphasias but they often happen to occur independent of them.

If the brain is damaged, a range of problems and difficulties will occur in the patients' competence, henceforth their performance is altered; this alteration depends on the extent and location of the damage. The damages, that are of important interest in this dissertation, are those that cause linguistic disturbances. The patients, who have devastating linguistic disorders after a brain damage, are not all aphasics. Certain cases of these deficits resolve over weeks or months into minor deficits. In few instances the patients experience complete

recovery; it appears that their innate knowledge of language has been preserved even though they have severe problems with performance. In aphasia there are language disorders without cognitive impairment. These patients produce sparse and disconnected speech and language. They have no problems solving non-verbal tasks such as playing, roaming in a city using a route map, cooking, etc. Other patients may show cognitive impairments without linguistic deficits. They produce and understand language, but they have difficulties in solving tasks of visually presented non-verbal material, for instance, the completion of a puzzle. This cognitive impairment affect daily tasks such as remembering of a common route, cooking, succession in the taking of daily meals, etc.

In the next parts it will be quite lucid that not all aphasics have the same symptoms because of the nature of the brain damage. A patient may have problems with word formation, another with sentence formulation or pronunciation and another with word finding or understanding. This has led the classical and modern aphasiologists, as it was unfolded in the introduction, to attempt to locate the areas of the lesions and classify the symptoms of aphasia.

In Germany as far as the classification of aphasia is concerned the classified components put forward by Klaus Poeck (RWTH, 1997) have pushed it through. While in America the aphasiologists distinguish between fluent and non-fluent aphasia, Poeck and his co-workers draw a demarcation line between Broca's , Wernicke's, global and anomic aphasia and also other additional forms of aphasia such as conduction and transcortical aphasia.

This classification was based on a statistical research study that was carried by Poeck and his assistants on patients who left the hospital after having partially recovered from a stroke, a brain disease or an accident. It was found that these standard syndromes have an occurrence that can be summed up in the following statistics: ca. 20% global aphasia, ca. 15% Broca's aphasia, ca. 15% Wernicke's aphasia, ca. 30% anomic aphasia and ca.20% of non-classified aphasia and other forms of aphasia. In this study they used the Aachener Aphasia-Test (AAT) to record their observations and assessments of the patients' linguistic abilities.

The test will be used in this dissertation during the application of the diagnosis. Some American tests will be cited so as to have a general view about what they have in common and what each of them contains and does. The AAT is very important as it selects the aphasics from a great number of brain impaired patients, who may have a syndrome of aphasia or other neuropsychological disturbances, and categorises them according to the syndrome they have. It also determines the intensity of the aphasics' disorders and makes a record of the different speech and language modalities. Finally, it differentiates the main classes of aphasia. What are these classes and the characteristics of each class?

1.1 Broca's Aphasia

Broca's aphasia is also known as motor aphasia. In this case the patient has motor and expressive disturbances; that is, language is understood but can not be articulated in a correct, systematic and structured way. The patient's comprehension is relatively spared, but the messages can not be transmitted due to articulatory disorders. In today's taxonomy the Broca's aphasic is considered non-fluent. Computer Tomographic (CT) examinations have shown that the lesions of this impairment lie in the front left hemisphere of the cortex, precisely in and around the blood supplying area of the arteria prerolandica, the reason why Broca's aphasia is often labelled as a blood vessel syndrome. The following figure shows approximately the areas of the left hemisphere over which this type of aphasia spreads.

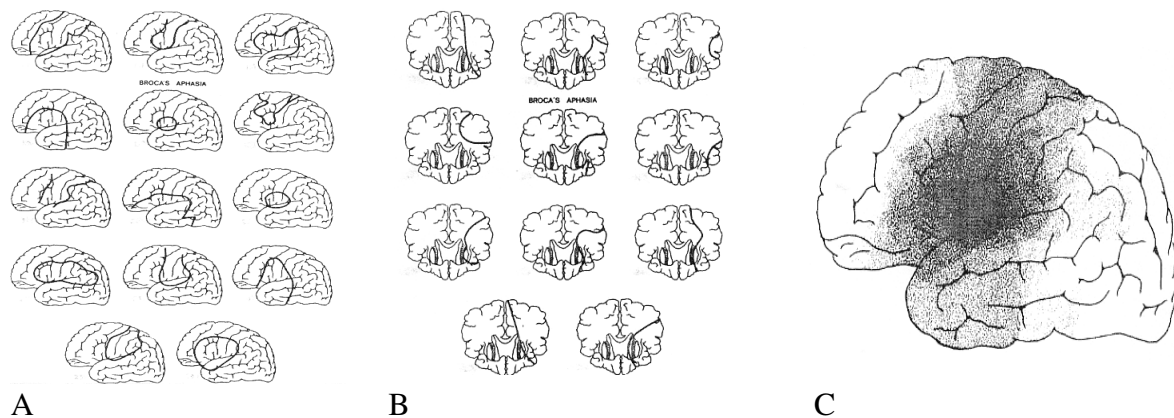


Fig.1. Broca's aphasics. A) Lateral template. B) Anterior template. C) Composite of lesions. (Reprinted from Kertesz, 1979: 150-152)

Clinical research shows that patients, who have this type of aphasia, speak slowly with many pauses and interjections such as “na”, “ah” or “nee” and make a great effort as they utter. Their gestures and mimic express often dissatisfaction and torment because they are aware of their bad performance. The patients' sentences consist of one to three words, with which they try to clarify any facts or what they intend to say. The grammatical structures of their sentences are incomplete. The production of a style which is similar to a telegram arises from this agrammatical language. The patients, who are not involved in an aphasia therapy just at the beginning of the impairment, show feelings of dissatisfaction; they even think that they are using complete sentences in context of communication. As they express themselves, Broca's aphasics assume that the hearers have no interests in attempting to understand their language. The vocabulary of their sentences is reduced to particular words that are frequently used in the standard language. The words are often changed by phonemic paraphases; that is, sounds and syllables are often left out, adjusted or distorted (e.g. ‘*Meksel*’ instead of

'Messer'). Generally speaking, they have difficulties trying to translate their ideas and thoughts into a spoken language (Broca, 1861; Luria & Hutton, 1977; Peuser, 1978; Code, 1989; Huber, Poeck & Weniger, 1989; Poeck, 1997).

The following dialogue between a therapist and a patient is an example that shows the characteristics of the Broca's aphasia:

Therapist : *Könnten Sie gestern die Sonne genießen?*

Patient : *Ja ... Garten ... Sohn ... schi ... toch ... äh ... Sohn und ... Schiebetochte ... Faul ... nein ... Faumen fülken ... nein Korb Faumen ... Garten ... ich Sonne sitzen, dann ... hause ... Kuchen backen ... Sohn gerne Faulmenchuchen*

The writing ability of these patients is also disturbed; whole constituents are left out, word forms and sentence constructions are distorted. Written words are often submitted with omitted, substituted and permuted phonemes, as well as morphemes and syllables.

1.2 - Wernicke's Aphasia

Wernicke's aphasia is also labelled as "sensory" or "receptive" aphasia. Computer Tomographic studies show that the Wernicke's lesions are in the area at the back and top of the temporal lobe posterior to the Broca's area. This area corresponds to the blood supplying area of the arteria temporalis posterior to the arteria cerebris media. Fig.2 below depicts the places where the Wernicke's aphasia happens to occur.

Clinical research has unfolded that a Wernicke's aphasic speaks fluently with a normal speech tempo and melody. However, the sound structure of the utterances is distorted by phonemic paraphrases such as the sound substitution in 'Spille' instead of 'Spinne' or semantic paraphrases shown by the word 'Stuh'l' instead of 'Tisch'. It always comes to the formation of neologisms (phonemic jargon/ creation of new words) and misunderstanding of language. Sentence construction is also badly distorted; it comes to the production of fractured and mixed sentences, formation of faulty combinations, formulation of new structures and use of faulty suffixes. Speech is relatively fluent; its intonation and pace appear normal but seriously distorted during a conversation as it contains unusual semantic features, new created words and elaborate meaningless descriptions. The patients are not always aware of this state of being. They do not accept to be misunderstood. This is a reason why they blame everything on their interlocutors. The latter - the patients think - do not try, intend or have any readiness to understand their language.

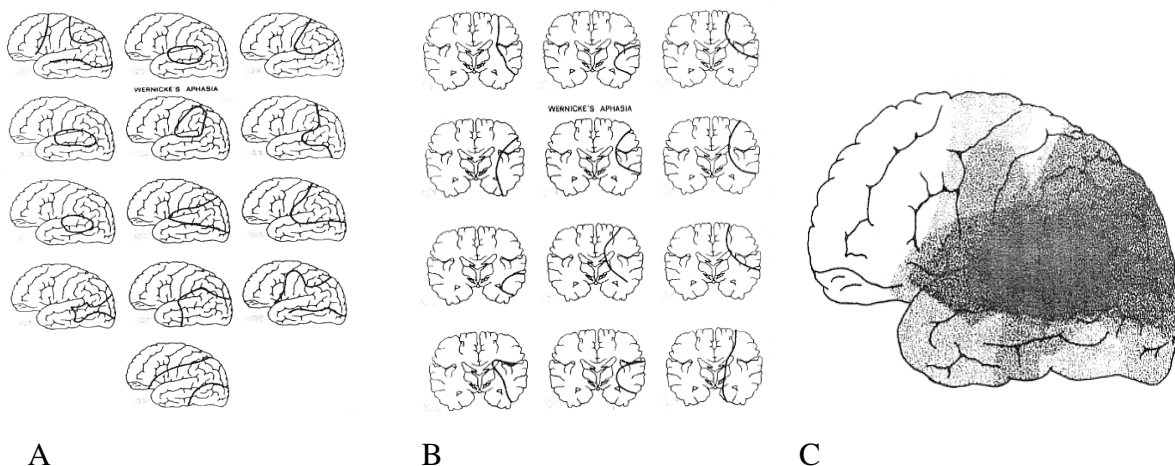


Fig.2. Wernicke's aphasics. A) Lateral template. B) Posterior template. C) Composite of lesions (Reprinted from Kertesz, 1979: 154-156)

In a comparison to people with Broca's aphasia, Wernicke's Aphasics have no reduced speech use. On the contrary they are euphoric and produce an impulsive speech. They can not make short sentences; they rather produce a whole torrent of words (Wernicke, 1874; Luria & Hutton, 1977; Peuser, 1978; Code, 1989; Huber & Poeck, 1983; Poeck & Weniger, 1989; Poeck, 1997) .

The following is an example that shows the language of a patient who suffers from the Wernicke's aphasia. In this conversation the therapist asks the patient whether he has still any complaints:

Patient : *“Ja das kann ich ihnen sagen; dass ich Beschwerden habe. Na ich muß mal anders ... ich glaube man sollte bei Null beginnen und nicht bei oben. Es ist so: gegenüber früher möchte ich erst einmal sagen über den ganz großen Beginn erst mal als ich ankam ist es natürlich ganz entschieden ... eh ... ein Unterschied ... heute besser als früher wollen gar nicht darüber debattieren... .“*

From a dialogue between a therapist and a patient we have another example that illustrates the Wernicke's ability in interaction.

Therapist : *Da wo Sie wohnen, haben Sie da auch einen Garten?*

Patient : *Ha ah, das seh ich sofort hier*

Therapist : *Ja haben Sie da auch einen garten? Da, wo Sie wohnen?*

Patient : *Ja gäh äh ka ur ein geomer, ein teomer vin annern te eh*

Therapist : *Ja ...*

Patient : *Nech, also, mein schön kerger küksil im Sommer, jetzt un diese Zeit ...*

Therapist: *Ja*

Patient : *Gehabt un so auch heute den bron denn ein für äh na et den oder oder für mich denn für – Gott, wie schwer ist das denn!*

Therapist : *Ich kann Sie immer noch nicht verstehen, leider! Ich möchte so gern, aber da kommen immer andere Wörter ...*

Patient : *Ich weiß, aber aber ein mies da hab ich denn manches manches manches so gelies gehakkert ja, ach ja, sach ich da etehn für halle sarge was ich wusste*

Even the written language of these patients is disturbed because of a surplus of produced letters and letter combination that have no sense.

1.3 – Global Aphasia

Global aphasia or total aphasia is also known as expressive and receptive aphasia. Some Aphasiologists do not recognize it as an independent aphasia form despite its development and different size from other aphasia types.

The lesions of global aphasia arise predominantly from a clot of blood (thrombosis) in the arteria cerebri media or from an injury to this main artery. This lesion affects the whole language regions from the frontal to the temporoparietal area. Therefore, the patients who suffer from a global aphasia are marked with the biggest damage to the tissue of this area of the cortex other than to other areas where other aphasias happen to occur. They have then a bad and an unfavourable prognosis to recover from this impairment. Fig.3 illustrates the huge area of the cortex over which the lesions of this aphasia stretch.

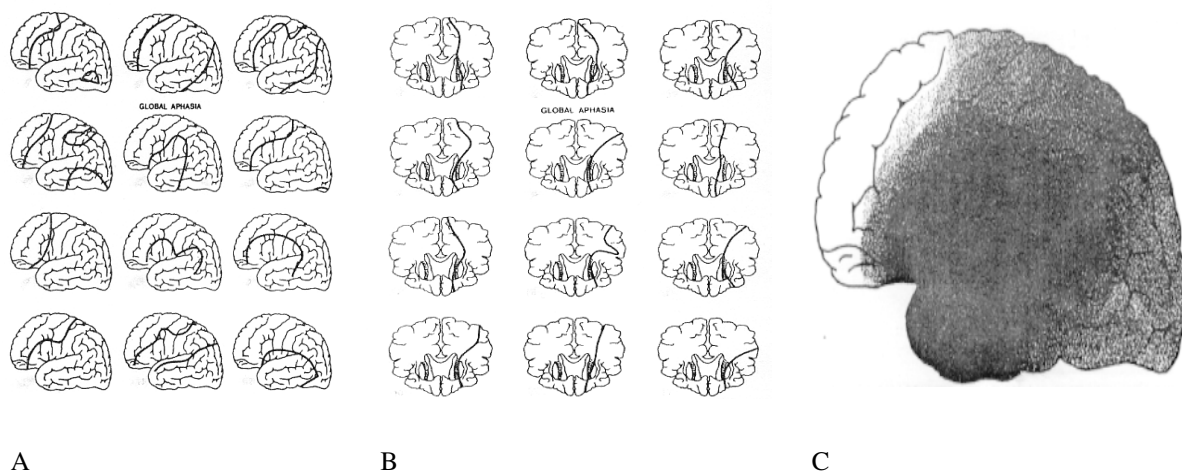


Fig.3. Global aphasics. A) Lateral templates. B) Anterior template. C) Composite of lesions (Reprinted from Kertesz, 1979: 147-149)

Research studies carried out by CT-scans show that this type of impairment is a difficult and a serious form of aphasia. Both speech production and understanding are disturbed. The

difficulties surface mainly in the spontaneous speech and language. The few utterances the global aphasics produce consist mainly of stereotypes, sets of phrases or automatisms such as “ja”, “nein”, “Donnerwetter”, “ach Gott”, “Guten Tag”, “meine Götter”, “genau” etc. which are actually not set in the adequate situation. In other words, they do not correspond to the context of use. Intonation and speech sounds of these patients are relatively preserved. They help them, despite their restricted capacity to communicate spontaneously, clarify their intention to their interlocutors. Therefore, contents such as agreements, rejections or questions are expressed by these sets of phrases (Luria & Hutton, 1977; Peuser, 1978; Poeck, 1983 & 1997; Huber, 1992).

The following instance displays the features of a global aphasic’s language. It is a dialogue between a patient and a therapist who asked him to describe a picture that shows a father and his several children in a living-room.

The patient : ... *is Frau und Kinder ...*

Therapist : *Herr G. eine Frau? Eine Frau sehe ich gar nicht ...*

Patient : *Nee ... oh, I ja ... das ... äh ... i ... is alles ... so ... so der Frau ... äh ... sucht ... am ob tu ... sam ... dem ge Mann sucht ... nein, das ist ein Kinder, is ... äh ... Mann, nee ?*

Therapeut : *Ja .. das ist ein Kind*

The writing ability of the global aphasic is also disturbed due to his inability to understand (perception) and utter (production) a correct speech and language.

1.4 – Anomic Aphasia

This type of aphasia is known in the Anglo-American literature as anomic aphasia or amnesic aphasia. In Germany it is labelled as *amnestische Aphasie*. All patients with aphasic disturbances of any type have anomia; they have difficulties remembering the names of things. This group of slightly impaired patients have a linguistic deficit that can be subsumed under word finding disturbances.

Patients, who got this type of aphasia, have a slight speech and language impairment. They can identify objects, persons, actions and features, but in many situations they have difficulties attempting to retrieve from their linguistic repertoire the sign that corresponds to its referent. The affected patients show in the spontaneous language a good articulation and stress. They make utterances with a length of five or more words. In every communicative context they are almost aware of their semantic and phonemic paraphrases, the reason why they tend to correct them. This form of expression leads to a hesitant speech and non-fluent sentences. To localize this form of aphasia, as it was done with the other forms, has been until

now not easy. However, the lesions, as it is shown by the CT-scans, lie predominantly in the retrorolandic; that is, in the temporoparietal area. Fig.4 elucidates the place where this type of aphasia occurs.

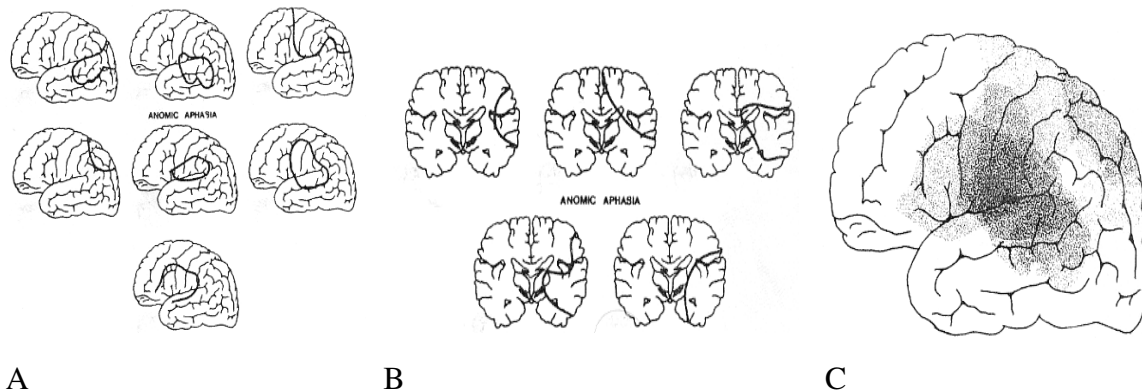


Fig.4. Anomic aphasics. A) Lateral template. B) Posterior template. C) Composite of lesions (Reprinted From Kertesz, 1979: 157-158)

In contexts of communication the anomic aphasics develop compensation mechanisms; it is a particular strategy so that the interlocutor will not notice their disturbed speech and language, for instance: they replace a word searched for with a set of words such as “*das Dings das*”, name things using a hyperonym (a general term) such as “*Buch*” instead of “*Notizbuch*” “*Tier*” instead of “*Hund*”. They also express their knowledge about a person and describe the features of a thing or an object such as “*das um die Hose zu halten*” for “*Gürtel*” and “*das zum Trinken*” for “*saft*”.

The structure of the sentences of the anomic aphasics are correct. The spoken language is intact but redundant and speech understanding is scarcely disturbed. (Poeck, Kerschen-steiner, Stachowiak & Huber, 1974; Luria & Hutton, 1977; Poeck, 1997 & 1989; Code, 1989)

The following is an example that shows the features of the anomic aphasic’s speech and language. The therapist asks the patient about how his disease began:

“ Ja das war so ... wir waren in ... eh ... mh ... wie soll ich das jetzt da so anfangen ... ja wir waren an und für sich wieder hier ... also ich habe da in der ... eh ... Osten gar nicht davon gemerkt ... wir waren ja mit einer Frau waren wir drüben ... ja ... und da war aber so weiter war da gar nichts ... aber wohl wie wir zurück kamen ... “

In another example the patient has to describe the picture of a broom (Besen):

“ Und jetzt wollen wir für Sauberkeit ...äh, sa der Sauberkeit denken und nehmen uns einen ... scho scho einen ... einen (11 Sek.Pause) ... was woollen wir woollen zu Hause oder im Geschäft woollen wir saubermachen und benutzen dazu einen Sch ... einen einen ... (6Sek.

Pause) ... einen ... wischen und nach dem Wischen kommt das auf ... hoch tro ein trocken ein ... ja das ist ein Fehlei“

It can be inferred from the above dialogue that the patient tries to recall word forms and their beginning so as to get to the target word he wants to say. The written language is not badly disturbed, but due to the difficulties of naming, the information are often reduced in the written language. Generally, an anomic aphasic can not find a suitable and specific substantive word that can be assigned to an object or a proper noun in certain contexts of language use. Their syntax is not impaired and comprehension is relatively preserved.

1.5 – Other Forms of Aphasia

Conduction and *transcortical* aphasia were terms that were put forward by Poeck et al. so as to describe other forms of aphasia. The deficit that arises from the symptom of *conduction aphasia* is an inability to repeat spoken language. This first term refers to a lesion that disconnects the areas of the Broca's and Wernicke's aphasia. The structure that connects them is known as arcuate fasciculus (fasciculus arcuatus)(Fig.22D). Fig.5 displays the regions of the cortex of the left hemisphere which is inflicted on by this aphasia type.

The patients who acquired this form of aphasia speak fluently, but their repetition of spoken language is distorted by phonemic paraphrases. In comparison with other aphasics these patients are aware of their bad performance and may have some comprehension and/or production difficulty as well, but their repetition is more impaired.

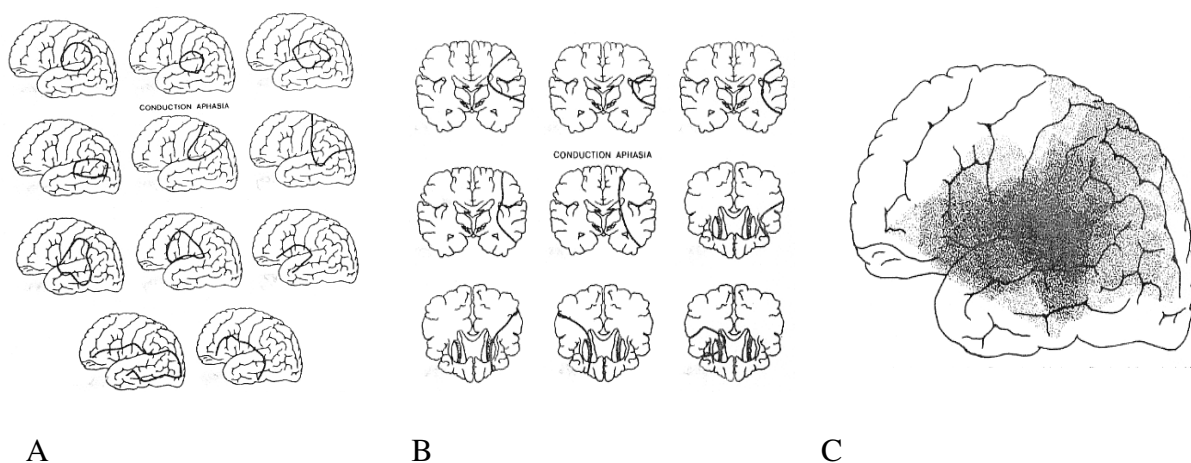


Fig.5. Conduction aphasics. A) Lateral template. B) Posterior template. C) Composite of lesions (Reprinted from Kertesz, 1979: 153-154)

The second term encompasses *transcortical motor aphasia*, that involves the prerolandic portion of the speech area (Fig.22B) and *transcortical sensory aphasia*, which is triggered by

posterior parietal lesions. In transcortical syndromes the repetition is completely spared because the lesions are beyond the language area. Studies, that were conducted on this form of aphasia, show that patients with a *transcortical motor aphasia* can scarcely speak, but they can repeat words or sentences with a good articulation and an intact syntax; that is, what they say will be fragmentary but not agrammatic.

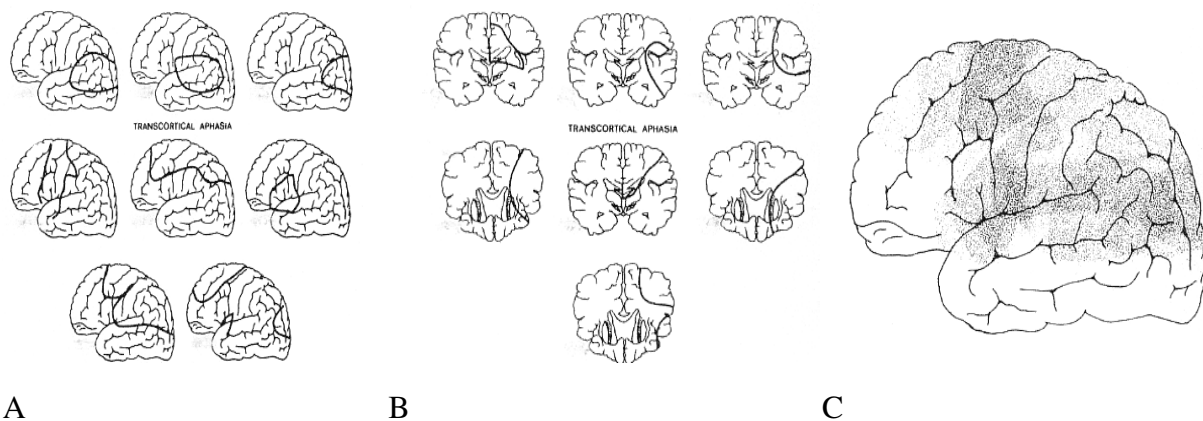


Fig.6. Transcortical aphasias. A) Lateral template. B) Posterior template. C) Composite of lesions (Reprinted from Kertesz, 1979: 159-160)

The patient have a good understanding of language and reading of texts. On the contrary patients with *transcortical sensory aphasia* have a poor comprehension; fluent but semantically empty speech, except when they are involved in repetition. They speak almost as Wernicke's aphasics; that is, with so much semantic paraphases. They may achieve an excellent performance in repetition, without any language understanding but with so much repetitions that are full of utterances or parts of speech of the interlocutor. This repeated speech utterances are known as echolalies. It is a widespread lesion that breaks the connection of the speech regions from other parts of the brain, quite exactly from the sensory association cortex. The other aphasic form is the *mixed transcortical aphasia* which is marked with a good performance in repetition, but a non-fluent speech and a poor performance in language understanding (Luria & Hutton, 1977; Peuser, 1978; Poeck, 1983 & 1997; Tesak, 2001).

The following schemata is a summary that unfolds approximately where the syndromes of aphasia happen to occur and overlap in the brain.

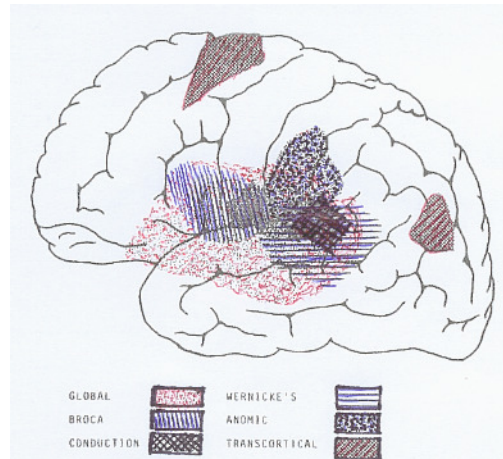


Fig.7. A general view about the overlap of the aphasic syndromes on the lateral templates Aphasia (Reprinted from Kertesz, 1979: 161).

The above classification of aphasia shows the linguistics abilities which the patients still possess. How they use the materials they still possess so as to be intelligible and how they use it effectively are inquiries that will be considered in the sections of diagnosis and therapy. On the basis of this classification I will gather the data of three patients, namely that of a Broca's, Wernicke's and anomic aphasic. Other forms of aphasia are to be left out due to the limitations of this research paper. In the diagnostic sessions I will particularly focus on the analysis of the content words (verbs, nouns, adjectives), function words (prepositions) and sentence structures of these aphasics.

The above examples that illustrate the characteristics of the aphasics' language will be elaborated in the section of testing and therapy administration. But before starting to deal with the diagnostic and therapeutic procedures of certain aphasic patients, it is necessary to shed light on the importance of linguistics and neurolinguistics in aphasiology

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2 – Neuro- Psycho- and linguistic Considerations of Aphasia

The aim of neurolinguistics, as it dealt with aphasia, has been until today the study of aphasic individuals whose brain damage has affected some or all other language capacities. However, the neurologists have other concerns; they study both the brain and the nerve systems. Their contributions to neurolinguistics unfold how the neural functions go apart after a damage to the brain and the whole neural network. On their part the linguists, who are involved in the research fields of neurolinguistics, concentrate on how language structures are formed in the brain. Even psychologists and psycholinguists contribute to neurolinguistics; in their research works they study language processing in healthy people. However, the neuropsychologists have other aims; they deal with the impairment of cognitive abilities that arise from a brain damage that may not include the syndromes of aphasia; that is, their field of research encompasses not only language capabilities but also attention and memory storage. Speech and language pathologists or therapists, because of their knowledge about aphasia as well as the examination and therapy of language, are expected to provide therapy plans that reduce or cure the disorders of speech and language. They are concerned with the diagnosis and recovery aspects of the aphasic patients.

Neurolinguists observe and take into account the correlation between language disorders and the nature of the brain impairments that happen to occur in it. Neurolinguistics is, therefore, a field of converging disciplines. It consists of language and neural components. Language is considered as a set of systems (phonology, morphology, syntax, semantics, discourse and pragmatics) that play a great role in the analysis of language. Another distinction that serves neurolinguistics is the differentiation between oral and written modalities; oral and visual gestural language.

Neurolinguistics has been dealt with using two methods. These methods created two groups of research scientists: the first one was built around Geschwind (1965) that has its roots in the research works of Broca and the second one around Goldstein (1948) that was adopted by Jackson in the 19th century. Geschwind and his co-workers followed a localisationistic approach; they attempted to localize language areas and the lesions that may affect the brain. They went some steps further so as to distinguish between fluent and non-fluent aphasics. However, Goldstein and his followers concentrated on the interconnection among the areas of the brain and the reliance of language on certain cognitive abilities such as attention, memory, abstract thinking, etc. in context of communication. Neurolinguists or speech-language pathologists who followed the holistic approach of Goldstein do not think in terms of individual syndromes that are related to particular language areas but rather in terms of a

single aphasic phenomenon in which there are patients whose language is more or less severely impaired. But recently the aim of neurolinguistics is to assert that the entire brain contributes to the wider range of the speech/language capacities and to its thorough organisation for the acquisition and use speech-language (See Sections: 6.2, p.135 & 6.3, p.144).

In the introduction it was hinted at that in the 19th and at the beginning of the 20th century Steinthal and Pick pointed to the importance of involving linguistics in aphasiology. Even the works of Jakobson contributed a great deal to the development of research in linguistic aphasiology, but they were shadowed in the fifties and the decades to come by the theories of Chomsky and his followers on language. But Jakobson remains as a representative of linguistic aphasiology in the first half of the 20th century as he saw a parallelism between the acquisition and disintegration of language. According to him the composition of language starts with non-differentiated initial forms and moves to greater differentiation and separation, but its decomposition begins at the high layers. As it was unfolded in his research works, phonology and grammar have overlapping layers which consist of primary and secondary components. The latter arise in the children after the former but it disappears in the aphasic language before the former. In this context an illustration can be provided by the child's and aphasic's lexical words and inflexions; how they are acquired by the former and lost by the latter (Jakobson, 1941-1982, 87-88, 130-131). In his analyses of the disturbances, he emphasized that the aphasic language can be better understood and described by the linguistic laws.

Chomsky was convinced that the understanding and processing of language is based on innate linguistic competence; it is an abstract system of mental representations and processes by means of which language use is carried out (Chomsky, 1978). Despite the postulations of the UG on language, its involvement in aphasiology was totally delayed. The aim was to use the aphasic data so as to support the linguistic hypotheses and models of the generative grammar. But referring to the UG different levels (phonology, morphology, syntax, syntax) were considered and examined in the linguistics of aphasiology (Grodzinsky, 1984, Goodglass & Blumstein 1973, Berndt & Caramazza, 1980, Caramazza & Berndt, 1978, Whitaker, 1988, Nespoulous & Villard, 1990, Caplan, 1987).

Linguistic analyses of the aphasic language have shown that a group of patients, who are classified in a particular syndrome of aphasia, submit, as a matter of fact, different speech and language disorders (Caplan, 1987). The important theme of linguistic aphasiology is agrammatism which is characterized by shortened length of sentences, simple syntactic structures, problems of morpho-syntactic elements and not badly disturbed content words.

Agrammatism is considered by the linguists as a disorder of syntax. Using the theoretical models of syntax, Kean (1977; 1978) and Grodzinsky (1984) attempted to clarify and characterise the agrammatical language processing. The results of these approaches were not at all surprising as the agrammatical patients have submitted syntactic performances that have different evaluating scales. This confirms that agrammatism can not be used as a basis so as to formulate a theoretical generalisation or an approach about the phenomenon of aphasia.

This investigation of aphasia, in which linguistics is clearly involved and interwoven, will render an insight into the production and perception of grammatical and content words, as well as simple and compound words. The two processes of production and perception are primordial to the processing of language. They are the basis of any mental lexicon that contains the whole knowledge about the words that form the sentences and the utterances that are used in contexts of communication.

Another point that must be accounted for during the application of testing and administration of therapy is the fact that word finding disturbances, that are often observed in the language of the aphasics, belong to the general course of this disease; that is, they occur in every syndrome of aphasia, but vary from one syndrome to the other (Kremin & Ohlendorf, 1988). They can be temporary for a particular word in a particular sentence and also everlasting if they are not subjected to a systematic therapeutic program.

The following examples illustrate the phenomenon of word finding. If a word such as "*Pferd*" is not available as the patients attempts to pronounce it, particular strategies, which pertain to the spontaneous language, will be used to approach the target word semantically. A deviating response to the above word will be: "*Hund, Das Tier das man zum Reiten braucht*" or another phonetic deviation that is shown by the word "*Pfaun*" derived from "*Pfennig*". These semantic and phonemic paraphrases of the word finding type in the aphasic language give us an idea about the structure of the mental lexicon.

Surprisingly, healthy people often have word finding disturbances, too. Psychological studies have proved that particular errors of the aphasics such as word finding often correlate with those of people who have a healthy language. They are, now and then, involved in the search for a word that fits in the context of communication. During this process of searching for a word, the speech of the speaker will be filled with short breaks and long pauses such as "*äh*", "*ähm*", "*na*". This phenomenon, which occurs in healthy speech, is known as a Tip-of-the-Tongue phenomenon; which means that the speaker knows exactly the meaning of a word but he/she is not in a position to recall the word form, its sound structure and meaning.

For instance, the normal speaker knows the conceptual representation of a “*Zirkel*”. It is a V-shaped instrument with two arms joined by a hinge, used for drawing circles, measuring distances on a map or chart, but the sound representation of the compass is not at the disposal of the speaker. Psycholinguistic studies proved that test persons, involved in an experiment, could supply the definition of a word. They were even aware of the first syllables of it, but could not produce the target item because of the TOT-phenomenon (Brown & McNeil, 1966). This observation entitles the psycholinguists to make the assumption that the meaning and form of expression are completely separate from one another. This undermines the sign model of De Saussure (1916) which suggested that the content/meaning and the form are bound up with an association as the front and the back of a coin. There is no separation but an arbitrary and reciprocal evocation between the content and expression of a sign.

Further evidence for this separation of meaning and sound structure can be found in other aphasic researches. A test of interaction with the aphasic patients shows that they are often involved in a TOT-state. In many situations of testing and therapy the aphasics’ behaviour shows, as it is deduced by the therapist, that they have it on the tip of their tongues but they can not express it (Goodglass et al., 1976).

Beside these word searching processes some slips of the tongue that occur in the language of a healthy speaker are interpreted as slight symptoms of word finding impairment. These speech and language errors are divided in two groups: the *assembly* and the *selection* errors. The former can be illustrated by the following example instead of saying “*Pfanne*” the patient says “*Pfauen*”; in the latter group the patient attempts to approach the target word using words that have the same semantic field such as “*Zweig*” instead of “*Baum*” or words that have a similar sound image or structure such as “*Da sind aber auch einige variable Instrumente drin*” instead of “*Elemente*” (Aitchison, 1997).

These errors of selection can supply the psycholinguist with important clues about the semantic structure of the lexicon if we take into account that the unwillingly pronounced word is intended to be in a close relationship with the target word. This shows that the aphasic patients produce faulty words that are semantically and phonemically similar to the target words. To draw a demarcation line between aphasic and non-aphasic persons, as it is confirmed by research works, aphasic disturbances have nothing to do with the spontaneous errors produced now and then by healthy speaker, as an example one can cite the case of neologisms, permutations and omissions that occur in the aphasics’ language.

The aphasic word disturbances have a peculiarity known as the category effect. This specific category of word disturbances do not affect all areas of the lexicon but only particular selected

groups of certain aphasics. Clear indications can be obtained, for instance, from the studies of the spontaneous language of the Broca's and Wernicke's aphasics. If we compare the two syndromes, we notice that there is a difference in the availability of the content words (Noun, Verb, Adjective and adverb) and function words (Article, Pronoun, Preposition and Auxiliaries) as far as these two syndromes are concerned. Broca's aphasics produce more content words, but Wernicke's aphasics more function words. These aspects are to be elaborated exhaustively in the sections of diagnosis and therapy.

According to Garret (1982) this difference lies at the basis of the word finding disturbances. His assumption of the existence of two lexicons: in one there are content words and the other function words, allowed him to express the following statements about the underlying impairments of the two syndromes. He asserted that Wernicke's aphasics have a limited access to the content words and Broca's aphasics can not access so easily to the lexicon of the function words.

Aphasics do differ from one another as far as the availability of word finding is concerned. Specific categories of word finding disturbances occur in their content words that are labelled as semantic category deficits. Research studies carried on the spontaneous speech of Broca's and Wernicke's aphasics show that they have different types of nouns at their disposal. Broca's aphasics produce mainly concrete and portrayal (descriptive) words, which occur frequently in the normal speech usage. Wernicke's aphasics, however, and also nominal aphasics produce often abstract words without so much portrayal features.

Moreover, aphasics - especially Wernicke's and anomic Aphasics - show semantic category deficits for words which mark living things (creatures), fruits, vegetables, body parts, and names. In the anomic aphasia the use of certain words, which mark things, may be impaired or not. In this syndrome there are often disturbances in the nomina and not in other classes of words. But certain observation confirms that things and actions can be also inflicted on. In this case these aphasics acquire specific deficits for nomina or verbs. The latter represent the categories that mark particular things, objects or actions.

These disturbances should not be considered simply as deficits in the semantic categories but also as parts of speech in which we can see the anomic aphasia phenomenon of the "word finding impairments" type and other disturbances that can be inferred from other forms of aphasia. From the semantic categories we can infer the information about the basic order of the mental lexicon. This point of view was summed up by Goodglass in the following citation: "*The first level of explanation is to propose that the brain's lexicon is organised by categories...*" (Goodglass, 1993: 90)

Therapists and examiners of speech and language have also observed that during the naming of pictures the word finding disturbances occur in the four classical syndromes (Broca's, Wernicke's, global and anomic Aphasia). All aphasics of this type encounter certain difficulties as they process certain words. They use particular strategies so as to approach the target words, if they are asked to recall one of them. The following example shows a patient who spoke of herself as she suffered from the Wernicke's aphasia. She said: *"It often happens that I use faulty words. Then generally I heard myself that I said something wrong [...] I wanted to say "red", but it could become "bleu". I wanted to say "winter", it became "summer", the word "warm" turned into "cold". Again and again I had to correct myself. It was tiresome"* (Tropp Erblad, 1997: 40). These patterned answers of the above aphasic patient show that there is a semantic relationship between a target word looked for and the provided answer. The target word is always substituted by words which are semantically close to it; generally, this is a form of semantic paraphasis. The fact that this mistake was observed in almost every aphasic's language, made Evers-Volpp(1988) conclude that the word finding disturbances have something to do with the word meaning which is stored in the mental lexicon (Evers-Volpp, 1988: 106).

Results from the naming experiments of Kohn and Goodglass (1958) which were carried on Wernicke's, Broca's, and anomic aphasics support this assumption, because these groups, as they were observed during naming, differ from one another as far as the occurrence of the semantic and phonetic paraphases in their language is concerned. It can be assumed that the aphasic patients of all these groups have this disturbance during the naming of objects. Tropp Erblad (1997) describes it as a system of rules that are rotted in our brain. She wrote: *"[...] the words in the brain are subdivided in categories. As a shelf-system which has various shelves for different categories of words. For example if I ordered "summer", small brain workers (neural impulses) rushed to the shelf of the seasons and came back with "winter"."*

This citation depicts in short the nature of the word finding disturbances from which most of the aphasics suffer. In the section of diagnosis and therapy some specific categories of word finding disturbances will be tackled with regard to their diversity as far as their nature in the mental lexicon is concerned. The scientists involved in aphasiology research attend to the conviction that semantic categories are localized in different brain areas and specific categories of word finding disturbances and impairments lie in particular structures of the neural system.

About the phenomenon of word finding Rapp and Caramazza said: *"the most straight-forward interpretation of the data is that these dissociations reflect quite directly the categories of*

knowledge represented in the brain, and, therefore, that objects and actions, animate and categories, and so forth, are, in fact, the basic “kinds” that are neurally implemented” (Rapp & Caramazza, 1995: 906) (See Theoretical Part, Section: 3.2). This proves that there is a strong association among the different regions of the brain and asserts that the interference with one area causes a dissociation in the relationship of the areas that contribute to the processing of language. Brain regions and neural pathways of speech and language will be dealt with in the next section.

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3 – Neuroanatomy, Cognitive Processing, Speech and Language Areas

The nineties were known among the neuroscientists as a period of the brain because of the intensive efforts that were mobilized in the domain of brain research that have been multiplied around the world so as to understand the brain areas, their activities and the way they function. Investigators from the domain of linguistics, psychology, neuro- and computer sciences converged their efforts in order to contribute to the research studies of cognitive sciences. They have attempted to develop a new view about the processing of cognitive abilities in the brain. Although the results of the decade of the brain unfold that the brain is the basic material for any human mental capacities, certain mentalistic views still prevail in cognitive sciences. As a consequence of this tendency, the mental phenomenon must be examined independent from its physiological basis (Schwarz, 1996: 59). However, many neurobiologists consider the mental phenomena as emergent characteristics of the brain; that is to say, the great number of the nerve cells in the brain give rise to any mental phenomenon (Searle, 1986). This attitude was criticised by certain researchers (Preface to Roth in Churchland, 1996: 14).

Another modern approach to this problem is offered by neurobiology. It points that mental states can be set parallel to the physical ones that can be labelled in physical terms. Even in this point of view there are decisive differences: Changeux (1984) postulated that the mental processes can be traced back to the characteristics of the nervous cells or even to their smallest parts, the synapses. This investigation was pushed still further by Churchland (1996) who believes that mental states are dependent on million neural activities that take place among and in the neurons, which form a huge and complex network in the human brain. According to him the mental activities and cognitive abilities, that are considered by some brain-research authors, as a spiritual phenomenon, do not arise from separate and single neurons, but from their associations. Which of these approaches is the right one? and which advantage cognitive linguistics will draw from the relationship between brain and language issues? are two questions that are not thoroughly clarified. In this context Pulvermüller (1996) added an important assertion. Owing to him the complexities of language can be understood, if we can understand how the brain works.

For more than a decade the scientists have had at their disposal for this research task the imaging techniques such as CAT-scans (Computerized Axial Tomography), PET-scans (Positron Emission Tomography) and MRI-scans (Magnetic Resonance Imaging) that provided precise information about the sites of the lesions in living patients. Through these techniques people's brains are x-rayed, the pictures taken are converted by computer

programs into maps that can be organized. CT-scans are very effective at localising various sorts of lesions. MRI-scans can display some lesions that can not be shown by the CAT-scans. PET-scans can offer ongoing images of the changes in brain activities over time to find more about the glucose uptake when an area of the brain requires more oxygen for difficult activities. The last two methods (MRI- & PET-scans) can be used to record the biochemical activities and blood flow of the brain and make the processing and representations of the data in a computer easier, clearer and divers, hence providing concrete evidence of how language processing takes place dynamically. The fMRIs (functional MRI-scans) go a step forward as they provide series of snapshots of brain activity so quickly that a continuous process of images appears on the video screen.

For example, if a test subject is given an exercise to solve, we observe then that more blood flows in the areas of the brain that participate in this task. These methods confirm which brain parts are involved in this cognitive performance. The use of these methods has made it possible for the aphasiologists to pinpoint and limit the speech and language areas and even widen them. Therefore, the so long maintained idea of the first half of this century of assigning lesions and loss of mental functions to particular areas of the brain has been to some extent given up by some investigators because of these image scanning methods (See Experimental Part, Section: 6.2 & 6.3).

This technique proved the following assumption; the left hemisphere is for many people the place where the language areas reside and the right hemisphere is responsible for emotion, as a simple and a superficial fact. The PET studies yield certain facts about the hemispheres: if a right-handed person solves some speech tasks, the speech dominant left hemisphere becomes active. It is supplied with more blood by the mid cerebral artery. This finding agrees with the classical notions of the Broca's and Wernicke's areas. But these new findings show that there are also activities in the right hemisphere as the test persons deal or solve an exercise that tests their speech understanding.

The PET confirms the existence of a Broca's region from which the speech production arise. It was found that this region is also active during the performance of certain tasks that do not require the use of the speech area of the Broca's aphasia. This research study has shown that the access to the lexicon requires the intervention of the left and right hemispheres; more than certain regions - near the Broca's and Wernicke's regions that are labelled as the pre-motor and post-sensory areas (or as supplementary areas) - that participate in the processing of language (Petersen et al., 1988). Poeck (1997) summed up this idea in saying that “[...] *up to*

now the existing findings speak for a network organisation of the brain and against the belief in localised centres which have small storage units [...]" (Poeck, 1997: 40).

According to Pinker (1996: 367) defining the demarcation line between the speech regions does not give a clarification to the goals that are traced by modern neurolinguistic research. The latter aims at clarifying the complex network of the brain, of course, looking at it from a neuro, psycho- and biological viewpoint (Pulvermüller, 1996). In the next section the neurally gathered knowledge will be considered by means of an examination of the relationship between neural networks and linguistic abilities, of course, taking into account the physiological and neuro-anatomical frameworks in which these abilities are carried out. This new technical development fused both the domain of cognitive research and neuro-sciences even though both of them looked at the brain functions from different perspectives and labelled them with a different terminology. The common intersection between them is their consideration of the micro- and macro-structures of the brain in their research works. In this case both linguistics and aphasiology benefits from these research developments as they give them assistance about the way the brain processes language. As a consequence they tell us about the associations among the various areas of the brain and the nature of the speech and language disorders. From here we can infer which language regions are inflicted on and where certain disorder types may have occurred.

The following sections are a global view about the neural networks and their functions. They can be considered as a basis that may help the therapist carry out a diagnosis and sketch a therapy plan. It is an overview about the brain structures that contribute to the perception and production of language. These neural structures, that intervene to trigger any cognitive functions related to the speech and language areas, will be dealt with in the next section.

3.1 – The Macro- and Microstructures of the two Hemispheres

Of course in this dissertation only a basic understanding and overview of the neuroanatomical structures is possible and necessary. A detailed study of cortical and sub-cortical structures is the subject matter of advanced research. What is of interest to speech/language diagnosis and therapy is the study of interconnections and communication between different structures and areas within and across the brain's hemispheres and also communication between the brain and the body through the peripheral nervous system.

3.1.1 – A View about the Macro-Structures of the Brain

The human nervous system consists of the central and peripheral nervous system that are labelled with (CNS) and (PNS) word-initials. The former includes the brain and the spinal cord; the latter is made of the cranial and spinal nerves. Fig.8 shows the areas over which the CNS and PNS stretch. The PNS, which controls the body functions, is known as the autonomic nervous system as it performs its functions with and without human conscious awareness. CNS and PNS are strongly related to each other as far as the regulation of particular functions are concerned. During the performance of a speech act the CNS sends impulses to the muscles that control the movements of the articulators such as the tongue and the jaws. They must be controlled in the right sequences so as to produce a correct speech. The muscles of the hand must do the same if they want to write a message or create a visual-gestural language. Therefore, the muscles that are responsible for communication are related via nerves to the cells of different areas of the brain. Muscles, nerves and cells contribute to the perception and production of speech and language through connections in a hemisphere and interconnections between the hemispheres and the periphery.

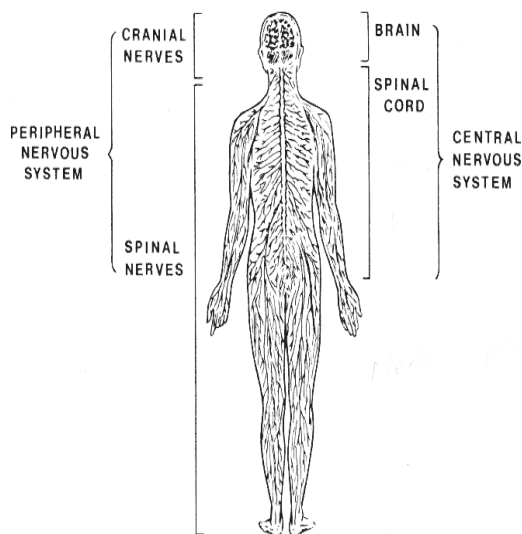
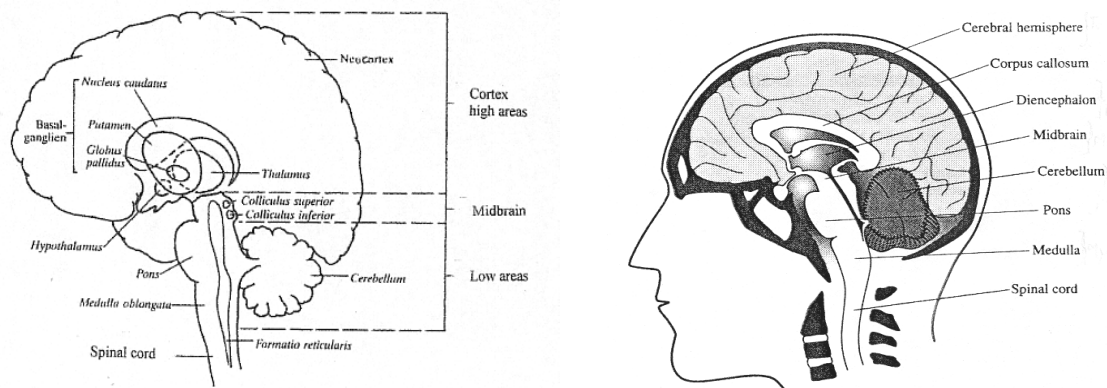


Fig.8. Peripheral and central nervous system (Reprinted from Borden & Harris, 1984: 47)

The organisation of the brain is stratified in layers and separated in areas and parts. It is assembled and structured from the front to the back in an End Brain, Mid Brain, Back Brain and Front Brain and extends in the spinal cord. Neuroanatomical and physiological examination show that the spinal cord and other structures such as the Mid Brain, Back Brain and the Front Brain control the vegetative functions of the body which include breathing, blood pressure, and digestion. The small brain, the basal parts that form the back brain, co-

ordinates and regulates all movements of the human body. In the middle of the brain we have the mid brain with the limbic system, the latter consists of the hippocampus, amygdala and hypothalamus which are involved in emotional behaviour; they can even store information for a long time.

The above part of the mid brain is known as thalamus which has a left and a right side. The low part is marked as a hypothalamus that contains the control centre for food reception. All information that come inside the brain are subjected first of all to the control of the mid brain. Each information gets through the thalamus on its way to the cortex. It is also known as the big brain or the great “analysator” responsible for the human mental abilities. Thalamus has a switch centre and an interface function that lead sensory impulses from the periphery by means of the afferent nerves to the cortex. Opposite are the efferent nerves that transport the impulses from the brain to the periphery. Fig.9 illustrates the stratification of the brain from low to high areas.



A

B

Fig.9. Important parts of the brain (Sketched adaption from Springer & Deutsch, 1987: 20, Birbaumer & Schmidt, 1991: 247)

This division in five parts can be listed in an order that runs from the lowest areas near the spinal cord to the highest ones that end at the level of the cortex:

1. Medula oblongata (Myelencephalon),
2. Pons and Cerebellum (Metencephalon),
3. Midbrain (Mesencephalon),
4. Thalamus and Hypothalamus (Diencephalon),
5. Cerebral hemispheres (Telencephalon):
 - Cerebral Cortex,
 - Basal ganglia,
 - Basal forebrain nuclei
 - Amygdaloid nucleus

It must be noted that cognitive performances are related, more or less, to the cortex, which has a thickness of two millimetres with a surface full of coils and furrows. The cerebral cortex

consists of the following lobes, that are illustrated in figure10 and 11. They play an important role in the processing of information, knowledge and language. Speech/language therapists have to take into account, specifically in an aphasic therapeutic context, that each brain is characterised by its uniqueness during the processing of language.

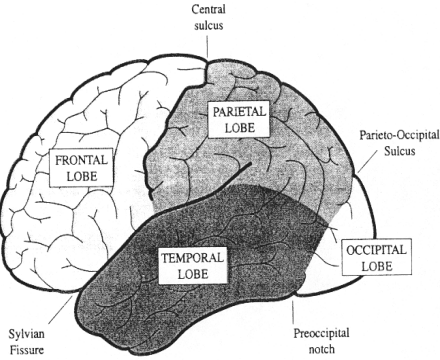


Fig.10. The different lobes of the brain (Adapted from Borden & Harris, 1984, 51, Springer & Deutsch, 1987: 202)

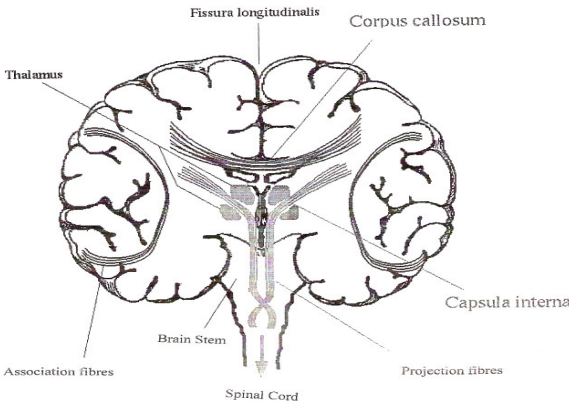


Fig.11. Left and right hemisphere connection (A sketched adaptation from Schmidt, 1987: 280; Birbaumer & Schmidt, 1991: 246, 254)

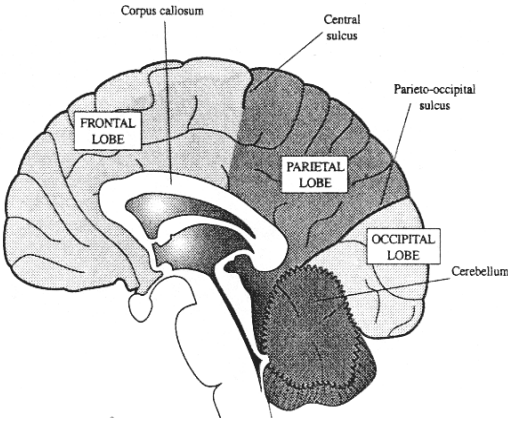


Fig.12. A. Sagittal section showing the lobes of one hemisphere (Adapted from Birbaumer & Schmidt, 1991: 247, Springer & Deutsch 1987: 202)

Scientists, specifically neuroscientists, have suggested that people have different brains even though the form of cortical and sub-cortical areas are similar in many people. This can be referred to unusual fetal hormonal events that make cells migrate in unusual patterns and environments triggering normal and abnormal fetal development and thus influencing the immune system and the endocrinological system in later years (Geschwind & Behan, 1982, Geschwind & Glaburada, 1985). To the uniqueness of the brain differences we can also add educational and social factors that fashion the cortical and sub-cortical areas of the individual persons.

The cortex, to put it in a synopsis, consists of lobes that have two functions: the *frontal lobe* is the region of the motor centres of the cortex, but the other three are the regions of perception. The *occipital lobe* is responsible for the visual processing, the *temporal lobe* takes over the auditory perception and the *parietal lobe* takes care of the sensations that come from the body. The cortex, which is made of the gray matter, is indispensable to the processing of speech and language. However, sub-cortical areas labelled as white matter, that are involved in other functions other than language such as sleep, appetite, emotions, etc, also take part in the processing of language. For instance, the internal capsule is implicated in aphasia; the temporal isthmus along with the arcuate fasciculus, that connects anterior (Broca's area) and posterior (Wernicke's area) regions are involved in language; the temporal lobe contains Heschl's gyrus, a structure particularly important for the reception of auditory stimuli.

3.1.2 – A View about the Micro-Structures of the Brain

The nervous system fulfils simultaneously an infinite number of tasks. This work is carried out with a high and a successful uniformity that can lead anyone to believe in the existence of an intelligent soul which controls this whole unity (Churchland & Sejnowski, 1997: 411). But according to the neuroscientists' point of view there is no intelligent acting soul, which conducts the central nervous system from beneath the human or animal skull bones. Scientific research, which was carried, mainly, on animal and partially on human brains, has shown fascinating results. First of all, the central nervous system consists of almost hundred million neurons (nerve cells), which are completely independent of each other, but they form places of contact through the synapses that build a complex network. This function of the brain network, which has been examined by the neurophysiologists, was exactly and minutely represented in Schwaz's (1996: 68) words about the brain whose function "*can be understood only through the co-operation of its basic units.*" In this context to understand the

neurophysiological aspects of the cognitive processes one has to deal with their smallest units, the neurons and their function during the establishment of a relationship.

Each neuron consists of a cell nucleus (Soma), a long cell fibre (Axon) and many short ramifications (Dendrits) (Fig.13). The peculiarity and characteristic of each neuron is its electro-chemical behaviour (Stevens, 1988). For instance, a motor neuron controls the muscle fibres in its motor unit by causing the electrochemical changes necessary to make a muscle contract, because each muscle fibre in the unit has the motor ending from a peripheral nerve. As a nerve impulse - that travels along the axon - attains these motor endings, a substance known as acetylcholine is released. The substance combines with a receptor substance so as to cause the contraction of the muscle. For example, the tongue is controlled by a cranial nerve pair known as hypoglossal nerves. Each of these nerves goes and controls one half of the tongue. Complex messages from the brain cells, in the form of impulses, must be sent so as to control the movement of the tongue for speech planning and correction.

It was found for forty years ago that the membrane of the cells possesses the capacity to produce nerve signals. These so-called action potentials have an electric nature; they are taken by the dendrits and their branches and led to the cell body, a procedure known as “an afferent process”, an uptake. In the opposite direction the electric signal travels along the axon away from the cell body. This movement of the signal as a reverse conduction is known as an “efferent process”, a movement in the opposite direction; that is, the signal moves from the cell body to the periphery. Therefore the dendrits are structures responsible for the reception of the input and the axon of the nerve cell is the carrier of the output (Fig.15.A & B). The length of an axon ends near the body of another cell, where we have “*a small opening, as a no man’s land, between two independent erected fences of neighbouring states*” (Calvin & Ojemann, 1995: 113); the electric signal must cross this jelly vacuum in a chemical way. This place where the nerve cells come quite close to one another was labelled by Charles Sherrington in the nineteenth century as synapses (Fig.16.C & D). One cell has almost one thousand synapses. They are micro-areas where communication takes place (Popper & Eccles, 1996). They are the border where the axon output of one neuron becomes the output of the dendrits or the cell body of another neuron (Fig.16.C & D).

At the end of the nerve fibre of the synapse extends a triangular head. This head contains the synaptic vesicles which store the neuro-transmitter. If an action potential reaches the synaptic head, some vesicles open and the neurotransmitter molecules slip through the synaptic opening - which has a width of about 0,2 million millimetre - and also near the dendrits where they will be bound to the receptors in the post synaptic membrane. It can be deduced from

here that the action potential can be conducted from one nerve cell to the other only with the help of the neuro-transmitter (Fig.17.E & F).

There are two types of neurons in the brain: the pyramidal cells, whose axons form the excitatory synapse and the inter-neuron (cells with a star form) which make the inhibitory cells (Fig.14). Any processed cortical information takes place in these two types of neurons, through which, for instance, the synapses of the pyramidal cells carry the neurotransmitter glutamat. But before a nerve cell fires and an action potential travels along the axon, the excitation in the cell, which is at rest, must reach for a short time a threshold value (Fig.18.G & H and Fig.19). After the delivery of the action potentials, the neuro can not be excited for a period of time of almost 1-2ms and then it becomes heavily excited in comparison with the normal condition. This so-called absolute and relative refracting period may have - next to the function of rest in the cell - an important role in the processing of information. In this context electricity is the carrier of information which is controlled by biochemical means. The following figures are illustrations of what has been put in words in the above paragraphs.

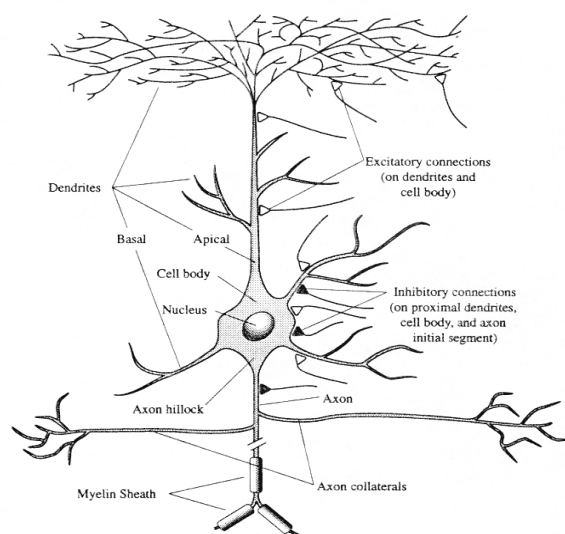


Fig.13. Neuron and its ramifications (Adapted from Zilles & Rehkämper, 1993: 40, Speckmann & Wittkowski, 1998: 58)

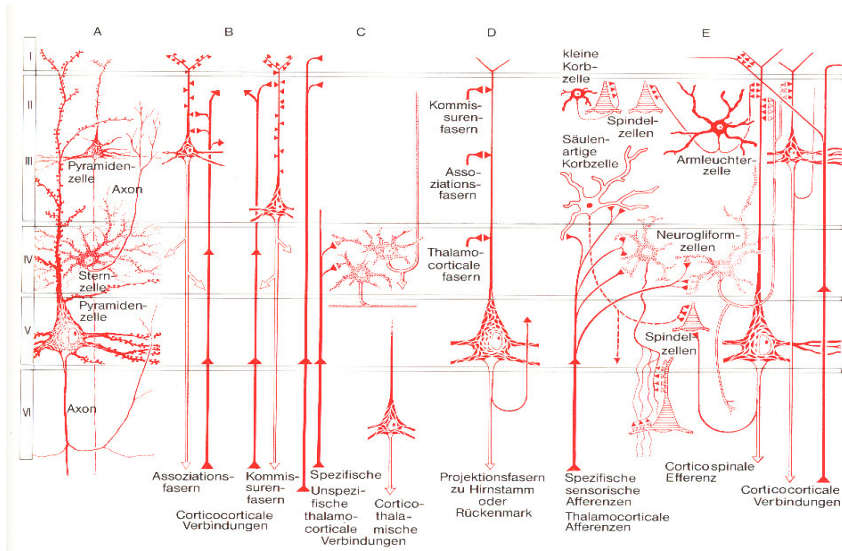
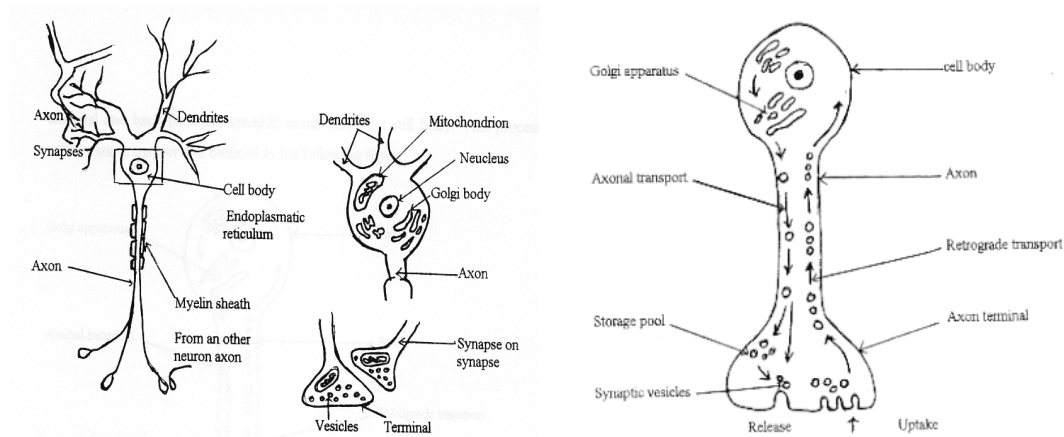
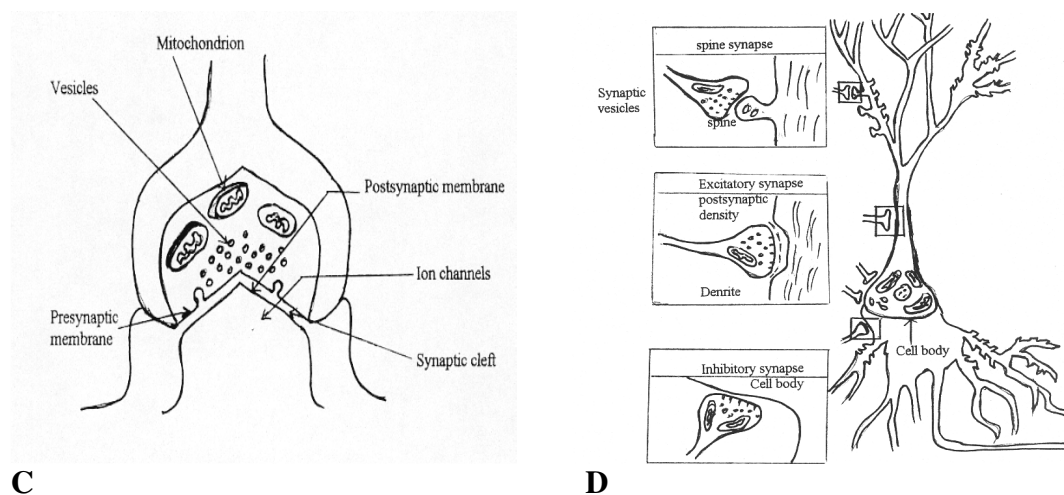


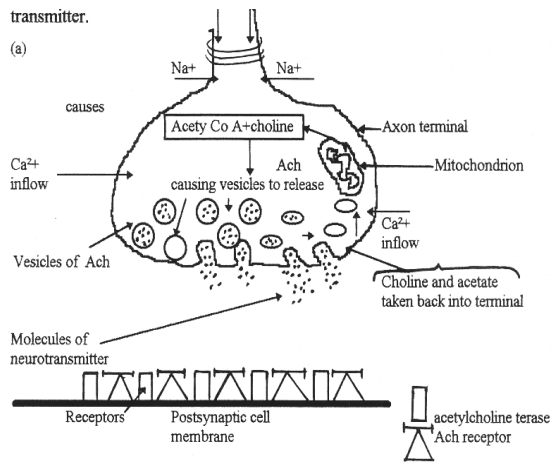
Fig.14.Types of neuronal cells (printed from Birbaumer & Schmidt, 1991: 259)



A **B**
Fig.15. A. Major parts of a neuron. B. Axon transport (Adapted from Zilles & Rehkemper, 1993: 40,42-43, 53 and Speckmann & Wittkowski, 1998: 58)

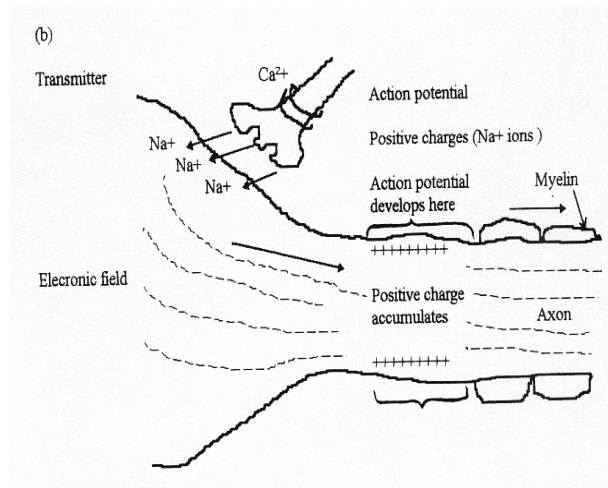


C **D**
Fig.16. C. A synapse depicting a synaptic cleft between the presynaptic terminal membrane and the postsynaptic cell membrane. D. The different types of synapses on a neuron (C. Adapted from Birbaumer & Schmidt, 1991: 218. D. Adapted from Zilles & Rehkemper, 1993: 40-47).

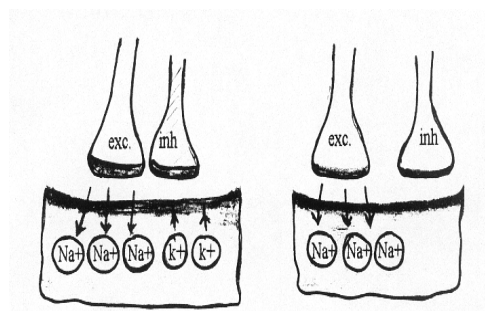


E

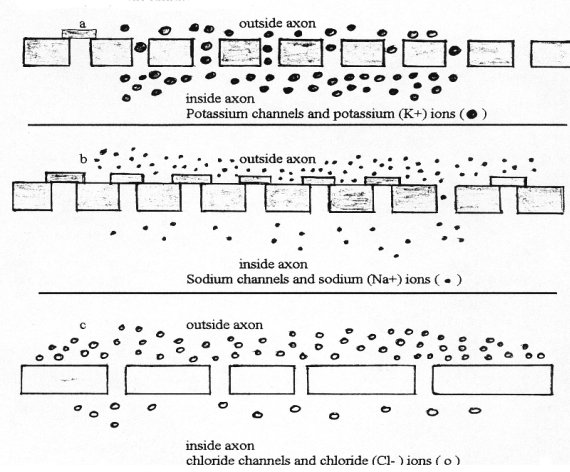
Fig.17. E. Chemical synapse. F. Excitatory synapse (adapted from Birbaumer & Schmidt, 1991: 218-219, 224)



F

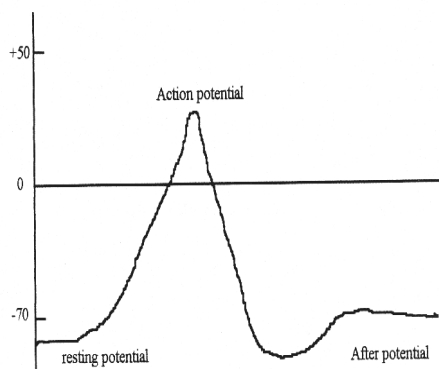


G



H

Fig.18. G. Inhibitory and excitatory synaptic transmission (IPSP & EPSP). (Printed from Birbaumer & Schmidt, 1991: 231. H. Potassium, Sodium and Chloride channels (simplified schema adapted from Schmidt & Thews, 1980: 60).



I

Fig.19. Phases of transmission in the neural cells (adapted from Schmidt, 1987: 40)

Although the scientists know so much about the individual cells and their conduction of information from one area to the other, they still try to clarify the mystery of the neuronal code (Roth, 1996 :16).

3.2 - Language and Cognitive Processing in the Hemispheres

3.2.1 – Generalization about Processing

The agreement that prevails among research scientists is that the foundations of learning and memory storage, either of a linguistic or informative nature, are based on the changes that occur in the activities of the neurons. The neuro-anatomists Ramon y Cajal (1911) indicated that the synapses are the basis to any neural functions. They conduct not only information to other neurons and areas but they also influence information in an excitatory and inhibitory way (Fig.18.G). Opposite to what they are in the deep parts of the brain, the synapses in the cortex lay on the so-called pyramids (Fig.14). According to Braitenberg & Schüz (1989: 191) these types of synapses on the cortex build the biggest memory storage in the brain. They can even modify their intensity; for instance the excitatory influential synapses have at their disposal the capacity to couple intensively two or more neurons with each other, if they are simultaneously active. From this simultaneously intensive excited neurons arise the consolidated neuron groups. If a great number of neurons are excited or a group of neurons becomes active, these neurons can activate the whole complex of neurons. These neurons should not necessarily be near one another, they can also be distributed in the two hemispheres. These associations of neurons known also as Hebb's Cell Assemblies, namely transcortical assemblies, mean that many intensively joined network of neurons are distributed over more cortical areas of the two hemispheres. According to the model of the neuropsychologist, Donald O. Hebb (1949) these cell assemblies represent objects, things, terms, thoughts and words. According to his theory the brain creates an associative memory through the changes in the synaptic connections; for instance the exciting of a particular cell assembly should correlate with the emergence of particular psychological processes.

Pulvermüller (1996) attempted to build his Language Model on Hebb's Concept about the Cell Assemblies. He took Hebb's theory and model and used them so as to make a Neurolinguistic Theory Model. Investigations carried on the hearing system indicate that the activities of the neurons in the auditory cortex correlate with the occurrence of different features of the phonemes; that is, with divers phonetic distinctive features. Thus, particular neurons respond to acoustic speech stimulus such as voiced and voiceless phonemes or particular sounds. These phonemes stand above the phonetic features, whose neuronal correlate in the nervous system, consist of cell assemblies. However, the syllables, the morphemes and the words, which in their hierarchy stand above the phonemes, have their neuronal correlate in the biggest assemblies of the brain. Therefore, Pulvermüller (1992: 29)

made a suggestion about the existence of a linguistic structure that has its corresponding assembly in the brain.

Damasio and Damasio (1994) set for speech and language a system of three groups. These groups are thought to reflect the foundations involved in the processing of language in the brain (Damasio & Damasio 1994: 58) (Fig.20.A & B, Fig.21 and 22.A, B & C). The first group consists of a population of many neurons both from the left and the right hemisphere. The cell assemblies of this group are responsible for sensory, motor, and gustatory stimuli. They order the brain in categories of colour, shape and taste. In this group there is a level of representation of the results of classifying, for instance, tools, objects and their relationship to one another. It contains also personal and common events that can be organized and unfolded at a terminology level.

The second group consists of a small number of neuronal structures, which are mainly localised in the left hemisphere. These cell assemblies represent phonemes, syllables, morphemes and syntactic rules. They are used to combine the words. This system provides the forms for the production of words. It carries out the first steps in the processing of language during the time of speech perception and production.

The third group is very significant in this context because it mediates between the other groups that are mentioned above. The neural structures of this group are localised mainly in the left hemisphere. On the one hand this group can record and activate the adequate word forms, on the other hand it receives words and causes other areas of the brain activate their appropriate concepts. It lies in the psychological nature of this group that these lexical mediating structures are registered and processed in the brain as a matter of fact.

The linguist, Levelt (1989 & 1991) showed in his psychological model of word processing that the word forms which are the end result of the concepts are formed in an intermediate component labelled as "Lemma". On the basis of neuro-anatomical and neuro-psychological scientific research Mountcastle (1978) came to the conclusion that cortical neurons group in a high specialized, functional and formed modules. According to him these basic modules are "units". They were discovered by the introduction of a microelectrode perpendicular to the surface of the cortex. The neurons which lay around these electrodes react to the same stimulus. If the electrode is moved for about a micrometer from this above position, the reaction to this special stimulus item changes. These neurons, which react to the high cognitive performance and which somehow have a specialisation in the processing of the same stimuli, have the form of columns in the cortex (Braitenberg & Schüz, 1989). Therefore, one considers the individual modules - the vertically connected six synaptic layers

(Fig.14) - as the basic constituents of the cognitive functions of the brain. Each columnar module consist of almost one hundred neurons. If there is a lesion in one of the modules, the function of the disturbed module will be taken over by the other modules, but a complete and a high efficiency in performance can not be attained and achieved.

Finally, the association of these modules assures an intact information processing in the brain. The idea and the assumption that there is a clear cut boundary among the modules of the cortex is a faulty assumption. The nervous system is an associative and a closely compressed construction, in which internal and external information are processed, and neither a block nor a box whose units can not be penetrated (Kochendörfer, 1997: 55).

3.2.2 – The Investigators’ Findings about the Hemispheres

Most of the brain scientists agree that more than 80% of the human brains have their language regions in the cortex of the left hemisphere. It is the dominant hemisphere as far as language is concerned (Popper & Eccles, 1996: 359). But this hemisphere is in a constant communication with its right counterpart through the nerves of the corpus callosum (Fig.10.B). Both hemispheres co-operate with one another during the processing of any stimuli; the left is dominant and effective in the processing of linguistic stimuli but the right has musical capacities and is competent in spatial-visual orientation (Schwarz, 1996: 66). However Zaiabel (1972), who dealt with split-Brain patients, found that the right hemisphere has an indirect participation in the processing of language. In his research he showed that the right hemisphere has at its disposal a receptive vocabulary whose size is similar to that of a fourteen years old child. Tools that are projected to the right hemisphere can not be labelled, although the left hand is in position to pick out from a number of tools the right ones. Therefore the right hemisphere knows what it perceives, but it can not verbalise it (Springer & Deutsch, 1998).

Experiments carried out on split-brain patients confirm that the right hemisphere has receptive as well as productive competence in its linguistic regions, but the receptive side is dominant during the processing of the linguistic stimuli (Bradshaw & Nettleton, 1981). The speech production of the right hemisphere consists mainly of clichés and conventional expressions (e.g. *Guten Tag*) and the use of concrete and often frequent occurring words (Leuninger, 1989). Abstract and frequently used words are processed in the left hemisphere. These scientists assume that the speech stimuli, which could not be processed in an analytic way in the left hemisphere, are recalled in a holistic way or structured units and produced by the right hemisphere (Leuninger, 1989: 6). On the contrary, the left hemisphere dominates and controls

the domain of syntactic and phonological competence as well as meaningful concepts (Ender, 1994). It also organizes the vocabulary in a taxonomic way; that is, in main and subordinate terms. The right hemisphere, however, stores its vocabulary in the form of associative, enriched, framed and structured imaginative conceptual situations (Heeschen & Reischies, 1990: 53). Consequently, the right hemisphere can form and build concrete associations (e.g. *Bleistift – wird zum Schreiben benutzt*) and has the ability to make almost four associations to an object which is presented to a patient who suffers from a form of aphasia; nominal aphasia can be cited in this context. The example “*Löffel : Suppe – Koch – Gabel – Besteck*” illustrates this feature of the right hemisphere. But the classes of abstract associations can be managed only by the left hemisphere (e.g. *Löffel : Ernährung*).

Consequently injuries to the right hemisphere may trigger aphasic syndromes. Research studies in this field have shown that a particular form of agrammatismus has been related only to Broca’s aphasia. Lesions to the right hemisphere can cause naming disorders and vocabulary deficits and lead often to disturbances in the use and understanding of metaphoric statements. If the left hemisphere is isolated from the right one, proverbs like “ *das ist Schnee von gestern, Lügen haben kurze Beine*” can only be understood at the level of their word for word meaning; they can be understood and clarified at a sheer propositional level. These findings unfold that the left hemisphere is not in a position to penetrate in the imaginative language of the prevailing proverbs or metaphors so as to recognise their symbolic meaning. The left hemisphere for example would not interpret the following metaphor “ *ein schweres Herz*” as a sad and a dejected mood but only as a physiological feature of the heart that can be measured in grams and kilograms. In this case the right hemisphere intervenes in order to help the left hemisphere to understand and clarify the imaginative, metaphoric and symbolic language. It is, thus, in a position to support the left hemisphere as it suffers from an aphasic impairment of the speech production and perception type (Ender, 1994).

Left hemisphere aphasics, whose right hemisphere was made inactive for a short time by an injection of the sodium amytal solution, lost completely their linguistic ability (Ender, 1994). Therefore it can be postulated that uncontrolled speech phenomena, such as automatisms, emotional speech, clichés, taboo words which are considered to be part of the language of the global and Broca’s aphasics, are performances of the right hemisphere. On the contrary Heeschen and Reischies (1990: 52) emphasise in their works the close relation between emotions and the right part of the brain. They come to astonishing consequences; the right hemisphere does not assume any special linguistic competence, it dominates no particular

sub-aspect of language, but its linguistic expressions are merely the result of its close relation to emotions (Heesch & Reischies, 1990: 52).

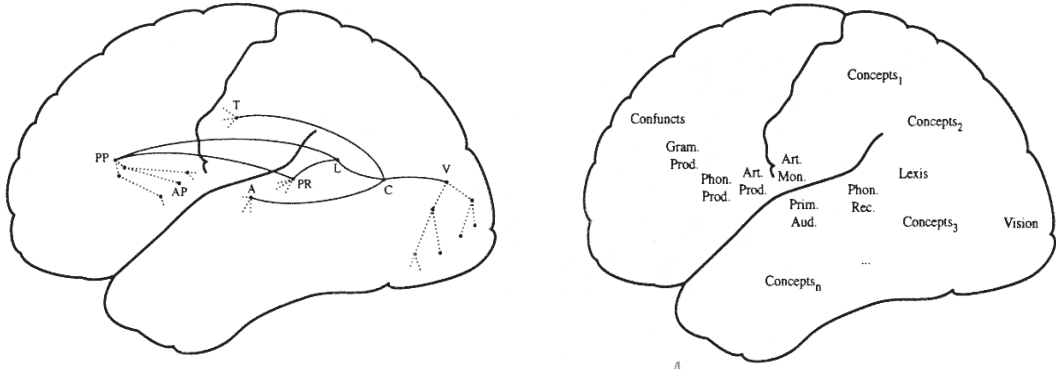
The aim of these two authors was to devalue the linguistic ability of the right hemisphere and foreground the dominance of the left one as far as language is concerned. This assumption was to some extent confirmed by the scientists who worked on the Split-Brain patients. They found that these patients, whose left hemisphere was completely damaged, could not solve the simplest linguistic tasks. Neurologists who worked on stroke patients ascertain that a stroke that hits the left hemisphere has fatal consequences to the linguistic capacities of any patient (Gazzaniga, 1998: 87). But it must not be ignored that the right hemisphere contributes also to a particular ability of verbal communication; it is an area that has the ability to interpret the emotional intonation and metaphoric use of language. Its connotative, associative, figurative and pictorial interpretation of language should not be overlooked. The contribution of the right hemisphere to communication can not be ignored (Ender, 1994: 228).

The use of computer tomography helped the aphasiologists to get lucid images about the sub-cortical areas of the patients who have lesions in thalamus. This technique supplied them with cues that gave them important insights into the language-processing functions of the thalamic area. Lesions in the limbic system, exactly in the left region of thalamus, cause for instance word finding disturbances, trouble in repetition, perseverance and impairment to the fluency of speech. The speech slows down and becomes monotonous. This type of disturbance is labelled as a thalamic aphasia. Among the scientists of this field prevails a consent that lesions to the thalamic nucleus of the dominant speech hemisphere, especial after a bleeding phase in this area, cause a serious and incessant loss of language. This type of impairment is characterised by a reduced spontaneous speech production and a semantic-lexical deficit with a relatively persevered performance in comprehension and repetition (Ziegler, 1997: 134). Experiments with electric stimulation to thalamus unfolded that by speaking two basic functions make allusion to thalamus. According to the neuro-surgeons Calvin and Ojemann (1995) thalamus controls, on the one hand, attention and speech stimuli that come from the outside world, it cares also for a correct verbal recall of the speech from the language memory storage, on the other hand, it controls breathing and speech muscles during the processing of speech.

3.2.3 - Illustrations of Processing

In this section the question to deal with is whether the different categorisation of the nomina as the concrete word, “*Ball*” and the abstract word one, “*Peace*” are due to real existent

differences in the processing of language in the human cognition and consequently to the different representations in the brain. Since 1929 the nominative was examined by the electroencephalogram (EEG) so as to find more about the concrete and abstract words. The EEG offers divers methods to examine the activities taking place in the brain. Its use in examinations provides a spectrum of measurements about the brain areas that are activated during the processing of language. The following figures delineate the approximate locations of concepts and show the places where other modalities are thought to be processed.



A B
 Fig.20. Areas that ought to process language and speech (a sketched adaptation from Calvin & Ojemann, 1995: 66-67, 263-264, 289, 322)

- The capital letters of the above figure stand for :
- C - concept,
 - T - tactile,
 - PR - phonological recognition,
 - PP - phonological production,
 - A - auditory image or recognition,
 - V - visual recognition
 - L - lexis
 - AP - articulatory production.

These aspects can be substantiated by the next figure that illustrates the levels of processing. It is a derivation from the above schemas.

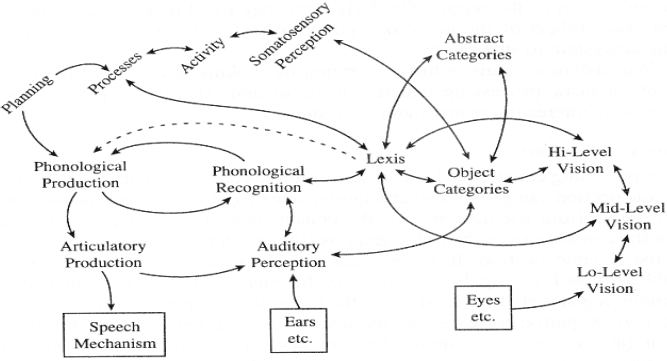


Fig.21. Levels of speech and processing

These figures show different areas for different kinds of concepts. They stand for several different subsystems in different locations. The dissection of the brain unfolds some of these places that can be displayed by the figures below:

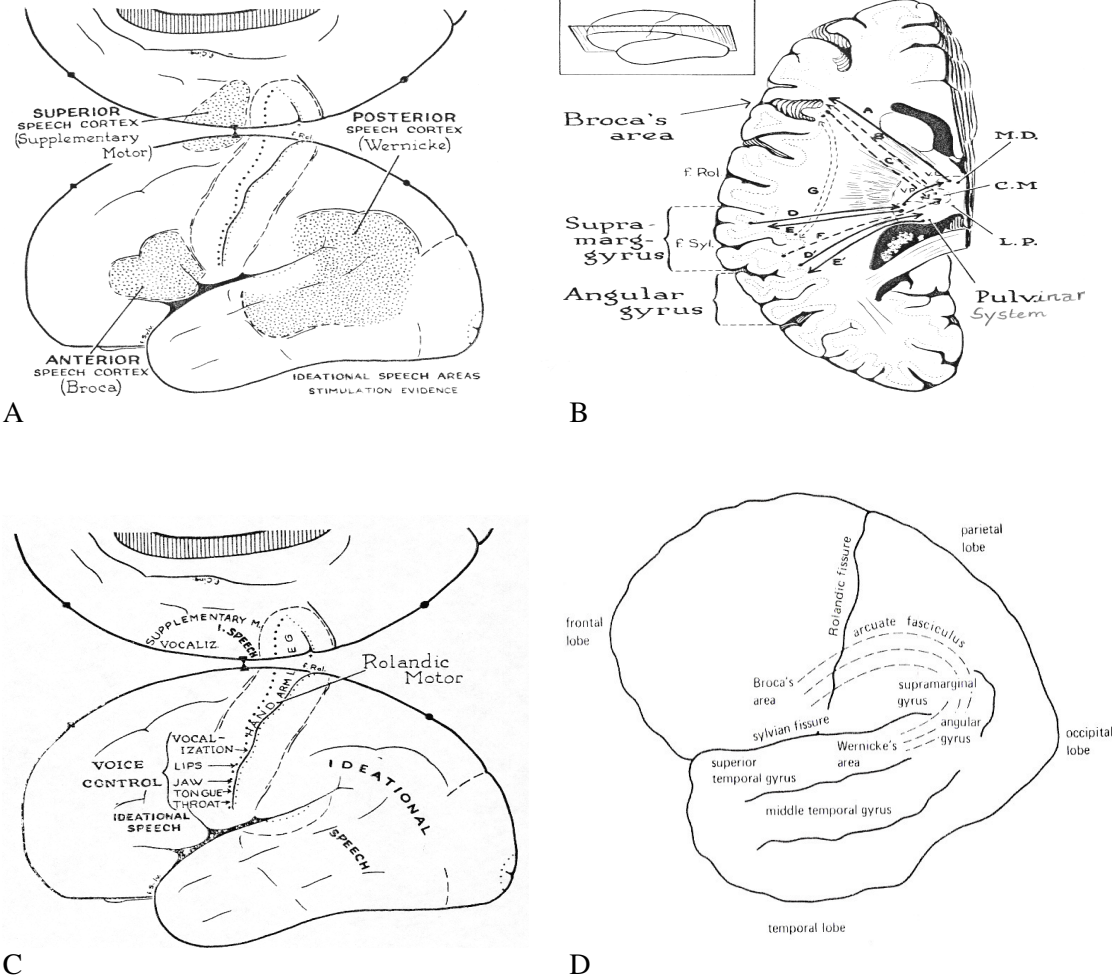


Fig.22. A,B & C. Neural areas of speech and language (printed from Pendfield, 1959: 200-201,208), D.Cortical structures associated with language (printed from Lesser, 1978: 1)

The examinations were carried with different methods. Most of them are imaging techniques that are competing to submit lucid pictures of brain activities as they take place. One such successful electrophysiological method and solution is the 'evoked potential technique'. This can be used with normal subjects or patients by attaching a number of electrodes on the scalp and observing which ones show electrical activities in the brain, of course, milliseconds after some stimulus has involved one or more areas of the brain that may have emitted an electrical response. In many references, books and articles, that deal with these aspects of the stimulus and electrical response, this technique is often abbreviated as 'ERP' that stands for 'event-related evoked potential'. The 'event' is the stimulus; the 'evoked potential' is the electrical response in the brain that can be read through the scalp.

In the early scientific research there was a strong conviction that the localization of language should be narrowly confined within cortical areas of the brain. However, the modern scanning techniques of research have foregrounded that both cortical and sub-cortical regions participate in the processing of language. Weiss (1997) proved that the processing of acoustically presented concrete and abstract nouns trigger different coherent patterns in the brain. This research study was deepened by the measurements of the brain activities with the EEG and Scanning-techniques. The latter confirm that the signals in the brain regions form a cohesion of different and widespread patterns, what the classical approaches did not unfold in their findings about language. As a matter of fact this depends on the presented stimulus type that should be processed (Fig.20).

This above experiment shows that many brain regions are involved in a co-operation with each other during the processing of the concrete words (concreta) other than at the time when the abstract ones (abstracta) are being processed. This phenomenon can be clarified by additional sensory impressions that arise during the processing of the concrete words. For example the concrete terms, “*Klavier*” and “*Apfel*” describe things whose concepts are represented in the semantic network through tactile, visual, acoustic as well as olfactory, gustatory and sensory components (Weiss, 1997: 131).

According to the neurophysiological concept of Donald O. Hebb the above word types can be described in the following way: - with reference to his findings - the neurons (neuronal Cell Assemblies in the perisylvic regions and other sensory brain regions) that are excited simultaneously intensify their synaptic contacts and render additional word meaning (Figs.20, 21 & 22), hence the contribution to the learning process of the content word. The neurons from the perisylvic region fire to the visual cortex as the word form “*Apfel*” occurs. Thus, cell assemblies arise there for the concrete word whose neurons are distributed over other further parts of the cortex (Pulvermüller, 1996: 34). This distribution is not confined to the left hemisphere but it extends also to the opposite one. Opposite to the Cell Assemblies of the nomina concreta (concrete nominative), whose network is represented in the sensory areas of the brain by an intensive connection, is the cortical distribution of those Assemblies of the nomina abstracta (abstract nominative) that shows a less intensively connected network because abstract words are not perceived. They impinge vague sensory impressions on the brain.

On the basis of this assumption the concreta shows an important ramification of its network in the two hemispheres of the brain other than the abstracta. These facts are being confirmed by the scientific findings from the domain of clinical neuropsychology and aphasiology. The

neuropsychologist, Tyler et al. (1995) reported that the aphasics process the concrete easily in comparison with the abstracta in which they encounter so much difficulties. A lesion in the language regions shows that the concrete and abstract words are separately and selectively disturbed (Shallice & Warrington, 1987), this assumption supports the idea that the two word forms are topologically represented in different areas.

Examination carried on healthy speakers ascertain that the test subjects have a good attention to the concrete other than to the abstracta (Eviatar et al., 1990) and the access to the abstract words is difficult and easily disturbed because they are represented as terms that have no referent in the outside world. Consequently, the network of the abstract words can be easily impaired (Weiss, 1977).

The concrete, however, is easily processed and accessed to due to the contribution of the sensory impressions in the activity of processing. In the case of a disturbance to the concrete the infliction on the network of the concrete words is very slight (Weiss, 1997: 126). It is well known from the research works of clinical neuropsychology that the word finding disturbance impairs selectively the access to particular lexical categories in the domain of the concrete; the case of the names of the objects and tools (Shallice & Warrington 1984), instruments (Damasio et al., 1996) and persons (Müller & Kutas, 1997).

There are enough clinical findings that confirm that patients who because of the acquisition of a lesion show an impairment to the use of some sort of terms or proper names. As far as the latter are concerned the patients, with word finding disturbances, are susceptible to memory faults both during learning and remembering of certain terms and proper names. For example, there are aphasic patients who - with the help of a person's famous picture – are able to make statements about the person's profession, his family and friends, but are not in a position to remember the name and surname of this person (Damasio & Damasio, 1994: 65).

The difference of the concretes in proper names (Nomina Propria) und genus names (Nomina Appellativa) is a theme that has been long debated by the linguists. The proper names have a special position in the concrete nomina. They are nouns (Vater, 1996: 207). Their primary semantic function resides in their reference. They have no primary meaning and do not refer to a descriptive characterisation of the referent which is directly executed as is the case in the example "*sierra Nevada*". The proper names have no clear cut concept and build no semantic structured field. These nouns can not be vague in their reference because they do not refer to concepts that could have various features. But the genus names (Nomina Appellativa) such as "*piano*", "*Sessel*", "*Stuhl*", "*Apfel*", "*Mensch*" have a meaning. According to Lewandowski (1990: 77) they label a whole genus of the same things or living things and at the same time

each individual creature or thing of this genus. Genus names (N.A.) have a concept. But each name, object, tool or thing is vague because of the different references they could have in the real world. For example the object “*Sofa*” possesses both the features of the concept “*Stuhl*” and the concept “*Sessel*”.

Müller and Kutas (1997) dealt with the linguistic differences of the nomina concreta that consists of the genus names and proper names. In their examination they used the already introduced ‘Event-Related Evoked Potential’ method to evaluate the cognitive differences of healthy test subjects as they process the acoustic features of the proper names and the genus names. They came to the conclusion that the proper names are processed quickly in comparison with genus names. They even went further and proposed the clarification of these findings by the existence of hidden stimuli at the phonological level that respond to proper names more better than to genus names (Müller & Kutas, 1997: 165).

The results forwarded by the PET-examinations emphasized the assumption that in the human brain there are different processing areas for different classes of words (Fig.20 & Fig.21). The PET- research examinations of Damasio et al.(1996) carried on healthy test subjects and aphasic patients unfold that three different object categories are processed and mediated exactly by the temporal lobe of the left hemisphere. These three different category-terms, that represent the basic object or living categories such as the categories of animals, instruments and famous persons (Fig23), are indispensable in their entities and relationship during the processing of speech and language.

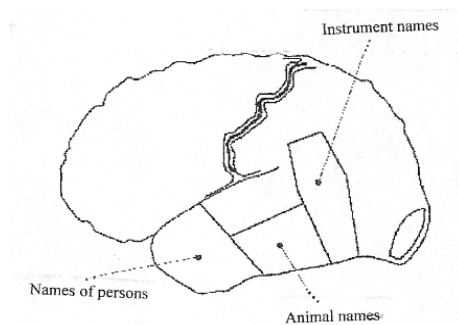


Fig.23. The retrieval of different word classes in different parts of the left hemisphere (printed from Damasio et al. 1996: 501)

From these examinations resulted the idea that the names of persons are processed in the Temporal Pole and those of animals in the Anterior- and Inferior-Temporal Pole; to this region we have the connection of the posterior Inferior-Temporal Pole which is specialized in the recall of words of instruments (Fig.10). According to Damasio temporal areas assume an intermediary role in the lexical recall (Damsio et al., 1996: 504).

The striking point in this examination is made about the aphasic patients by whom it was observed that there is an occurring disorder in the categorical combination of both persons and animals and no disorder in the combination of persons and tools. These clinical findings back up the view that there is a variable and a different binding among the three word classes (names of persons, animals and instruments). These were resided in the anterior, inferior and posterior temporal lobe.

The results drawn from the works of Weiss (1997), Müller and Kutas (1997) and Damasio et al. (1996) lead to the conclusion that the differentiation of the “Nomina” and their lexical categorization is inherent in the existence of different cognitive structures that are involved in the processing and control of the linguistic components

Finally, the aim of these tests is to describe the human processing of language in which anatomical and physiological parts are involved. Relying on the approach of Poeck (1997) one can emphasize that the processing of language in the brain takes place in very complex systems. These systems involve both cortical and sub-cortical structures of the two hemispheres (Fig.22A, B & C). They form the basis to the neural networks whose different areas (cell assemblies) lay far away from each other. As they are required to perform one or more functions, they can work parallel, co-operative or independent from one another.

The Cell Assemblies, which are responsible for the processing of language, have many wiring-connections in the perisylvic regions, which are labelled as the classical language areas (Fig.22B). It must be noted that the cell assemblies that lie outside the language areas show certain activities in reference to language. The neurons of certain words, sounds, colours, shapes and objects are spread over other areas of the cortex (Pulvermüller, 1996). This clarifies that not only the damage to the classical language regions but also the impairment to other further areas can lead to the disturbance of speech and language or to a certain form of aphasia.

But in these examinations, assumptions and findings there are many open questions that can be the subject of further research. Certain findings about the impairments to the brain areas, their differences and functions will be dealt with in the next section.

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4 - Language Lateralization and Models for Impairment Labelling

As it was unfolded in the introduction the research to localize the brain areas of speech and language has gone, until today, through specific historical periods. The phrenologists, the early neurologists of the 19th century, to whom the reference was made earlier, opened this field of research. The pioneers of this domain believed that certain talents manifested themselves in an increased development of particular cortical areas with subsequent effects on the shape of the skull. According to their postulations an examination of the skull could lead to an understanding of a person's cognitive and psychological characteristics. The European phrenologists, such as Gall in England, Spurzheim in Germany and Bouillaud in France, were convinced that the language area was located in the frontal lobes. Despite this common attitude, the phrenologists later on disagreed with one another as to whether language has one or two centres; one centre to memorize the words and another one to articulate them (Gall, 1822-1825). Marc Dax argued in a paper (1836) he delivered with the title, "*Lesions of the Left Half of the Brain Associated with the Loss of Signs of Thought*" that language has its area in the left hemisphere. In reality it was the neurologist and anthropologist, Paul P. Broca (1865) who discovered and reported that the loss of language was to be attributed to the left-sided rather than right-sided injuries (See Introductory View p.1 & Experimental Part, Sections: 6.2 & 6.3)

4.1. The Lateralisation of Language

As the works of Broca (1865) ascertained the fact that the left hemisphere was the area where the functions of language were to be found, Dax (1865) went still further in his studies and ventured to raise the idea of cerebral dominance. According to Zangwill (1964) Broca was the first investigator who dealt with the phenomenon of hemispheric dominance and handedness. Today it is presumed that 96% of the population have a left hemispheric dominance for language; 93% of them are right-handed (Pratt & Warrington, 1972; Penfield & Roberts, 1959; Zangwill, 1960); the other 7% are left-handed; however, 50% to 70% of them have a left dominant hemisphere. The probability is very high that a left-handed person gets a linguistically dominant right hemisphere (Strauss, Wada, & Koska, 1983; Bryden, Hecaen & De Agostino, 1983). It was found that persons whose left hemisphere was damaged in childhood and got healthy later on use both the left and the right hemisphere for the dominance of language. Other studies on patients with epileptic attacks that developed in early years show that 23% to 33% of them have an atypical speech dominant hemisphere; their speech areas lie both in the left and the right hemisphere (Helmstaedter, Kurthen, Linke,

& Elger 1997; Kurthen, 1992; Rey, Dellatolas Bancaud & Talairach 1988; Strauss, Walda & Goldwater 1992).

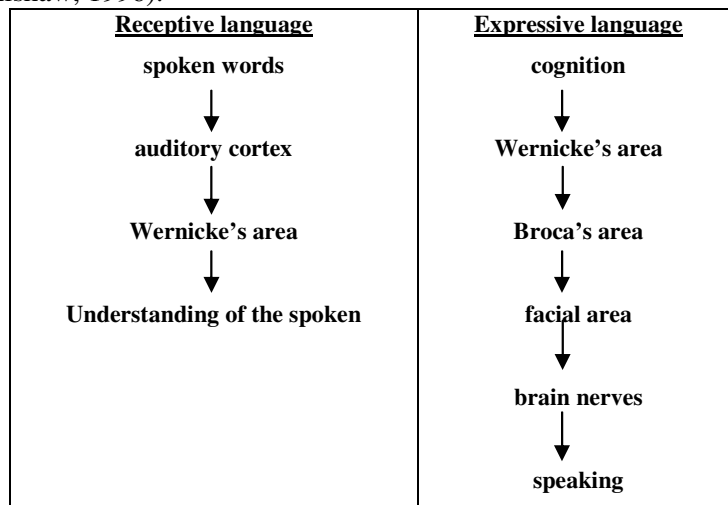
On the basis of these above observations and also examinations of the patients' language functions, whose left hemisphere was removed or damaged, the two hemispheres are given an equipotentiality; that is, an equal position as far as the acquisition of language is concerned in childhood (Zangwill, 1960; Basser, 1962). Thus, the right hemisphere assumes every function of language and develops into a dominant hemisphere if the left hemisphere was damaged in an early age. However, it becomes impossible for the right hemisphere to take over the functions of speech and language in persons, whose left hemisphere was impaired after a total acquisition of language.

4.2 - The Model of Lesions

From the examination of the aphasics with the imaging and scanning methods arose the model of language processing known as the lesion model. The well-known model is the Wernicke-Geschwind model. According to this model the neurological basis of speaking and language subsumes the following structures (Table A): Broca's and Wernicke's area, Fasciculus arcuatus - which relates Broca's and Wernicke's area - precentral and postcentral facial area, gyrus angularis and auditory and visual cortex (Kolb & Whishaw, 1996). The programs, responsible for the complex co-ordination of speech muscles (the motoric speech production), are presumed to be lying in the Broca's region.

In this context processing has the following run: the auditory input signals are transferred into the Wernicke's area where they are recognized as meaningful speech units or words; the fasciculus arcuatus relates the anterior and posterior speech zones; the facial area controls the movement of the face and tongue; and finally the gyrus angularis serves in the binding of sensory information so as to recognize the visual patterns of the letters. The latter area is considered as a decisive place for the perception of the written material and the establishment of words in the brain.

Table A : Neural model of the receptive and expressive language according to Geschwind (Kolb & Whishaw, 1996).



On the basis of this model different impairments to specific brain areas of language can be differentiated. They are derived from the classification of the syndromes of aphasia. The place and the nature of the lesions are explicitly outlined in table B.

Table B: Place and nature of the lesions of different types of aphasia

Type of aphasia	Assumed damaged area	Disturbed language functions	Undisturbed language functions
Broca's aphasia	Broca's area, frontal lobe premotoric cortex, subcortical lesions under Broca's area	spoken & written language little disturbance to understanding	partial disturbance of understanding
Wernicke's aphasia	Wernicke's area temporal lobe	spoken & written language understanding	production of language
global aphasia	Broca's & Wernicke's areas	production & understanding of language are badly disturbed	
Anomic aphasia	retrorolandic i.e. temporoparietal area	word finding	production, understanding, repetition, reading, writing
Conduction aphasia	fasciculus arcuatus	production of language with phonemic paraphrases repetition of spoken language, reading & writing	understanding of language
transcortical motoric aphasia	supplementary-motoric cortex anterior motor area	spontaneous production of language	understanding of language repetition reading
transcortical sensoric aphasia	temporo-occipital area, auditory association cortex posterior sensory area	understanding of language, naming, (semantic paraphases)	production of language

It must be critically remarked about the lesions model that most of the data stem from the autopsy of the heart attack patients. In the acute phase of a heart attack great areas of the brain are inflicted on. The damage affects not only the areas of language but also other cognitive

abilities that are related to thought and memory. In the chronic phase there are adaptive processes in the brain which allow the patients to recover certain language functions despite the damages to early fully developed regions.

Although examinations with the CT support the lesion model through autopsy, there are still certain differences. For example, there are other impaired areas, found outside the strict localized areas that are set by the lesion model (Damasio, 1984), that cause some sort of aphasia, mainly in the sub-cortical and right areas of the brain (See Theoretical Part, Sections: 1.2 & 3). An overview about the features of the disturbances is listed in table B.

4.3 – The Model of Stimulation

The stimulation of the brain with electrodes triggers for a short time lesions or disturbances that ought to have been caused by a brain damage or a heart attack. Jefferson (1935) reported that the stimulation of the gyrus angularis interferes with speaking. Penfield (in Penfield & Roberts, 1959) found that a stimulation to the anterior and posterior regions of the classical areas of language lead to the rise of errors in naming, counting, reading and writing. This is also the case during the stimulation of the sensory and motor regions of the brain that control the facial areas of the two hemispheres. This agrees with the Wernicke-Geschwind model with the exception that there are no different speech mistakes during the stimulation of the anterior and posterior speech areas corresponding to sensory and motoric dichotomies of the lesion model.

Ojemann (1979) found that the stimulation of some areas show the same effect. Ojemann (1982) pinpointed to the individually variable localization of the speech areas. He postulated that there are functional systems, which support the linguistic tasks, whose relationship appears similar in every human being, but whose localization differ from one person to the other. From the outcome of his examination resulted the following cortical language model of Ojemann. According to him the cortical areas, supporting language, are located in a mosaic of macro-columnar patterns of the left hemisphere where there is a common connection of language, which is partially located in the inferior frontal cortex. A stimulation to this area causes by every patient a sort of speech arrest and an impairment to the facial motoric. This area is surrounded by the Sequential-Motoric-Phonemic Identification system (SM-PI) which is localized in the perisylvic language zone exactly in the inferior frontal, superior temporal, inferior parietal areas. Stimulation to this area disturbs many ordinary functions; namely, oral-facial motor sequences, phonemic identification, naming and reading.

It is presumed that there is a common binding region of 'speech production' and 'speech understanding' because both phonemic identification and sequential oral-facial movements can be disturbed. The perisylvic region is surrounded with a third system whose stimulation interferes with Short Time Memory (STM), of course without the impairment of other tasks. Speech and language storage is mainly disturbed during the stimulation of the temporal and parietal lobes, but recall during the stimulation of the frontal lobe. There is an area between the SM-PI- and the parasylyvic STM-system; its stimulation leads to the disturbance of syntax, naming and reading. All these systems run together at the posterior inferior frontal area, which finally serves as a general pathway to speech and language.

Lüders et al. (1991) discovered through electric stimulation another language area, the basal temporal region of the dominant hemisphere. The basal temporal speech region is confined in the occipital temporal gyrus. This basal temporal language region is seen as independent area from the Wernicke's region because there are no speech functions in the neighbouring inferior temporal gyrus. Even though similar effects are available during the stimulation of the Wernicke's lobe, great differences occur after the resections of these areas. Such an intervention in the Wernicke's area is accompanied by a slight Wernicke's aphasia, where there is no apparent sign of a permanent neurological deficit, which follows the resection of the anterior head of the temporal lobe. These changes may trigger in some patients temporary anatomic aphasia.

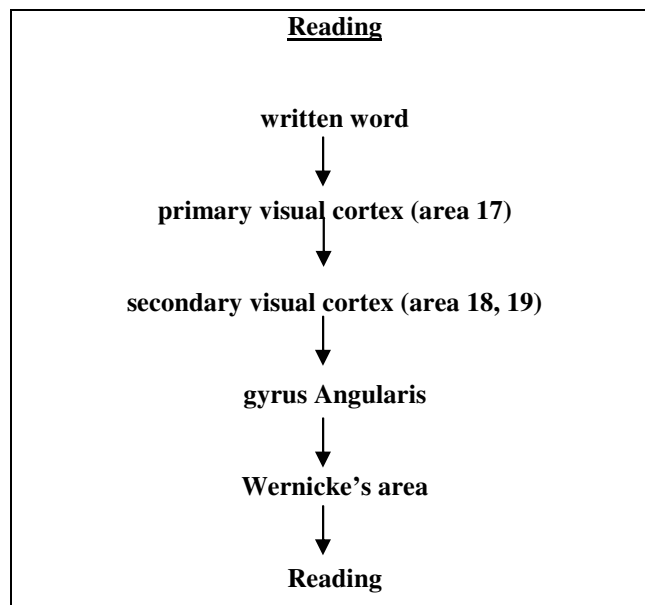
The stimulation model is supported in the results it forwards by the fMRI (functionalMRI-scans). Brain areas which lie far away from Wernicke's and Broca's region are also responsible for the expressive and receptive speech (Binder, 1997; Binder, Frost, Hammecke Cox, Rao & Prieto, 1997).

The critic that can be waged on the stimulation model is that the language of the patients, who suffer from a brain damage, changes its organisation in the course of time. This is a reason why the results supplied by the stimulation model are not fixed and clear cut objective facts that may confirm the patients' speech and language areas and the lesions that may be inflicted on them.

4.4 - Reading Routes

Reading is a written and a linguistic evocative reaction. The ability for a silent reading can be determined, according to the Wernicke-Geschwind model (Lesion Model), by serial and expiring processes. Table C presents a general overview about these processes.

Table C: Neuronal Model of Reading (Kolb & Whishaw, 1996)



During the reading of a word, information - according to the above model – moves from the primary to the secondary area of the occipital lobe and then to the gyrus angularis. It is presumed that the understanding a written word needs the activation of its auditory form in the Wernicke's area. The region of the gyrus angularis is made responsible for it; that is, the visual input signals in this region are translated or transformed into auditory forms. The word in the Wernicke's speech area is activated by the gyrus angularis, finally reading is made in this way possible. Loud reading is activated by signals that move through the fasciculus arcuatus to the Broca's region in the frontal lobe of the left hemisphere. In this place there is a memory storage for the articulation of any words. The PET examinations of Peterson, Fox, Posner, Mintum and Reichle (1988) triggered the question whether there are auditory and visual routes, which get from one another an independent access to the semantic area of the frontal lobe. To this point there are controversial findings (Peterson, Fox, Posner, Mintum, & Reichle, 1989; Howard, Patterson, Wise, Brown, Friston, Weiller & Frackowiak, 1992; Demonet, Chollet, Ramsey, Cardebat, Nespoulous, Wise, Rascol & Frackowiak, 1992; Zatorre, Eva, Meyer & Gjedde, 1992; Wise, Chollet, Hadar, Friston, Hoffner & Frackowiak, 1991).

The inability to read can occur, on the one side, as part of an aphasic syndrome (i.e. the case of a Broca's aphasia), on the other side, as an isolated speech deficit. This inability is labelled as a dyslexia (Ger. Alexie) of which there are four types: dyslexia without "agraphy", dyslexia with "agraphy", frontal dyslexia, and finally deep dyslexia. The regions of the speech

production of this type of dyslexia, that are supposed to carry traces of impairment, are unfolded in the following table.

Table D: The definition of the dyslexia types and their different damaged regions

Type of Dyslexia	Assumed damaged area	Disturbed functions of language	Undisturbed functions of language
Dyslexia without Agraphy (Derjerine, 1891; Vignolo, 1983)	left medial occipital lobe splenium of corpus callosum	reading aloud, understanding of reading	naming, spontaneous writing, copy of the written
Dyslexia with Agraphy (Derjerine, 1891)	gyrus angularis	reading aloud, understanding of reading, writing	
Frontal aphasia (Benson, 1977)	posterior part of the inferior frontal gyrus, spreading to subcortical tissue of anterior area	naming of letters	reading aloud, understanding of individual words, partly with worse writing problems
Deep dyslexia or phonemic dyslexia (Kaplan & Goodglass, 1981)	association with Broca's aphasia with agrammatismus	semantic errors in reading aloud	

The model of lesions and reading, elaborated in this section, offer a tremendous assistance to the examiners and therapists during the administration of any procedures of testing and therapy. The eradication of the disturbances, that can be attained through an amelioration in the production and perception language, can be attributed to the therapist's successful attempts in stimulating the neural network of a particular area.

4.5 – Wernicke-Lichtheim Model

In this context it is of interest to sketch the form and content of the Wernicke-Lichtheim model (or schema) due to its importance in the history of aphasiology and influence on the course of aphasia therapy. It is a model of speech and language centres in the cerebral cortex developed by Lichtheim (1885) on the basis of Wernicke's (1874) proposals. The purpose of sketching this type of model is to provide a theory of localization of language centres in the brain. It was used to deduce and unfold all forms of aphasia that could have been observed. Each node and connecting point in the diagram stands for a processing of language. The diagram consists of five centres:

A = centre of auditory word images that lies in Wernicke's area in the temporal lobe;

M = centre of motor word images which resides in Broca's region in the frontal lobe;

B = centre of word concepts which is placed in the inferior part of the parietal lobe;

(Illustrations of A, M & B, see figs. 10 & 12)

O = centre of visual word images participates in reading and writing (visual sensory of the occipital lobe and the inferior and superior voluntary motor that lies in the pre-Rolandic motor area)

E = centre of writing images is used to control the spelling (inferior voluntary motor that lies in the pre-Rolandic motor area),

(Illustrations of O & E, see fig.22 A, B, C & D)

moreover there are also the following two places of perception:

a = as auditory input,

o = as visual input;

and two others of production:

m = as articulatory output,

e = as written output.

As the diagram shows, the A, M and B centres are joined by tracts. Some aphasia types are triggered by an interference in these pathways. Thus, *Broca's aphasia* is caused by a lesion in M; *Wernicke's aphasia* by a lesion in B; *conduction aphasia* by a lesion of in the A-M tract; and *anomic aphasia* arises from a lesion in the B-M tract, or if comprehension is impaired, also from a lesion in the B centre. Neo-classical syndromes that were found subsequently have also their place on the diagram: *transcortical motor aphasia* is caused by a lesion in the B-M tract; *transcortical sensory aphasia* by a lesion in the A-B tract and *global aphasia* is due to lesions in the A and M tracts. The schema was criticized by Bastian (1898), Head (1926) and other investigators and scientists of aphasia to come later on (See General Introduction, Section *Introductory Overview* and *Aphasia Therapy*, Sections 6.1, 6.2 and 6.3).

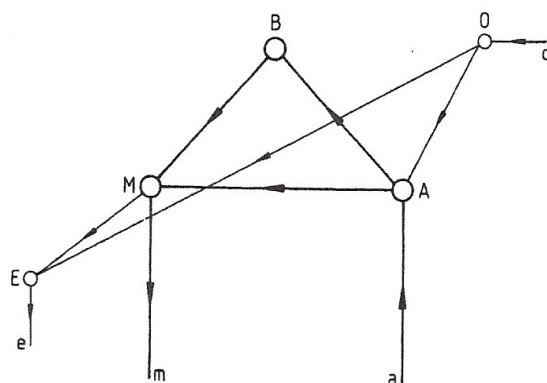


Fig.24. The Wernicke-Lichtheim model

4. 6 - The Word Finding

The word finding is not a model with which to label the impairments. It is, however, worth to be cited in this section because it stretches to other syndromes of aphasia. This syndrome arises from a break in the naming of images, objects or things. By naming the objects or pictorial things, at least, three processes must be travelled along: the object, which has particular features that make it different from the others, must be identified; the decision for the selection of a word from a number of similar words must be made; and an acoustic form must be formulated for the word that is looked for (Luria & Hutton, 1977). Word finding disturbances, labelled as anomia or amnesic (Ger. Amnestische) aphasia, may have different causes that can be put down to different neurological deficits. This aphasic disease occurs during an exercise of naming or in a spontaneous language. Patients with anomia have slight difficulties in their expressive and receptive language. Their spontaneous language is fluent although they have sometimes certain pauses or breaks in their speech due to the lack of a particular substantive. These aphasics' spoken language is often altered because of the substitution of a specific word with a generalization; that is, with a long explaining sentence, a way that does not mediate the message of communication satisfactorily. This anomia aphasics' speech makes us characterize the patients' language as blurred. But these aphasics sustain a good capacity for the repetition of speech, a normal audition and an intact understanding to the written language. The reading ability is mostly well preserved. This anomia aphasia can be observed in the patients who have recovered from other forms of aphasia. It is therefore a symptom that occurs in every type of aphasia.

Neurological findings about this disease vary a lot from one another. But this aphasic syndrome is often associated with lesions in the area of gyrus angularis or with subcortical lesions. Gloning, Gloning and Hoff (1963) found in a research, in which they tried to localize this disease, that 60% of the patients, with different aphasic syndromes, have lesions in the parietal temporal lobe of the dominant hemisphere. The other 40% have intensive and variable lesions in different localized areas. The CT research studies have shown also the same results (Hayward, Naeser & Katz, 1977).

Up to this section we have been dealing with the different types of impairments, the place of their occurrence and the areas of processing. To plan and carry out a therapy on the disturbances of the aphasics, a limited number of patients, who have the syndromes that are of particular interest to this dissertation, must be found. They will have their word forms and sentence structures examined with certain selected sections of the AAT. The diagnosis has

two aims, on the one hand, to know the type and the nature of the errors as well as the frequency of their occurrence, on the other hand, to structure therapy plans that suit the linguistic abilities of the individual patients. The examination of the patients will be dealt with in the next section.

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Experimental Part

The purpose of this paper in this part is to present practical methods of testing and treating of the aphasic patients, by means of which the therapists can determine the disturbed processes, make recommendations for treatment and have an expectation and a prognosis for the degree of recovery.

5 - The Diagnostic Approaches

Speech and Language disorders need particular diagnostic approaches and persistent therapies. Even though the therapists and the clinics use different diagnoses and therapies, their methods are almost similar to one another. They all have the same aim: to understand the nature of the impairments and help the patients recover from their linguistic disorders, so that the persons, suffering from any disorders, may develop certain strategies with they can control their speech and language in situations of communication. The following description is based on the observations I made as I encountered many patients who have the syndromes of aphasia.

It must be hinted at that through successive analysis of test data obtained from a large series of aphasic patients examined with the AAT five major categories of aphasic impairment have been identified; more than 90% of these patients can be classified in one of these major diagnostic categories (See Theoretical Part, Section: 1). Minor categories with other patterns of impairment that occur less frequently have been also considered. I recognized, as many therapists and examiners did, that because of the complexity of the cerebral and mental processes and also of speech and language processes one can find from time to time aphasic patients who do not fit into the categories I am going to select and describe.

I learned that the syndromes of aphasia in an early age may have different causes and unfold complex processes a fact that requires from the therapists descriptive and variable approaches. Because of the approach I am going to adopt in this dissertation, I assume that there is nothing absolute about this selective classification system in the sense that one way of selecting and classifying phenomena is right and all other ways may be wrong. A selective classification system is simply a sorting system that will be meaningful in dealing with complex processes of the aphasic patients. The use of this method of selecting and classifying aphasic patients has a particular purpose which is the focus on some aphasics' characteristics and linguistic abilities as well as on some modalities and processes of language I wish to investigate and diagnose.

The diagnosis, which has the form of a sample, is carried out at different intervals. It consists of various steps during which the language of the patients must be registered and analysed in

its components. These steps, which will be sketched below, are necessary and primordial as the therapists attempt to deal with the patients' disorders. Generally, any diagnostic steps or tests should foreground two things about any aphasic patient: Which cerebral processes of the aphasics are impaired? What is the prognosis and the chance of any patient for recovery from aphasia? This approach will rely on a descriptive diagnosis (test and retest) and a predictive treatment (unlimited therapy). The aphasic patients' disorders to deal with are related to the places and extent of the brain damages, neuro-physiological conditions and patterns of aphasic impairments.

During the *first step* the therapists inquire about the disease of the patients and talk to the doctors and nurses about it. One wants to know about the results that have been rendered by the medical and neurological examinations. At this stage the therapists need information about the causes of aphasia, other diseases the patient may have and whether diagnostic procedures and certain therapy plans may bother the body and psyche of the patients. Moreover information about any spasms, heart attacks or other neurological problems such as apraxies, memory weaknesses or paralyses are necessary.

On the basis of these details the therapists adapt their diagnosis and therapy to the needs of the patients, thus they avoid the straining of the aphasics' bodies and minds with long testing tasks and difficult therapeutic exercises. The therapists have to inquire about the social situation of the patients, for instance, whether they are care for by their families or they are only patients who are dependent on the nursing staff.

The most important thing that must be given a consideration in this first step is to be sure of how to establish the first communicative contact with the aphasics. Is the spontaneous language of the patients enough so as to limit the kind of aphasia the aphasics suffer from? Or is a systematic and an organized material necessary to the examination of patients' speech and language?

The *second step* consists of the establishment of a personal contact with the patient. It must be a dialogue between the therapist and the patient. A situation in which the presence of a third person may bother the act of communication. It must also be a dialogue without any strain. This context of slight interaction stands as a contact in which the therapist and the aphasic get to know each other. At this stage the introduction of any standard language test can trouble their contacts and even frighten the patients during the first contact. It can turn into an approach that may handicap the therapy process later on.

At this diagnostic level the therapists must introduce themselves as helpers who are to help the patients overcome the problems of aphasia. But if the therapists behave in the opposite

way; that is, just at the beginning, the moment they meet the patients, they start with test situations, the patients will feel overwhelmed with the requirements of the test that may make their language deficits conspicuous. Therefore the patients may find the establishment of any relations of trust with the therapists very difficult. This trust becomes later on a basis to the success of any therapy sessions.

The therapists must proceed otherwise; they should involve the patients in slight dialogues, make notes about their physical and psychological state, as well as pay attention to the capacities, interests, fear and mood of the patients. Finally, they have to observe whether the patients really suffer from the types of aphasia that are already well known to the therapists. It is possible that the patients suffer from other handicaps that impaired their language. This small talk paves the way to any intermittent tests and therapy sessions between a patient and a therapist.

During the *third step* the therapists check whether the aphasics are in a position to meet the demands they make on them. They also observe whether the understanding of simple questions and statements, naming of certain every day used objects, writing of the alphabet, reading of simple words and answering of questions with “yes” or “no” are impaired. The patients, who may have a Broca’s, Wernicke’s, anomic, conduction or trans-cortical aphasia, are often asked to tell something about their families, professions, interests, write some sentences about their hobbies and read small texts.

The therapists must be very tactful; that is, any demands they make on the patients should not bother them but rather give them the conviction that despite the impairment of their language, they are still in a position to use what remains of their linguistic repertoire. Any response coming from the patients, such as nodding, shaking of the head as a sign of consent or disagreement or smiling to a particular stimulus, must be considered by the therapists as a positive participation in the act of communication.

In this way the therapists get a general overview about the understanding, naming, repeating, articulating, reading and writing abilities of the patients. The latter on their part have forwarded the material about the remains of their linguistic ability without being aware of the simplicity or complexity of the test situations or the demands that have been made on them by the examiners or therapists.

During these tactful steps even though the therapists appear to have deviated from the standard diagnosis, they succeed in creating an atmosphere of appreciation and trust other than in gathering of some percentage values. But it must not be ignored that this individual

approach presupposes from the therapists the possession of a high qualification in speech and language mechanisms and pathology.

This playful testing method, wherein the patients have had the scope to respond with the greatest ease, help the therapists gather in a systematic way the clues, for instance, the recording of the dialogues. The latter help them analyse the patients' language, categorise their impairments and set therapy plans for each of them. After four slight therapy sets, the therapists proceed with the use of standard diagnostic tests so as to emphasize or discard the assumption they made during the analysis of the results of testing. They must be sure of the types of disorders the patients suffer from and their remaining linguistic abilities.

Finally, the therapists register any changes that are unfolded by a diagnosis and triggered by a therapy training. Up to this point onward diagnosis and therapy processes run parallel to one another. They determine the performance of the patients and their individual problems. The abilities and problems of each patient must be a theme of the whole nursing staff if therapy has to be conducted in a clinic or a nursing house.

5.1 – General Characteristics of the Diagnostic Tests

Having established relations of trust and acquaintance with the patients, the therapists proceed with the intention of obtaining minute details about their speech and language. These can be gathered through an observation of their language deficits, a general overview about their diseases (biographical anamnesis), medical findings, standard aphasia tests and other tests which examine the performance of the brain. Examination procedures are sometimes complex and results are often confusing. However, there are recurring patterns of aphasic impairments that can be identified by simple testing.

5.2 – Instruments of Testing

The therapists often use standard aphasia tests to get information about the state of the modalities so as to limit and find the undisturbed linguistic abilities of the patients. Certain tests are not suitable to pinpoint the disorders; they can not be employed as a basis for the composition of a rehabilitating program. A standard diagnostic test is the only instrument that assists the therapist in getting the intended information from the aphasics. The reason why a short skipping attention to the important tests becomes necessary in this context. As it will be unfolded, the tests have many points of intersection and similarities even though they vary in their contents and ways of administration. An elaboration of the form and content of each of

them can be helpful to any therapist who deals with the phenomenon of aphasia or other disorders of language.

Most of the following tests appear to be based on the assumption that speech and language are based on a process of three levels, hereby three parts are differentiated from one another: the input, the processing and the output. There are different possibilities with which the stimuli can be brought inside this processing system to get responses (reactions) to the items. The idea of the stimulus and response is used to examine the way the system functions. It is quite well known that the input takes place through the auditory, visual and tactile-kinaesthetic channels. However, the output, which is the result of the processing in the nervous system, is rendered through speech, writing and body movements.

As a matter of fact, the inputs are the tasks with which the aphasics are examined. The outputs; however, are responses that give the therapist information about the type of aphasia, its place, how to carry out a diagnosis and structure a therapy plan. Every test is based on the above variables (Input, Processing & Output).

In what follows an overview will be submitted about the well known tests so as to draw a distinction between what is used by the therapists in the United States therapy centres and German clinics. These tests facilitate the therapists' comprehensive examination of the types of aphasia. Attention will be given to the following five test batteries: (1)the *Minnesota Test for Differential Diagnosis of Aphasia(MTDDA)* (Schuell, 1965), (2)the *Porch Index of Communicative Ability(PICA)* (Porch, 1967), (3)the *Boston Diagnostic Aphasia Examination (BDAE)* (Goodglass & Kaplan, 1972), (4)the *Western Aphasia Battery(WAB)* (Kertesz & Poole, 1974) and finally to (5)the *Aachener Aphasia Test(AAT)* (Huber, Poeck, Weniger & Willmes, 1983). These are the widely used aphasia tests. Although they differ in their orientation, they have some common objectives: Firstly, they assess the patients' linguistic abilities that become later on as a guiding basis to any therapy plan. Secondly, they are used to measure the performance for a long time to detect the changes that may occur over time. Thirdly, they pinpoint to the syndromes of aphasia and make inferences about the cerebral localization of these impairments. The following tests, and many others that are not to be cited in this context, are sufficient to any diagnostic purposes.

5.2.1 – Minnesota Test for Differential Diagnosis of Aphasia (MTDDA)

MTDDA was considered as a prototype test for aphasia even though Halstead and Wepman, (1949), Head (1926) and Robbins (1939) had used other forms and procedures of testing. Hildred Schuell's MTDDA was the first test for the adult aphasia. It paved the way to the

oncoming tests and predicted their contents and structures. The purpose of using the MTDDA is to assess the patient's abilities and weaknesses, as far as the modalities of language are concerned, as a guidance to the sketching of a therapy program. The other aims included a differential diagnosis and an anticipation of recovery. In this context differential diagnosis refers to the fact whether the examined patients have aphasia, agnosia, apraxia, dysarthria, other types of disorders or brain impairments. It makes no clear reference to differentiating the forms of aphasia or other chronic brain syndromes.

This test developed from seven revisions made over seventeen years, of course starting with the first version in the summer of nineteen forty eight. The nineteen sixty five version was the eighth form. It consisted only of very few changes from the sixth and the seventh version. Thompson and Enderby (1979) wrote that “ *it is the most widely used aphasia assessment in Britain*” (P.195).

The MTDDA is a complete test of aphasia. Its application takes almost six hours. It consists of forty-six sub-tests divided in five parts: (1)auditory disturbances, (2)visual and reading disturbances, (3)speech and language disturbances, (4)visuo-motor and writing disturbances, (5)disturbances of numerical relations and arithmetic processes. During the examination of the four modalities of language the test is graded from easy to difficult. The test has clinical rating scales for each modality. These scales provide test findings to the therapists and orient their attention to how to forward the patients with a functional communication.

The auditory disturbances consists of nine sub-tests that include common word recognition, serial word recognition, answering yes/no questions, following instructions and understanding paragraphs. Other two sub-tests, known as digit and sentence repetition, are used to examine the auditory short-term memory.

The visual and reading disturbances are examined with eight sub-tests. It should be taken into account that another score is derived from the reading rate during the use of these sub-tests. Thus, the examiner obtains the sum of nine scores after the application of these sub-tests. Visual language is assessed with word, sentence, and paragraph comprehension. The patient's reading aloud is also examined so as to answer to the needs of the other two sub-tests.

Speech and language disturbances are examined with the use of fifteen tasks. The attention is given to oral articulation, rapid alternating movements for speech sounds, repetition of words and phrases that are selected and organised according to particular speech sounds. Automatic verbal expression is tested by having the patient count to a certain number, say the days of the weeks and complete sentences. Propositional form is assessed by picture naming, answering

questions, using a word in a sentence, describing a picture, defining words and retelling a paragraph.

Visuomotor and writing disturbances are examined with ten sub-tests. The patients is told to copy or write a word, a sentence or a paragraph.

Numerical relations and arithmetic processes are tests with four sub-tests using the notion of addition, subtraction, multiplication and division.

The therapist needs test materials that include two manuals: an interpretation and administrative one, a record booklet and some packs of visual stimulus cards. This administration manual contains instructions that assist the examiner in testing the patients and recording the scores of each task. It is recommended that the test should be used in two sessions due to its length. The therapist should stop the test the moment the patient shows signs of tiredness or uneasiness. But if the patient is a nursing home case, the test may take a long time as it has to be scheduled only for a half-hour session.

The test series reported by Schuell et al.(1964) focused on re-testing after the end of a therapy period. These re-testing intervals take place intermittently in a time of one to six months or more. The aim of this series of testing was to assess the patients' recovery over a particular time and not to examine whether the measurement device is stable, valid and reliable.

The MTDDA, which includes a differential diagnosis, was not designed to differentiate and identify the aphasic syndromes as Schuell did not recognise these differences within the aphasic phenomenon. The therapist, using the MTDDA, intends to derive from the patients' performance - which is triggered by the naming, description, comprehension and repetition of the tasks of testing - the evidence for the identification of the disturbances.

An adaptation of the short version (Schuell, 1957) was used by Halpern et al.(1973) to make a difference among aphasia, apraxia of speech, confused language, generalized intellectual impairment and dementia of chronic brain syndrome. Schuell's categorization of neural damage and impairment of communication has undergone at least two revisions. In the revised interpretation manual (Schuell, 1973) the categories from five major categories to two minor categories and finally to seven major categories were reorganized. These categories were not related to the brain regions, where the lesion might have occurred, because the techniques that could have localized the brain lesions were not very advanced in the fifties and sixties. Therefore, Schuell divided aphasia in the following groups:

Simple Aphasia is the first group. It represented reduced language function in all modalities without any complicating conditions.

Aphasia with visual involvement is the second group. It consists of simple aphasia with more severely reduced reading and writing functions.

Aphasia with sensory involvement, Schuell's third group, has been labelled as an apraxia of speech. It is a non-fluent or Broca's aphasia with apraxia.

Aphasia with scattered findings compatible with generalized brain damage is the fourth group which is described by Schuell as aphasia with visual and motor involvement. The patients, included in this group, show behavioural changes and bilateral brain damage.

Irreversible aphasic syndrome is Schuell's fifth group. It stands for the loss and impairment of every modality of language. It is a global aphasia if we label it with a terminology of the recent aphasiologists and speech-language pathologists.

Mild aphasia with persisting dysfluency is Schuell's minor syndrome. This type of aphasia, labelled by Schuell as a mild dysarthria, carries traces of articulatory disorders.

Aphasia with auditory imperception is also Schuell's minor syndrome. It refers to the patients who behave as if they were deaf. It is considered as a mild form of a Wernicke's aphasia.

The rate of recovery is valued as being either excellent, limited but functional or poor. Categories with excellent recovery in all modalities include simple aphasia, aphasia with visual involvement and mild aphasia with persisting dysfluency. However, categories with visual involvement or reading and writing disorders improve slowly. Other categories with persisting dysfluency, but normal patterns of articulation can improve if the patient succeeds in the establishment of a conscious control over the speech movement. Limited recovery of language is assigned to aphasia with a sensorimotor involvement, an intermittent auditory imperception and a total brain damage. Most of the therapists agree that the level of recovery from a total aphasia is very poor. In this case even though auditory comprehension may become functional, a satisfactory improvement of other modalities can not be achieved (Schuell, 1973).

The use of the MTDDA, as a test and a retest approach, is a prior guide to the planning of treatment. It is a context where a therapist observes the speech and language of the patients, gathers their responses, that render an insight into the impairment, and assesses their performance. In the course of testing and re-testing; if a test helps in the identification of a disorder, the options for the direction of treatment will be narrowed. The therapist directs, thus, treatment, in an accurate and effective way, to the major problems and disorders that disturb the patient's communication.

The MTDDA can provide these advantages because of its comprehensiveness that supplies many tasks and items of comparison that help the therapist to make inferences about the basic

problems to be treated. There are no guidelines in the test manual for turning test results into therapy plans. But there are three principles that help the therapist make such a decision: the primary principle is to select an adequate stimulus, the secondary one is to get responses from the patients and not to force them out of them, the third and last principle is to select a task which is challenging to the patient's ability but which can be answered successfully (See Section: 6.3, pp.139-141).

5.2.2 – Porch Index of Communication Ability (PICA)

PICA is a standardized aphasia test despite its limited scope. It is not comprehensive as the MTDDA as far as the number of tasks and items is concerned. Emerick and Hatten (1979) criticized this test as not being founded on a scientific base that provides treatment methods and demonstrates recovery. However, Bruce Porch (1967) responded that a standard test “... *would not solve all the problems of aphasia testing, but would serve as a starting point for improving communication between researchers and [...] as a spring-board for the development of better methods...*” (p.3).

PICA, which has had an enormous influence on clinical aphasiology, is oriented towards providing a reliable measurement of the degree of the deficit and the amount of recovery. As this test was designed to measure recovery, it has been used to submit predications about the amount of recovery in terms of scores. This test consists of eighteen sub-tests for the four modalities of language, manipulation of objects, visual matching and copying of abstract forms. The eighteen sub-tests were labelled as *gestural*, *verbal*, and *graphic*. Each sub-test consists of ten items, (whose objects are used throughout the eighteen subsets). The examiner gives the patients very few linguistic clues about the objects with the expectation to obtain a maximum of information later in the test.

To administer this test the examiner needs test material that consists of two manuals, a guide of instructions, ten objects in double, a score sheet and other forms so as to apply the graphic sub-tests. This administration is confined to some guidelines so that the patient will be sure that the patient is assessed in the same way each time the test is repeated. These prescriptions include accurately what the examiner says to the patient in the administration of each task. Standard test conditions require a test room free of distractions, prescribed seating arrangement, particular arrangement of the objects, and procedures specified for each task. The order of task presentation must be consistent and the series of tasks must be completed in one session. PICA's multi-dimensional scoring shows the degree of correctness and incorrectness in the aphasic behaviour and thus renders more information quantitatively than a

plus-minus scoring. Moreover, it is based on five dimensions of the patients' responses; namely, *accuracy* - the correctness of the responses - , *responsiveness* - the sum of information the patient needs to complete a task - , *completeness of the response*, *promptness* - the time needed to respond to a task - and *efficiency* - ability in performing. These dimensions are related in a rank order of response adequacy; the highest value in the rank represents the most adequate response and the last and low value stands for the least adequate response.

The interpretation of the performance that is issued from the PICA is helped by turning raw scores into percentage values which indicate the deficit with respect to a large sample of left hemisphere damaged aphasic patients. The turning of raw scores into percentage scores is accomplished with tables provided in the administration and interpretation manual. The way Porch sampled his aphasic patients was intended to reflect the male, female, age, race, education, occupation, and aetiology of the aphasic patients. Strokes and brain injuries were the dominant aetiologies of the group.

PICA profiles have been used to differentiate among aphasia, apraxia of speech and dysarthria. Porch (1979) pointed that PICA is sensitive to non-aphasic patients and motor speech disorders. Profile forms with bilateral brain damage are to be found in Porch (1971a & 1978), Watson and Records (1978) and Wertz (1978). Bilaterally damaged patients generally do less well on the easiest sub-tests than aphasic patients. They show a progressive regression of functions instead of an amelioration in recovery.

Porch indicated that the objective identification of aphasic and non-aphasic disorders is important for the appropriateness of a continual rehabilitation. Porch and Porec (1977) instructed subjects to imitate aphasia so as to point to the importance of the test in deriving the true aphasia profiles. The group of the subjects consisted of speech pathology students and bartenders. They all produced a profile which was in the opposite direction of the typical aphasia profile.

The use of PICA was considered to provide objective measurements of recovery. It renders a single summarising score. It is a statistic value that depicts changes in single sub-test-related functions, response categories and overall language function. Mean scores are used as a basis for predicting later levels of a functional language. The overall score is a single indicator of the amount of recovery made by an aphasic patient. It reflects the performance in the 180 items of the test. The overall score is thought to be reliable in comparison to the mean scores. Reliability is not so strong at the level of certain mean scores of a particular sub-test.

The difference between the nine highest sub-test and the nine lowest sub-test is referred to in the PICA as the dynamic range of a patient's pattern of performance at any time in his or her

recovery. This dynamic range is a range of functional ability in which the high percentage represents the patient's ability for the overall recovery. It is a concept that predicts the patient's recovery which can be observed in a period of six months if the patient's training is continuous and systematic. Wertz, Deal and Deal (1981) waged a critic on the concept of the High-Low sores as it is only a simple method of prediction. Kennan and Brassell (1975) commented on aphasia tests in general as being time-consuming, too restricted and too formal in standardization of administration. According to them standard tests "... *have been so formal that they have served to break down the rapport with which clinicians spend so much time and effort to establish*" (p.2). Emerick and Hatten (1979) considered PICA as being rigid and mechanical that it may endanger the relationship between the therapist and the patient. Despite the above shortcomings, the PICA remains in many cases very effective. The patients mainly their relatives, family members or closest can be advised about the general nature of this test before taking it for the first time. Tasks and stimuli can be represented calmly, continuously and warmly without foregrounding the pressure implied by the mechanical aspect of the PICA. Therefore, the sixty minutes that the PICA takes can not be harmful to the relationship that develops between the therapist and the patients during several weeks.

5.2.3 – Boston Diagnostic Aphasia Examination (BDAE)

This test was developed by Goodglass and his colleagues, Quadfasel and Timberlake in 1964. The BDAE is directed towards the diagnosis of the presence of aphasia and its types, of course leading to conclusions concerning the location of brain damage (Goodglass & Kaplan, 1972). It is a comprehensive test which contains twenty seven sub-tests. It is made to sample language behaviours which appear to be suitable for the identification of aphasic syndromes. These behaviours include auditory comprehension, self-initiated and conversational speech, word retrieval, and repetition. The moment a symptom pattern indicative of a syndrome is apparent from the results, the region of the brain lesion can be pinpointed. The examiners (mostly therapists) who intend to categorize or describe the patients according to syndromes are advised to use the BDAE as a basis for this categorization.

This Test consists of the following sections that deal with the modalities of language:

Conversational and expository speech is the first section in which conversational speech is elicited with questions that have the form of an interview or conversations about familiar topics. A picture is then presented to the patient to be described. The therapist must record each utterance or sentence with a tape recorder.

Auditory comprehension section has four sub-tests. The first sub-test of word recognition is concerned with having the patient identify objects, actions, letters, numbers, colours and shapes simply by pointing to the items on stimulus cards. The other word recognition sub-test involves pointing to body parts. In this case it must be noted that the right-left hemisphere discrimination problems, that result from the parietal lobe damage, are investigated within this task. The other two sub-tests represent following the commands of the examiner and then answering yes-no questions and listening to the examiner reading each time a short paragraph from which a question is derived to which the patient has to provide an answer.

The *oral expression* section contains sub-tests for oral and verbal apraxia, non-propositional speech, repetition, and word retrieval. The tests of non-propositional speech consist of citing days, months, alphabet, counting, reciting previously memorised verses and singing. Repetition is an important feature of this test. The patient is made to repeat phrases and sentences which increase in length and alternate between high and low likelihood of usage. He/she is also required to respond with single words to questions spoken by the examiner. Naming of visual stimuli is examined with the same stimulus cards used for the auditory comprehension section. Divergent word retrieval is assessed by instructing the patient to produce as many animal names as possible in a restricted amount of time. Word and sentence reading are also assessed in this section.

The section of *understanding written language* contains five sub-tests of word recognition, comprehension of spelling, word comprehension, and sentence paragraph comprehension. The writing section consists of seven sub-tests in which written mechanics, non-propositional writing, writing to dictation, spelling, word retrieval, and sentence writing are assessed.

The BDAE has its own test material which is used for the administration of testing and scoring. It is made up of a set of stimulus cards containing pictures and reading items, an examination booklet, as well as an administration and interpretation manual. The examination booklet, used to record scores and behavioural changes, contains task instructions. If we compare it with the MTDDA, the latter consists only of one booklet with task instructions and another booklet for recording performance. Another feature of the BDAE is the use of a manual containing general guidelines for the administration of testing and the scoring of the results. These guidelines appear in the protocol booklet.

This test takes one to four hours to administer. It measures language functions which are related to different areas of the left hemisphere that are differently affected by the syndromes of aphasia. The use of the Boston Test helped the examiners to foresee the regions where the lesions could have occurred thanks to the patterns of the test that managed to foreground the

patients' performance. Naeser and Hyward (1978) submitted CT-scan data of nineteen patients who were examined by the Boston Test. They provided an important insight into the localization of the disorders. Their drawings of the lesion areas were consistent with the findings identified by the BDAE of Goodglass et al.(1964) about the Broca's, Wernicke's, global, anomic, conduction and transcortical aphasia (See Section: 6.3, pp.144-146).

5.2.4 – Western Aphasia Battery (WAB)

Kertesz and Poole (1974) developed the WAB at the University of Ontario in Canada. It is an alteration to the Boston Diagnostic Aphasia Examination, but its purpose is similar to the BDAE as it identifies the syndromes of aphasia and attempts to pinpoint to the impaired areas. The WAB differs from the BDAE in structure and content. The main difference lies in the WAB's dependence on subset scores so as to classify the aphasic patients. Similar to the PICA, the WAB forwards an individual overall score which is known as the aphasia quotient. However, the WAB is no longer as the PICA because its AQ (Aphasia Quotient) shows performance in only auditory and speech modalities. On its part the PICA has other advantages. It deals and presents the patients' performance in all four major language modalities.

The overall basic pattern for deriving the AQ is made up of four sections: (1) *Spontaneous speech* that consists of questions to an answer, a picture to describe, and a line to draw taken from the MTDDA; (2) *Auditory verbal comprehension*, which contains tasks similar to the BDAE but with more yes/no questions and more instructions to follow; (3) *Repetition*, which includes single words, phrases and sentences; and finally (4) *Naming* that subsumes sub-tests of real objects, word fluency, sentence completion, and single word answers to questions.

The Western Aphasia Battery can be administered to most aphasic patients in one hour. Kertesz (1979) widened the scope of this test as he added other additional tests for reading, writing and non-verbal functions from which he inferred the performance quotient (PQ). Shewan and Kertesz (1980) introduced also another term, the Cortical Quotient (CQ) which stands for the score which is derived from all sub-tests. Scoring and calculation required to reach the Aphasia Quotient is what discriminate the WAB from the BDAE. Most of the data gathered about the spontaneous recovery is presented in terms of the AQ. There is a rating scale of fluency, whose scale points are defined with respect to length, grammatical completeness, use of jargon, word finding, and intonation; and also a rating of information content, whose scale points are determined with respect to the communication value of the

patient's utterances. This value relies on the number of correct responses to the questions and the completeness of picture description.

The interpretation with the WAB focused on differential diagnosis; it is a trial to define the rate of impairment and recovery. Even though the WAB was used to measure recovery, prediction in terms of the AQ has not been developed formally. The norms of the test can be used to identify different disorders. Kertesz (1979) took it for granted that an AQ below 93.8 is an indication of aphasia. Patients with diffuse, cortical or sub-cortical brain damage are likely to go beyond this score. Kertesz's test unfolded the AQ's average of the syndromes of aphasia. It is derived from the scores of auditory comprehension, repetition, naming and patterns of fluency rating.

5.2.5 – Aachener Aphasia Test

The AAT is a special method, developed by Huber, Poeck, Weniger and Willmes (1983) so as to deal with the aphasic language in German speaking countries. This test diagnoses aphasia that arises from brain impairment and assesses repetition, writing, naming, comprehension and spontaneous language. It also differentiates the aphasic standard syndromes in global, Wernicke's, Broca's, anomic, conduction and transcortical aphasia. Likewise, it identifies the non-standard aphasia, determines the severity of the disorder through a performance profile and describes the aphasic disturbances on different language processing levels (morpho-phonetic, lexical, syntactic and semantic level). The AAT is suitable for a single diagnosis, a description of the aphasic syndromes and a re-testing. Its aim is to detect the place of the disorders on the basis of which the therapist can control and direct the process of treatment and effect of therapy. All in all, the Aachener Aphasia Test is the commonly used test battery in German speaking countries (See Section: 6.3, pp.146-147).

This test consists of six sub-tests :

Spontaneous language is the first sub-test. It assesses the patient's spontaneous speech with a range of scores from 0 to 5 points. The examiner records a patient's 10minutes dialogue. It is a standard interview in which clear cut word forms and questions - used as stimuli - are fixed at the beginning. The questions refer to the patient's disease, profession, family and spare time. The recorded speech is a basic data that can be used to analyse the features of the impaired speech and the frequency of their occurrence in the patients' language (speech velocity, recurring utterances, language automatisms, stereotypes, phonemic and semantic paraphrases, phonemic and semantic neologisms, word finding disturbance, missing flexion,

sentence fragments, sentence restriction (paragrammatismus)). Moreover, general communicative behaviour is assessed according to the following criteria that are divided in six sections: (1)communicative behaviour, (2)articulation and prosody (melody of speech), (3)automatized language (stereotype, automatisms), (4)semantic structure (verbal paraphasia, word retrieval difficulties), (5)phonological structure (literal paraphasia, neologisms) and (6)syntactic structure (structure of sentences, grammar).

The token test is the second sub-test which is used to assess the general comprehension of language. The patient has to choose the right token out of a set of tokens different in shape, colour or size. The token test has five sub-tests of increasing difficult levels of administration. The tasks are carried out orally following certain established sound patterns.

- The first pattern consists of *five squares* and *five circles* different in colour. The examiner asks the patient to find the *adjectives of colour*.

For example:

Zeigen Sie das grüne Viereck?

Zeigen Sie den blauen Kreis?

- The second pattern is made up of *five small squares*, *five small circles*, *five big squares* and *five big circles*. Each of them is different in its colour from the other. The task of the patient is to find the adjectives of colour and size.

For example:

Zeigen Sie den großen roten Kreis?

Zeigen Sie das kleine Viereck?

- The third pattern subsumes *five squares* and *five circles*. They are all different in colour. The patient is asked to find the adjectives of colour, using at the same time a conjunction.

For example:

Zeigen Sie den weißen Kreis und das rote Viereck?

Zeigen Sie den grünen Kreis und den blauen Kreis?

- The fourth pattern includes *five small squares* and *five small circles*, *five big squares* and *five big circles*. They are all different in colour. The demand made by the examiner on the patient is to recognize the colour and the size of the adjectives of each question that includes a conjunction.

For example:

Zeigen Sie das große grüne Viereck und den kleinen weißen Kreis?

Zeigen Sie das kleine gelbe Viereck und das blaue Viereck?

- The last fifth pattern consists of *five squares* and *five circles* different in colour. The patient must answer a question in whose structure there is an adjective of colour which is arranged in a structure that contains either a conjunction or a preposition.

For example :

Legen Sie das weiße Viereck auf den grünen Kreis?

Nehmen Sie den blauen Kreis oder das gelbe Viereck?

Bevor Sie den grünen Kreis berühren, nehmen Sie das weiße Viereck?

It must be remarked that the token test differentiates between aphasic and non-aphasic brain damaged patients. It does not contribute to the classification of the individual aphasic syndromes. The assessment simply shows whether the tasks are answered in a correct or faulty way.

Repetition is the third sub-test. The patient has to repeat different sounds, words or sentences. The test has five sections separated in items of 10 sounds, 10 mono-syllabic words, 10 loan-words, 10 complex words and 10 sentences. Each item is pronounced by the examiner at least one time. The patient is required to repeat the name of an item just after the examiner has finished its pronunciation. The items of the sections have the following form and content:

For example:

1. Sounds

/a:/, /ö:/, /oi/, /sch/, /f/

2. Mono-syllabic words

Floh, Tisch, Ast, Bank, Knirps, Zwist

3. Loan- and foreign word

Hur, Kanu, Lotterie, Schokolade, Influenza, Liliputaner

4. Compound words

Haustür, Badewanne, Kraftfahrzeugschein, Unverhältnismäßigkeit, Hallenballmeisterschaft

5. Sentences

Der Hund bellt.

Wir werden von ihm abgeholt.

Er holt seine Mutter mit einem Auto vom Bahnhof ab.

Der Mann, der unser Auto kaufte, ist seit gestern verheiratet.

Written language test is the fourth sub-test. It is an evaluation of reading and writing abilities. The examiner requests from a patient to read aloud and compose letters so as to form the words. In this context the patient uses small card boards on which letters are printed and follows the examiner's instructions. He/she is required by the examiner to write mono-, bi- and polysyllabic words. The test consists of three sections each of them has 10 items.

- *Reading aloud section* has as a material of examination that consists of small card boards, on which the words and the sentences to be read, are printed.

For example:

Bild, Brief, Brille, Löffel, Seite, Sicherheit, Wahl, Das ist mein Haus

- *Composition to dictation section* includes letters and words printed on cards with which the patient has to compose words or sentences following in this context the examiner's dictation and instructions.

for example:

B-A-L-L, B-A-N-D, G-E-L-D

LEDER-JACKE, NOTIZ-BUCH, INFORMATIONEN-VERARBEITUNG

RECHT-SCHUTZ-VERSICHERUNG, BINNEN-SCHIFF-FAHRT

ABWASSER-REINIGUNGS-ANLAGE

DIE-DAME-SPIELT-TENNIS

DAS-MADCHEN-LIEST-EIN-BUCH

DER-MANN-PFLANZT-EIN-BAUM

- *Writing to dictation* is the third section of the written language test whose material consists only of a sheet of paper and a pen. During this test the patient has to write the words that are dictated by the examiner.

For example:

Lesen, schreiben, arbeiten, fahren

Amt, Ast, Bank, Beruf, Beschwerde

Bequemlichkeit, Beschäftigung, Binnenmarkt, Geländewagen

Machtergreifungsstreit, Magenschleimhaut, Rückenschmerztherapie

Er schreibt einen Brief

Er schreibt seinem Betriebsleiter einen Brief

Sie bringt den Brief zur Post

Er kann nicht kommen, weil er krank ist

Er hat gesurft obwohl die Wellen hoch waren

In the repetition sub-test above the items are assessed according to a criterion that runs from 0 to 3 points so as to define the presence or absence of the disorders; however, in this section of the written language test the examiner applies the test and picks up the results from the responses of the patient. In this examination context the examiner provides no assistance to the patient even though the latter relapses in mistakes of writing at different intervals of testing.

Confrontation naming test is the fifth sub-test. It is an assessment of the patient's ability of describing things, situations or actions using adequate words. The test includes 10 sections each with 10 items. In the first three sections objects and colours are named with one word. In the fourth and fifth sections mapped or drawn situations and actions are named with one sentence.

For example:

1. *objects* (simple nouns)

Tisch, Buch, Heft, Stift, Stuhl, Waage

2. *Colours*

10 small card boards in 10 different colours

3. *Objects* (compound words)

Staubsauger, Sicherheitsnadel, Kassettenrecorder, Tischlampe, Dosenöffner, Rollstuhl

4. *Situations*

They could be of three types:

- Situations of description(1), narration(2) and argumentation(3)

5. *Actions* can be tested by sentences in which the subject (1)does something, (2)makes somebody to do something, (3)is made by somebody to something, (4)or finally the subject does something together with somebody.

The 30 items are assessed according to the 0 to 3 points scale.

The comprehension test is the last sixth test. It assesses the patient's understanding of words or sentences. The test is built in a way that the patient has to select the right image from a small card board of four drawings and assign it to a word or a sentence that was read previously by the examiner. In the first test section of words and second one of sentences the items are read by the examiner, but in the third section of words and fourth one of sentences the patient must read an item and assign it to an image that consists of four drawings presented to the patient by the examiner.

The card board with the four drawings can be presented after the word forms of the drawings have been read and hidden. They are selected in a way that one drawing, which does not fit in with the image of a card board, has a sound as well as a semantic similarity to the word stimulus (section1 & 3 of words); likewise, a thematic, a syntactic and a morphological similarity to the sentence stimulus (section2 & 3 of sentences). The patient selects one drawing from the four drawings of the card board and assign it to an item (word or sentence stimulus). Finally, the patients' responses are assessed with a scale that extends from 0 to 3 points.

To compare the severity of the aphasic syndromes of different patients and evaluate their progression over time, it is necessary to quantify the defects and standardize the examinations. But the decision which test to use is not as simple as it appears to be. Many therapists use one particular diagnostic test loyally and accurately because it is the test that has served them in the best way for many years. A therapist, who tries to apply another test, must get accustomed to its nuances. In this case difficult processes of adjustment can be developed in the course of time.

Therapists, who work regularly with the aphasic patients should have the MTDDA, PICA, BDAE and AAT at their disposition. They can, thus, be flexible in their choices about the method that can be effective during the examination and assessment of the patients'

language. They can select from each of these tests the portions that could supplement the assessment of individual cases. It is often recommended that a therapist or an examiner should master one of the short tests and have a general overview about the others because long testing is time and energy consuming.

Research, that has up now altered and refined theoretical understanding of aphasia, led to the rise of new methods of diagnosis and assessment. Each of these diagnostic tests has its own valuable procedures. Their effect depends on what the examiner intends to do and achieve with the process of testing and re-testing of the patients at different intervals. Some examiners of the aphasic language want to deliver theoretical assumptions about aphasiology; however, others follow the intention of attempting to determine the regions of the impairments or the deficits, categorize the syndromes of aphasia and finally sketch a therapy plan that suits to the linguistic ability of each patient (See Sections: 6.2 & 6.3).

Although these tests appear to follow the same intention which is to find the disorders and categorize them, their structures reflect different primary objectives. No one can claim that a test does one thing and not another because the main aim and intention of each examiner or therapist using these methods of diagnosis and assessment lie in the objectivity and interpretative abilities of the examiner. Most of these tests serve the major goals of diagnosis and assessment if an examiner proceeds carefully towards the results and interprets them with regard to each test's individual and unique characteristics, of course, with respect to the assessment strategies that were sketched in the previous examinations.

The tests are helpful in identifying the deficits and providing explanation to a variety of symptoms. They are therefore the basis so as to infer reliable findings about an impaired language and the brain functions. The information that follow in the next sections of data analysis are unfolded suggestions about the AAT as an instrument of diagnosis and assessment that paves the way to particular and systematic ways of treatment.

5.3 – Data Diagnosis with the AAT

Due to the limitations set by the requirements of this research paper, I will use and apply only certain sections of the Aachen Aphasia Test; otherwise, this paper will be too long without any particular targets. I opted for the use of the following tests: *spontaneous language test*, *repetition test*, *confrontation naming test* and *comprehension test*. The use of the *Spontaneous language test*, which is the first section of the AAT, helped me gather an important data about the *global*, *Broca's*, *Wernicke's* and *Anomic* aphasics. This test will set a foundation to the type of aphasic language, on which I will work in this paper. The responses of this test will

unfold a general insight into the aphasics' word formation and sentence construction as well as word and sentence comprehension and production. The aim is to gather as much information as possible about the form and content of the patients' words and sentences that are to be treated during the administration of the first and second phase of therapy.

5.3.1 - Spontaneous Speech

- *global Aphasics*:

The following dialogue shows the spontaneous response of a male patient, who suffers from the syndrome of global aphasia:

E. : Guten Tag Herr G-

P. : (he nodded once) Gut.....(silence)

E. : Herr G. wo wohnen Sie ?

P. : Neu ... (Pause) Neu.... ja..... Neu...Neu ...Neu... ss

E. : Wie Kommen Sie hier zu uns ?

P. : (he made no reply he just stared at me)

E. : Kommen Sie mit der Bahn? Oder Wurden Sie von ihrer Frau hier hingefahren?

P. : (he remained silent. There was a long break.) Frau...ja....

E. : Ihre Frau fährt Sie hier hin ?

P. : Ja ... (he gave a sigh of relief)

Another dialogue with a second female patient with the same symptom submitted the following data. Mrs. M. was shown the picture of a ship that sailed along a river in a sunny day so as to trigger a small spontaneous dialogue.

E. : " Mrs M. was ist das ?"

P. : (Mrs M. looked at that picture for a long time) ... Bi...

E. : Ja, richtig, sehen Sie etwas in diesem Bild ?

P. : etw... Bi ... (She became thoughtful)

E. : Das ist ein Schiff.

P. : Ja ... (pause)

E. : Das ist kein Flugzeug. Das ist ein Schiff

(Then I showed her the picture of a plane)

P. : Ja ... Flug (pause) ... (she remained silent)

E. : Frau M. man kann mit einem Schiff eine schöne Reise machen.

P. : Oh! Ja sch ... n ... (Mrs M. smiled and fell in silence, but suddenly she retorted)

Äh! ... was ...sch... (she pointed at the water that flew along the river).

As far as the global aphasics' are concerned their produced spontaneous language is very poor in form and content due to the impact of global aphasia on their language. It has no word formation, sentence construction and semantic component. It is very difficult and almost impossible to carry out a linguistic analysis on this data. Undertaking any attempts in this direction will be an adventure in no man's land. Therefore, I will not take it into account

during the examination of the Broca's, Wernicke's and anomic aphasics' words and sentences that will be provided as responses to particular stimuli.

- Broca's Aphasics

The following two examples show the way the Broca's aphasics express themselves in a spontaneous language.

E. : Herr S. was machen Sie heute Abend?

P. : Gehe ... Kino... heut Abend.

E. : Das ist schön. Gehen Sie dort allein?

*P. : Ich ... nein [a long pause] Frau ... Sohn... zusammen Film gucken. Film gut ... Frau
Zuhause nit gut allein ... sagen me Frau ... [a long pause] ich zusammen Restaurant essen
Frau ... Sohn gern Restaurant essen.*

The second example delineates the same characteristics as the above instance.

E. : Frau B. was machen Sie in den Ferien?

P. : Mann ... Urlaub ... Reise machen ... nit Taxi Flugzuck

E. : Sie wollen eine Reise mit dem Flugzeug machen.

P. : Ja, mit Fugzug

E. : Wo wollen Sie hinfliegen?

P. : Mann... Fliegen Malga ... zwie Woche ... Spanien. Vie Sonne ... Strand schön.

The spontaneous language of the Wernicke's aphasics differs completely from that of the Broca's both in form and content. The following examples unfold these differences:

- Wernicke's Aphasics

E. : Frau K. haben Sie Freunde da wo Sie wohnen?

P. : Ha ah viele Häuser. Hundert im eine dort auch hier.

E. : Ihre Freude wohnen hier in dieser Stadt?

P. : Nach ... te ...eh... spazten mit mein gut basten vin ane mer Sommer.

E. : Frau K. ich habe von das was Sie mir sagen wollen wenig verstanden. In diesem Sommer wollen Sie mit ihrer Familie etwas unternehmen?

P. : Freunde un so auch, jetzt um diese Zeit ... äh na denn ein ein für oder für mich et kanne.

(she held her hand on her mouth) Oh! Gott! Das ist schwer

E. : Frau K. ich habe wenig verstanden. Ich weiß Sie wollen mir das gern erklären, aber da kommen immer andere Wörter in ihrer Sprache. Das ist aber nicht schlimm.

K. : Ja ich weiß, aber aber ein denn manches, ja ach die Sache nicht weiß.

Another patient's spontaneous language, who has a Wernicke's aphasia, shows the same features as the above example.

[...]

E. : Herr W. erzählen Sie mir etwas über ihren Beruf. Bevor Sie krank geworden sind was haben Sie beruflich gemacht?

P. : Ah. Viele mit den doch arteiben dort nicht Gebau... fahten pat kann könnte.

E. : Ok, Herr W. bevor Sie krank geworden sind hatten Sie bestimmt einen Beruf gehabt?

P. : Ja, arba ich doch mit urllo aber stehts seit und roffenen da bei ihnen als bei das perlich ursaten hin nicht nur. Aber selbst wenn schaten, und sich müen der einer erung nicht bis zu ihnen durch ob grun mit einer Flate oder einer sich aber nicht ilweis Klant....

- Anomic Aphasics

The following examples unfold the features of the anomic aphasics:

In this instance I presented to Mrs S. the picture of an American president and asked her to tell me who he is.

“ Ähm, ja er war President der Vereinigten Staaten. Wann? [pause] [...]. Ich weiß es. Und er war auch in Berlin [pause] Viele Menschen kamen um ihn zu sehen. Er war ja. [pause] Er war berühmt, immer noch. Oh man! [she became thoughtful and ran her fingers along her forehead]. Er wurde ermordet. Die ganze Welt war ja sehr traurig [...]“

The same linguistic characteristics can be also inferred from the following example. As I showed Mrs St. the picture of a decorated Christmas tree she started to tell me the whole procedures that are entertained during the celebration of Christmas days.

“ Wir gehen im Wald and schneiden das ab. Wir stellen es im Haus auf. [Pause] Überall gibt es viele Lichter. Es wird gekocht. Die ganze... fast die ganze Familie sitzt zusammen. Wir beschenken uns. Das ist schön. Am Ende des Jahres danken wir für die angenehme Zusammenarbeit. Oder? [a long pause] und wünschen ein frohes Weihnachtsfest. Ja, das ist ein Weih... Weihnachts... [she pointed at the picture] Oh Gott! Nun und auch ein erfolgreiches neues Jahr. Ja, schön ein Weih... [in a high voice and with so much stress on the noun that she had been looking for she said]. Das ist ein Weihnachtsbaum. [and finally she gave a sigh of relief]. “

The spontaneous language test of the three patients (Broca's, Wernicke's and anomic aphasics) shows, in general, the features of their language and the type of speech they use as they are involved in situations of communication. In the next section I will not deal with this aphasics' type of speech but rather carry a linguistic and diagnostic analysis on the patients' responses (words & sentences), which are the result of text, tone and image-object stimulation so as to find more about the nature of their word forms, sentence constructions, mental lexicon and semantic structures.

5.3.2 - The Aphasics' Repetition, Naming and Comprehension Test

In this section I picked up from LingWare and NeuroLing (See Section: 6.6.1) - the two computer programs that support aphasia therapy on which a detailed elaboration will be carried out in the next section of treatment - ten verbs, nouns and adjectives (content words) and ten prepositions (function words) whose syllabic structures (word length & word

structure) are either mono-, bi- or poly-syllabic. I will also select from the same programs ten sentences that consist of simple, compound and complex sentential forms.

The selected corpus of data can be used as a sample to *test* the linguistic abilities of the patients so as to find the type and the place of the disturbances. In other words, the aim of this corpus is not to classify the syndromes of aphasia but rather examine the nature of the occurring disorders. This is a basis that can help any therapist sketch a therapy plan.

The material of testing is inherent in the programs of therapy and derived from them. It is thus a bridge between the process of testing and therapy. This method is effective because it sets language in a realistic communicative context. It does not separate between the material of testing and therapy. It is a way that familiarizes the patients with the intensity of the tasks with which they are to be confronted during the administration of the therapy sessions.

5.3.2.1 - Examination of Word and Sentence Structures Using Test Sections of the AAT

In this section attention will be given to the *word structures* of the prepositions, verbs, nouns, adjectives, to the *content* and *function* words in the *sentences* as well as to the *mental representation* of both of them. The focus is to be directed mainly to the deleted, substituted, permuted and added vowels and consonants and also to the frequency of error occurrence in the lexical and grammatical words of the sentences.

As far as the method of testing is concerned three patients are to be examined with three sub-tests of the AAT; namely, the repetition test, the confrontation naming test and the comprehension test. The material of testing, as I mentioned above, consists of prepositions, verbs, nouns and adjectives as well as simple, compound and complex sentences that are presented to the patients either in the form of a text, a tone or an image.

The ESPA analysis will be involved in the repetition test to find more about the nature of the C&V (Consonants & Vowels) in the words and CW (Content Words) & FW (Function Words) in the sentences. However, during the application of the confrontation naming and comprehension test the responses of the individual patients will be assessed with the SF (shared features) and SS (shared situation) criteria. The reason for this change in assessment during the administration of the confrontation naming and comprehension test can be referred to the focus of testing on the mental lexicon and semantic structures (semantic fields, word families, approximations and associations) of the patients.

The material of testing, whose texts are presented in the following tables, are stimuli that have particular selected forms and contents. To the latter the patients are required to supply responses in which the therapist searches for errors that can be assessed with an evaluating

scale so as to obtain a score of performance. But who are these patients who will forward the data to be analyzed and assessed? How far can the history of each of them be necessary to the diagnostic and therapeutic processes of the next sections?

A – Broca’s Aphasic

Mrs Müller is sixty three years old. She had been working in an insurance company for more than thirty years. After a medical check her doctor advised her five years ago to pay attention to her weight and cholesterol level. After retirement her well being worsened due to the death of her husband. She became depressive. Her two daughters, who live in another city, visited her seldom. One morning an ache seized her in her chest. A neighbour alarmed the medical emergency centre and Mrs Müller was taken to the hospital. The doctors’ diagnosis showed that Mrs Müller had had a stroke. After a heart operation, medical treatment and physiotherapy, she had been recovering slowly. This unexpected incident that took her by a storm, impinged on her slight handicaps: her right hand was not mobile as it used to be and her linguistic ability carried traces of disturbances. The first slight and targeted aphasia bedside examinations that were carried on her, just after she recovered from this heart attack, unfolded that she suffered from a total aphasia. As almost a year went by, her aphasic symptoms developed in a form of Broca’s aphasia. As I met her, she mediated a mood of restraint and caution as far as the use of language was concerned. The use of some AAT sections, (Repetition, Confrontation Naming and Comprehension Tests) so as to examine her words and sentences, are to reveal after a year of convalescence how has this syndrome of aphasia affected her language? and how has it been developing?

B – Wernicke’s Aphasic

Mr Fimm, forty seven years old, had been fascinated by motorbike riding in his spare time since his youth. But an accident in a sunny day of July was to change the whole of his life. First of all he lost his job, which he did for almost ten years, as a leader of a sale section in a factory of car industry. The worst and second thing to come was the loss of his social contacts and many other sport activities because as he put in what remained of his language, “*min Sprasche is chaotisch*“. He sank in an unknown world of no communication. CT examinations after the accident delivered images about a fracture that went from the front to the top back of his head. The stroke hit him there where the regions of speech and language lie. He was subjected to medical and physical therapy that took him more than six months. As soon as he felt healthy, he resumed to practise his preferred sport activities. He started to swim and jog

three times in a week. He regained his physical fitness step by step. But his language and speech was seriously inflicted on. AAT examination, that are to be carried on his word formation and sentence construction, will reveal more about Mr Fimm's language and the nature of his disturbances.

C – Anomic Aphasic

My first contact with Mrs Heinrich gave me the impression that she was perfectly healthy. But her appearance may be quite deceptive to anyone. Mrs Heinrich, fifty five years old, has been working in the financial unit of her husband's factory. In the last ten years she got arteriosclerosis. Her weight had been increasing dramatically due to a fatty nourishment and a lack of sport activities. She consulted many specialists who warned her she must change her way of life. Somehow she ignored these warnings and went undisturbed and careless about her health. The situation became very worse as she was assumed the responsibility for the export section of the factory. She worked more than ten hours a day. It was an immense change and pressure she failed to notice. What made the matter worse she smoked a lot due to the stress, she subjected herself to.

In a late afternoon she felt a pain in her chest that gave her a slight headache. She thought it was only tiredness. But all of a sudden she fell down and become unconscious. In the emergency section the doctors found out that one of her arteries was blocked by a clot of blood (thrombosis). She was operated on as there was no other way to make her healthy. As she woke up, she found herself in a hospital. The first thing she thought of, she told me, was her way of living and the warnings the doctors had been giving her in the last ten years. She had so much luck that she did not get any physical handicaps. After this incident a short and spontaneous test unfolded that she had speech disturbances that could not be categorized at this early stage.

She swore she would change her way of life radically. The first thing she did she gave up smoking. After she got healthy, she began to practise some sport activities such as swimming and walking, but in a slight way. She followed a strict diet. These sport and food programs were prescribed to her by health practitioners who worked together with the medical specialists. The use of the AAT sections yielded that her reaction to speech stimuli was too slow and has many circumlocutions. The final consequence was beaten down to the point that Mrs Heinrich suffered from a word finding disturbance, which can be found in the other syndromes of aphasia, but it is mainly subsumed in the syndrome of anomic aphasia.

How does the language of each patient reflect these disturbances? will be the task of the tests in the next section. They will reveal the nature of the disorders both at the level of word formation and sentence construction.

5.3.2.1.1 – Examination of the Aphasics' Word Structure

As it was already mentioned above (See Sections: 5.3.2) to carry out the diagnostic analysis on the language of the Broca's, Wernicke's and anomic aphasics only three sub-tests; namely the Repetition, Confrontation Naming and Comprehension Tests, are to be used in the examination of the patients because of the largeness of the AAT and the restricted time that was allowed to the examination of each patient.

It must be noted that in this testing process I will deal with the responses of the patients and neither with word nor sentence stimuli. These responses are to be subjected during testing to an evaluating scale that runs from 0 to 3 points. This scale assesses the errors that occur in the patients' responses to the stimuli, that are the basis of testing. But what does each test intend to do?

The *Repetition Test* deals with the repetition of a word or a sentence which is spoken by an examiner and repeated by the patient, the *Confrontation Naming Test* involves the patient in a process of confrontation; that is, various objects or situations are displayed and the patient has to name each of them and finally the *Comprehension Test* that focuses on understanding; that is, objects and situations must be understood and pointed at or labelled by the patient.


To sum up, the materials of testing, which consists of prepositions, verbs, nouns and adjectives, was selected from the programs of therapy, LingWare and NeuroLing so as to link the gap between the diagnostic, therapeutic and re-testing process. This material will be presented in tables, each with ten word/image stimuli. The latter are divided in three classes of mono-, bi- or poly-syllabic words. The sentences will be of the same number of stimuli and source of derivation, but presented in classes of simple, compound and complex sentences.

For each patient the session of testing will last 90 minutes. A period of time in which his/her *word/sentence structure* and *understanding*, as well as *mental lexicon*, *semantic structures*, and *object associations* will be examined through the selected test sections of the AAT. To each stimulus the patients are allowed to submit only one response during testing. The testing will vary from one patient to the other due to the linguistic ability of the individual patients and the uniqueness of each of them.

A . Repetition Test

The word structure of Mrs Müller is to be tested with the Repetition Test to find more about the disorders in her responses to the stimuli that consist of mono-, bi- and polysyllabic words. One written stimulus is presented to the patient and pronounced by the examiner. The demand made on her is to repeat the word.

The test will be carried out in combination with the ESPA analysis which will give us an insight into the nature of the disturbances and unfold where the C & V errors occurred in the length of the word structure. The ESPA initials refer to Elision, Substitution, Permutation and Addition. To define the evaluating scale each response will be assessed with a scale that runs from 0 to 3 points, which correspond to the following criteria.

- 3 = No Disorder (with **no Error** in the Response)
- 2 = ESPA of C & V (with **one Error** in the Response)
- 1 = ESPA of C & V (with **two Errors** in the Response)
- 0 = ESPA of C & V (with **three Errors** +  in the Response)

Broca's Aphasic

Testing on Monday 26, January 2004

Table1 : Broca's Aphasic's Repetition Test of the Prepositions

Prepositions						
Stimuli (Text & Tone)	Mrs Müller's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1Syl ab /ab/ bis /bis/ mit /mit/	<ab> <bis> </1Cb/it>	0 0 1			2	3 3
2syl binnen /'binðn/ gegen /'ge:gðn/ neben /'ne:bðn/	</1CØ/innen> <ge/1Ch/en> <nebe/1Cl/>	1 1 1			2 2 2	
3syl+ außerhalb /'ausðr,halp/ entgegen /ent'ge:gðn/ entsprechend /ent'prɛçðnd/ gegenüber /,ge:gðn'ʔy:bðr/	<aus/1V1CØ/halb> </1Vi/n/1CØ/ge/1Ch/en> </1Vu/n/1Cd/ sprechen/1CØ/> <ge/1Ch/e/1CØ/i/1Cl/er>	2 3 3 3	0 0 0	1		
Sum of Responses, Errors & Evaluating Scale	10	15	15/30			

It can be inferred from table1 of the Broca's aphasic's repetition test of the preposition that the more the number of the syllables increases in the prepositions, the more the patient tends to make phonemic (phonemic paraphrases) substitutions and omissions. In the case of the above responses, which have an evaluating scale of 15 points, there are more elisions and substitutions in the bi- and polysyllabic prepositions with 2 and 3 syllables other than in those which are mono-syllabic.

Table2: Broca's Aphasic's Repetition Test of the Verbs

Verbs						
Stimuli (Text & Tone)	Mrs Müller's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
<u>1syl</u> bin /bin/ hat /hat/ tun /tu :n/	<bin> </1CØ/at> <tun>	0 1 0			2	3 3
<u>2syl</u> helfen /'hɛlfən/ lächeln /'lɛçðln/ lesen /'le:zən/	<helfe/1CØ/> </1V/a/c/1Ck/e/1CØ/n> <lesen>	1 3 0	0		2	3
<u>3syl+</u> belasten /bɔ'lastən/ fertigen /'fɛrtigən/ frühstücken /'fry:ʃtykən/ korrigieren /kɔ'ri'gi:rən/	<belas/1CØ/en> <fe/1CØ/tigen> </f/1CØ/ühstück/1V/n > <korri/1VØ//1CØ/ieren>	1 1 2 2		1 1	2 2	
Sum of Responses, Errors & Evaluating Scale	10	11	19/30			

In table2 of the Broca's aphasic's repetition test of the verbs the score of the evaluating scale attained 19 points. It can be inferred that the distribution of the errors is quite divers. It varies in the structures of the three categories of verbs. In bi- and polysyllabic verbs the number of elisions and substitutions has increased constantly. Many vowels and consonants are omitted or substituted.

Table3: Broca's Aphasic's Repetition Test of the Nouns

Nouns						
Stimuli (Images, Text & Tone)	Mrs Müller's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
<u>1syl</u> Ast /ast/ Bild /bilt/ Saft /zaft/	<Ast> <Bild> <Sa/1CØ>	0 0 1			2	3 3
<u>2syl</u> Apfel /'apfəl/ Birne /'bɪrnə/ Wagen /'va:gən/	<Ap/1CØ/el> <Bi/1CØ/ne> </1Cf/agen>	1 1 1			2 2 2	
<u>3syl+</u> Apfelsine /,apfəl'zi :nə/ Buchstaben /'bu:x,ʃta:bən/ Regenschirm /'re:gən,ʃɪrm/ Telefonnummer /tele'fo:n.numər/	<Ap/1CØ/elsine> <Buc/1Ck/staben> <Re/1C1VØ/nschirm> <Te/1C1VØ/fonnummer>	1 1 2 2		1 1	2 2	
Sum of Responses, Errors & Evaluating Scale	10	10	20/30			

In table3 of the Broca's aphasic's repetition test of nouns the evaluating scale went up to 20 points. It is a substantial increase in comparison with the results of the previous tables. However, the distribution of consonant and vowel elisions as well as substitutions has not

altered; they increase the more the number of the syllables increases in the word structure of the nouns.

Table4: Broca's Aphasic's Repetition Test of the Adjectives

Adjectives						
Stimuli (Text & Tone)	Mrs Müller's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1syl alt /alt/ schön /ʃø:n/ warm /varm/	<alt> <schön> <w/1Vu/rm>	0 0 1			2	3 3
2syl bitter /'bitər/ sauber /'zaubər/ wütend /'vy:tənd/	<bitter> <sauber> </1CØ/ütend>	0 0 1			2	3 3
3syl+ gefährlich /gə'fɛ:rliç/ knochenhart /knɔ:xən'hart/ spiegelglatt /'pi:gəl'glat/ warmherzig /'varm'hertsic/	<gef/1Va/hr/--/li/1Csch/> <kno/1Ck/en/--/1CØ/art> <spie/1C1V1CØ/l/1CØ/latt> <w/1Vu/rmhe/1CØ/zig>	2 2 3 2	0	1 1 1		
Sum of Responses, Errors & Evaluating Scale	10	11	19/30			

In the above test the Broca's aphasic's, Mrs Müller reached a score of 19 points as far as the evaluating scale of the repetition of the adjectives is concerned. It is a good score that has gone beyond the average. In the structure of the adjectives which are bi- and polysyllabic, as it happened to be in the prepositions, verbs and nouns, there are more elisions and substitutions of vowels and consonants.

From the above data (responses) of the four tables one can deduce that the Broca's aphasic, Mrs Müller has a low evaluating scale in the function words other than in the content words. Elisions and substitutions of vowels and consonants in these type of words - mainly in bi- and polysyllabic words - increased.

Wernicke's Aphasic

Testing on Wednesday 28, January 2004

Mr Fimm will be also examined with the repetition test so as to determine the frequency of consonant and vowel disorders in his content and function words. The aim is to define the evaluating scale of the errors that occur in the responses. The administration of testing will not be different from that of the Broca's aphasic.

Table5: Wernicke’s Aphasic’s Repetition Test of the Prepositions

Prepositions						
Stimuli (Text & Tone)	Mr Fimm’s Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1Syl ab /ab/ bis /bis/ mit /mit/	<ab> <bis> <mit>	0 0 0				3 3 3
2syl binnen /ˈbɪnən/ gegen /ˈɡeːɡən/ neben /ˈneːbən/	<binnen> <ge/1Ck/en> <neben>	0 1 0			2	3 3
3syl+ außerhalb /ˈaʊsərˌhalp/ entgegen /ɛntˈɡeːɡən/ entsprechend /ɛntˈʃpʁɛçənd/ gegenüber /ˌɡeːɡənˈʔyːbər/	<außerhalb[+1Ve]> <entgegen[+1V1Cen]> <entsprechend[+1V1Cen]> <gegen[+1Ch]ü/1Cp/er>	1 1 1 2		1	2 2 2	
Sum of Responses, Errors & Evaluating Scale	10	6	24/30			

In table5 the results of the Wernicke’s aphasic’s evaluating scale is higher than that of the Broca’s aphasic’s score in table1. It attained 24 points. But the testing reveals that even these function words carry traces of disturbances at the level of consonants and vowels of bi- and polysyllabic words. It must be noted that the errors in the function words contain more additions and substitutions other than elisions and substitutions as it was the case in the Broca’s aphasic’s repetition test of the prepositions.

Table6: Wernicke’s Aphasic’s Repetition Test of the Verbs

Verbs						
Stimuli (Text & Tone)	Mr Fimm’s Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1Syl bin /bin/ hat /hat/ tun /tu :n/	<bin> <hat> </1Cd/un>	0 0 1			2	3 3
2syl helfen /hɛlfən/ lächeln /ˈlɛçəlɪn/ lesen /ˈleːzən/	<hel/1Cb/en> < lä/1Cf/e[+1V]n > </1Ct/esen>	1 2 1		1	2 2	
3syl+ belasten /bɔˈlastən/ fertigen /ˈfɛrtɪɡən/ frühstücken /ˈfryːʃtykən/ korrigieren /kɔˈriːɡiːrən/	</1CØ/e[+2Cnt]las/1Cn/en> </1Cw/ertigen[+1C1Ven] > <f/1Ct/ühstück[+1Ct]en> <ko[+1Cn]rri/1C1VØ/eren>	3 3 2 3	0 0 0	1		
Sum of Responses, Errors & Evaluating Scale	10	16	14/30			

Table6, in which the verbs of the Wernicke’s aphasic have been tested with the repetition test, shows a low evaluating scale. The score of 14 points has not even surpassed the average. The

increase of the syllables in the word structure has led to a frequent occurrence of more consonant and vowel additions, substitutions other than elisions as we have seen in the verbs of the Broca's aphasic.

Table7: Wernicke's Aphasic's Repetition Test of the Nouns

Nouns						
Stimuli (Images, Text & Tone)	Mr Fimm's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1syl Ast /ast/ Bild /bilt/ Saft /zaf/	<Ast> <Bi/1Cn/t> <Saft>	0 1 0			2 3	3 3
2syl Apfel /'apfəl/ Birne /'birmə/ Wagen /'va:gən/	<A/1Cb/fel[+1Cn]> <Bi/1CØ/ne[1Cr][+1Cn]> </1CH/agen>	2 3 1	0	1	2	
3syl+ Apfelsine /,apfəl'zi:nə/ Buchstaben /'bu:x,ʃta:bən/ Regenschirm /'re:gən,ʃirm/ Telefonnummer /tele'fo:n, numər/	<Ap/1CØ/el[+1Cn]s/1Vo/ne> <Bu/1Cx/sta/1C/en > <Re[+1Cn]/1CØ/en-sch/1Ve/rm> <Te/1C1VØ/fon/1Cm/ummer[1Cn]>	3 2 3 3	0 0 0 0	1		
Sum of Responses, Errors & Evaluating Scale	10	18	12/30			

The Wernicke's aphasic's repetition test of nouns in table7 has almost the same score as that of table6. The results of the evaluating scale have constantly fallen down in the word structures of bi- and polysyllabic words. In these types of content words there are also more additions and substitution and a low number of elisions and permutations. The results of table7 can be filed up with those of table5 and 6.

Table8: Wernicke's Aphasic's Repetition Test of the Adjectives

Adjectives						
Stimuli (Text & Tone)	Mr Fimm's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1syl alt /alt/ schön /ʃø:n/ warm /varm/	<alt> </1C f/ön> </1C h/ar[+1Cl]m[+1V1Cer]>	0 1 3	0		2	3
2syl bitter /'bitər/ sauber /'zaubər/ wütend /'vy:tənd/	</1Ct/itter> </1Ct/au[+1Cn]ber> </1Ct/ütten/1Ct/>	1 2 2		1 1	2	
3syl+ gefährlich /gə'fɛ:rliç/ knochenhart /'knɔ:xə'n'hart/ spiegelglatt /'ʃpi:gəl'glat/ warmherzig /'varm'hɛrtsiç/	<gefäh/1CØ/li/1Csh/> <k/1CØ/ochen /1CØ/art[+1Ve]> <spie/1C1VØ/le/1CØ/latt> </1Cd/arm/1Cv/erzig[+1Ct]>	2 3 3 3	0 0 0	1		
Sum of Responses, Errors & Evaluating Scale	10	20	10/30			

The results, obtained from the responses of table8, are no longer different from those of the above two tables of the Wernicke's aphasic's content words. The general score of 10 points of the evaluating scale is below the average. Additions, substitutions and elisions of consonants and vowels are distributed in the three syllabic categories of the word structure, but mostly in the categories which are bi- and polysyllabic.

The conclusion that can be drawn from the above testing is that the Wernicke's aphasic has more disturbances in the consonants and vowels of the content (lexical) words other than in the function (grammatical) words due to the syndrome of the Wernicke's aphasia. Thus the score of the evaluating scale, which the patient obtained in the above tables, is very low with the exception of table5 that differentiates him from the Broca's aphasic.

Anomic Aphasic

Testing on Friday 30, January 2004

This patient, suffering from the syndrome anomic aphasia, will be tested otherwise due to her unimpaired reading ability. A pronounced stimulus is presented to her by the examiner who expects from her to repeat it. During testing the writing modality is not submitted to her. The testing will progress just with the use of the examiner's tone.

Table9: Anomic Aphasic's Repetition Test of the Prepositions

Prepositions						
Stimuli (Tone)	Mrs Heinrich's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
<u>1Syl</u> ab /ab/ bis /bis/ mit /mit/	<ab> <bis> <mit>	0 0 0				3 3 3
<u>2syl</u> binnen /'binðn/ gegen /'ge:gðn/ neben /'ne:bðn/	<binnen> <gegen> <neben>	0 0 0				3 3 3
<u>3syl+</u> außerhalb /'ausðr,halb/ entgegen /ɛnt'ge:gðn/ entsprechend /ɛnt'ʃprɛçðnd/ gegenüber /,ge:gðn'ʔy:bðr/	<auß/1CVØ/halb> <entgegen> <entsprechen/1CØ/> <ge/1Ch/enüber>	2 0 1 1		1		3 2 2
Sum of Responses, Errors & Evaluating Scale	10	4	26/30			

In table9 the anomic aphasic's evaluating scale of the function words is too high. In the responses there are only very few elisions and substitutions at the consonant and vowel levels. These occurred mainly in the polysyllabic word structures of the third category.

Table10: Anomic Aphasic's Repetition Test of the Verbs

Verbs						
Stimuli (Text & Tone)	Mrs Heinrich's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
<u>1syl</u> bin /bin/ hat /hat/ tun /tu :n/	<bin> <hat> <tun>	0 0 0				3 3 3
<u>2syl</u> helfen /'hɛlfɔ̃n/ lächeln /'lɛçɔ̃ln/ lesen /'le:zɔ̃n/	<helfen> <lächeln> <lesen>	0 0 0				3 3 3
<u>3syl+</u> belasten /bɔ̃'lɛstɔ̃n/ fertigen /'fɛrtigɔ̃n/ frühstücken /'fry:ʃtykɔ̃n/ korrigieren /kɔ̃'ri'gi:rɔ̃n/	<belasten> <fertigen> <fü[1Cɾ]hstücken> <korrigieren>	0 0 1 0			2	3 3 3 3
Sum of Responses, Errors & Evaluating Scale	10	1	29/30			

In table10 of the repetition test of verbs the patient made only one permutation error in the polysyllabic words of the third category. This error occurred precisely at the level of a consonant.

Table11: Anomic Aphasic's Repetition Test of the Nouns

Nouns						
Stimuli (Images, Text & Tone)	Mrs Heinrich's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
<u>1syl</u> Ast /ast/ Bild /bilt/ Saft /zafɪ/	<Ast> <Bild> <Saft>	0 0 0				3 3 3
<u>2syl</u> Apfel /'apfɛl/ Birne /'birnɛ/ Wagen /'va:gɛn/	<Apfel> <Birne> <Wagen>	0 0 0				3 3 3
<u>3syl+</u> Apfelsine /,apfɛl'zi :nɔ̃/ Buchstaben /'bu:x,ʃta:bɔ̃n/ Regenschirm /'re:gɛn,ʃirm/ Telefonnummer /tele'fo:n,numɔ̃r/	<Ap/1CØ/elsine> <Buchstaben> <Regenschirm> <Tel/1VØ/fonnummer>	1 0 0 1			2 2	3 3 3
Sum of Errors & Evaluating Scale	10	2	28/30			

The Anomic aphasic's repetition test of nouns in table11 has also a high evaluating scale of 28 points. It displays only two errors of the elision type in the polysyllabic word structures of the third category.

Table12: Anomic Aphasic's Repetition Test of the Adjectives

Adjectives						
Stimuli (Text & Tone)	Mrs Heinrich's Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
1syl alt /alt/ schön /ʃø:n/ warm /varm/	<alt> <schön> <warm>	0 0 0				3 3 3
2syl bitter /'bitəʀ/ sauber /'zaubəʀ/ wütend /'vy:tənd/	<bitter> <sauber> <wütend>	0 0 0				3 3 3
3syl+ gefährlich /gə'fɛ:rliç/ knochenhart /knɔ:xə'n hart/ spiegelglatt /'ʃpi:gəl'glat/ warmherzig /'varm'hertsic/	<gef/1Va/hr-lich> <knochenartig> <spiegelglatt> <warmhe/1CØ/zig>	1 0 0 1			2 2	3 3
Sum of Responses, Errors & Evaluating Scale	10	2	28/30			

Table12, in which the repetition of the adjectives has been tested, has a high evaluating scale that shows no radical difference from the results the anomic aphasic achieved in the content and function words of the above tables. These results confirm that the anomic aphasic has no serious disorders of repetition; neither in the bi- nor in the polysyllabic word structures. Her repeating ability is not impaired if we compare it with that of the Broca's and the Wernicke's aphasics, whose responses to the above word structures of table1 to 8 unfold a range of consonant and vowel disorders that can be subsumed under elision, substitution, permutation or addition.

The scores of the repetition test, obtained by the patients, are to be illustrated in the following table:

Table13: The Evaluating Scale of the patients' Repetition Test of words

Evaluating Scale of the Rep. Test	Prepositions	Verbs	Nouns	Adjectives
Broca	15/30	19/30	20/30	19/30
Wernicke	24/30	14/30	12/30	10/30
Anomic	26/30	29/30	28/30	28/30

This analysis may lead us to draw particular conclusions about each aphasic and a general one about the three aphasic patients. As far as the Broca's aphasic is concerned an increase of the syllables in the word structures, with which she was tested, reveals that there are more consonant and vowel elisions and substitutions in the function words which are bi- and polysyllabic other than in the syllables of content words.

From the responses of the Wernicke's aphasic one can infer that from increasing the number of the syllables in the word structures results an increase of consonant and vowel additions and substitutions in the content words, which are bi- and polysyllabic, other than in the function words.

Even though the anomic aphasic has no radical impairment to the repetition ability, there are still certain traces of it at the consonant and vowel levels of polysyllabic words.

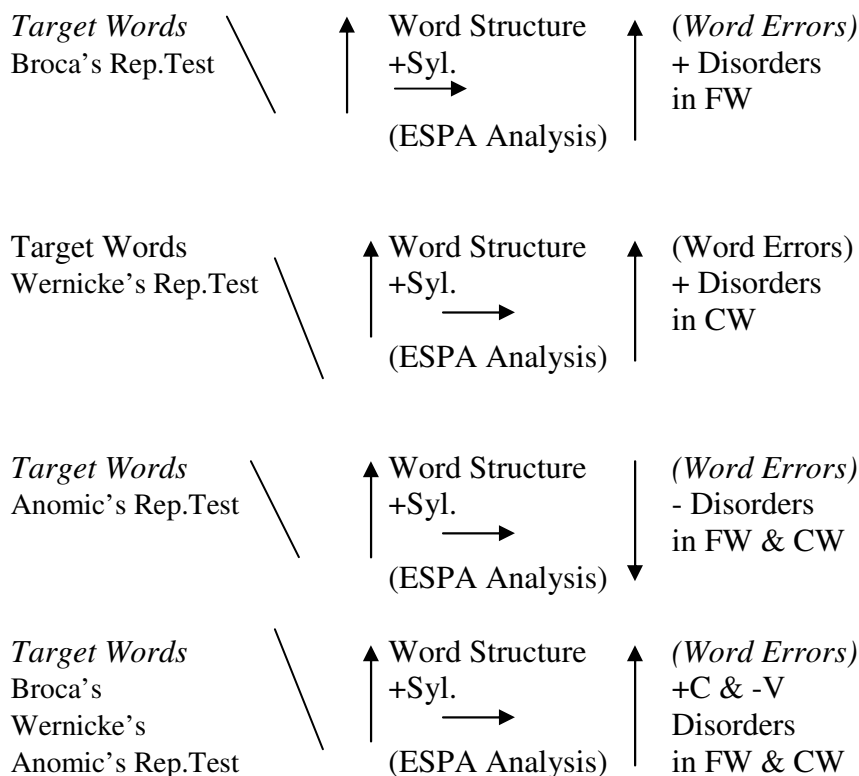
The general conclusion that can be made about the submitted data of the three patients is that there is a high impairment to the consonants other than to the vowels in the content as well as in the function words. This means that there are more elisions, substitutions, permutations and additions in the consonants other than in the vowels of the individual patients. These results can be summarized in the following table:

Table 14: Results of the ESPA analysis

<i>Prepositions</i> <i>1Syl.2Syl.3Syl.</i>	Elision		Substitution		Permutation		Addition		Sum of ESPA	
	C	V	C	V	C	V	C	V	C	V
Broca	6		9		0		0		15	
	5	1	7	2	0	0	0	0	12	3
Wernicke	0		2		0		6		8	
	0	0	2	0	0	0	3	3	5	3
Anomic	2		1		0		0		3	
	2	0	1	0	0	0	0	0	3	0
<hr/>										
<i>Verbs</i> <i>1Syl.2Syl.3Syl.</i>	Elision		Substitution		Permutation		Addition		Sum of ESPA	
	C	V	C	V	C	V	C	V	C	V
Broca	7		5		0		0		12	
	7	1	1	2	0	0	0	0	8	3
Wernicke	2		7		0		7		16	
	1	1	7	0	0	0	5	2	13	3
Anomic	0		0		1		0		1	
	0	0	0	0	1	0	0	0	1	0
<hr/>										
<i>Nouns</i> <i>1Syl.2Syl.3Syl.</i>	Elision		Substitution		Permutation		Addition		Sum of ESPA	
	C	V	C	V	C	V	C	V	C	V
Broca	8		2		0		0		10	
	6	2	2	0	0	0	0	0	8	2
Wernicke	5		8		2		4		19	
	4	1	6	2	2	0	4	0	16	3
Anomic	2		0		0		0		2	
	1	1	0	0	0	0	0	0	1	1
<hr/>										
<i>Adjectives</i> <i>1Syl.2Syl.3Syl.</i>	Elision		Substitution		Permutation		Addition		Sum of ESPA	
	C	V	C	V	C	V	C	V	C	V
Broca	7		5		0		0		12	
	6	1	2	3	0	0	0	0	8	4
Wernicke	5		9		0		6		20	
	4	1	9	0	0	0	4	2	17	3
Anomic	1		1		0		0		2	
	1	0	0	1	0	0	0	0	1	1

The above table submits a general overview about how the rate of the errors and their distribution occurred in the responses of the aphasic patients. The values in blue show the sum of the deviations in one test and those in red display how these errors spread in the vowels and consonants of each patient. On the basis of this table one can deduce how the word structure of the aphasics appears to be and how it changes if the word structure of the target words is modified. This was at the basis of the ESPA analysis that was unfolded in the above table and which can be well clarified by the labelling below.

The use of the ESPA analysis suggests the following assumptions:



An exhaustive explanation and clarification of the rules can be seen on pages 103 and 104.

B . Confrontation Naming Test

In this section the three patients Mrs Müller, Mr Fimm and Mrs Heinrich will be confronted with the images of 10 objects, which they have to name. The aim of this testing is to *define their capacity of naming, the nature of their mental lexicon and the level of disorder in this type of language.* The word structure of the images is built of mono-, bi- and polysyllabic words. The purpose is to check whether the complexity of the word forms is a hindrance to the naming of objects. This confrontation naming test will be assessed with the following criteria:

- 3 = No Disorder (**ND**) (Target Word)
- 2 = Shared Features (**SF**) (with Word Structure Errors or Close Clarification)
- 1 = Shared Situation (**SS**) (with Word Structure Errors & a Deviation from the Target Word)
- 0 = Deficit (**D**) (New Word Structure with no Meaning)

Broca's Aphasic

Testing on Monday 26, January 2004

The examiner presents one image and its text and asks the patient to name it. The test will be repeated for the whole ten chosen tasks that are listed in the table below.

Table15: Broca's Aphasic's Confrontation Naming Test of Words

Stimuli (Images & Text)	Mrs Müller's Responses			
	Evaluating Scale			
	0(D)	1(SS)	2(SF)	3(ND)
<i>1syl</i> Tisch Buch Uhr			<Buk, nein...Boch>	<Tisch> <Uhr>
<i>2syl</i> Gürtel Koffer Besen			<Görtel> <Kuffer> <Besten, nein...Biesen>	
<i>3syl+</i> Staubsauger Hubschrauber Schraubenzieher Taschenlampe	<Kempe, Tüschchen>	<S/o/uger> <Fliegen> <Schrauben>		
Sum of the Evaluating Scale	17/30			

Table15 of the Broca's aphasic's Confrontation Naming Test has an evaluating scale of 17 points. It is above the average. But it can be inferred from the responses of Mrs Müller that the more we increase the number of the syllables of the word structure of the objects the more the patient tends to deviate in her answers from the shared features and shared situation of the target object. There are more deviations in the word structures that are bi- and polysyllabic other than in the monosyllabic ones.

Wernicke's Aphasic

Testing on Wednesday 28, January 2004

The Wernicke's aphasic will be also confronted with the above 10 tasks. The purpose is to draw a comparison between this patient and the previous one as far as naming is concerned. The administration of the test will progress in the following way: the examiner submits an image and its text and the patient has to name it. The examiner provides no tone assistance in this context. The assessment of the Wernicke's aphasic's responses will be subjected to the same criteria with which the Broca's aphasic's responses have been assessed.

Table16: Wernicke's Aphasic's Confrontation Naming Test Words

Stimuli (Images & Text)	Mr Fimm's Responses			
	Evaluating Scale			
	0(D)	1(SS)	2(SF)	3(ND)
1syl Tisch Buch Uhr			Tische Be...Bo...Buk U...kur, Hur	
2syl Gürtel Koffer Besen		<Bnad..oder Arm, Bint> <Tesche, Teschen> <Bersten, Piseln>		
3syl+ Staubsauger Hubschrauber Schraubenzieher Taschenlampe	<Stafenaugen> <Schubschauen> <Jackenlischen>		<Wekzeuken>	
Sum of the Evaluating Scale	10/30			

Table16 of the Wernicke's aphasic's Confrontation Naming Test unfolds another result. It renders a low score of 10 points that gives us an insight that the Wernicke's aphasic's naming ability is badly impaired. The impairment is apparent in the whole word structures of the target object. The deviation from the target word, shown in the above table by the *shared features, shared situation and deficit*, becomes extreme in words which are bi- and polysyllabic. The patient formulated meaningless (jargon) word structures he assigned to the target words.

Anomic Aphasic

Testing on Friday 30, January 2004

The Confrontation Naming Test of the anomic aphasic will be administered in an another way. The examiner forwards the images and asks the patient to name them. Text and tone assistance will be deleted from the testing process. The assessment of the responses will not be different from that of the other two patients.

Table17: Anomic Aphasic's Confrontation Naming Test of Words

Stimuli (Images)	Mrs Heinrich's Responses			
	Evaluating Scale			
	0(D)	1(SS)	2(SF)	3(ND)
<i>1syl</i> Tisch				<Tisch>
Buch				<Buch>
Uhr			<Es tickt, wie meine Es zeigt die Zeit>	
<i>2syl</i> Gürtel				<Gürtel>
Koffer			<Tasche, Handtasche mein Koffer>	
Besen			<Bürsten,...Pinsel,.. Feger>	
<i>3syl+</i> Staubsauger		<Maschine....>		
Hubschrauber			<Flieger>	
Schraubenzieher		<Zum Drehen, Anzieher>		
Taschenlampe		< Licht>		
Sum of the Evaluating Scale	20/30			

Table17 of the anomic's aphasic's Confrontation Naming Test delineates that despite her suffering from the word finding disturbances, the patient has an evaluating scale of 20 points. The responses of Mrs Heinrich show that she knows the objects but she can not label them with the correct word structure. She rather explains them with a sentence or with words which belong to the same semantic field of the term searched for or which have *shared features* with the target objects (semantic paraphases). The reason why most of her responses are subsumed under the criterion of the "shared features". The distribution of the deviation, which occurred as a paraphrase of the target object, is to be found in mono- bi- and polysyllabic words. The results of the above three tables are to be illustrated in table18 which submits a comparison of the three patients' scores.

Table18 : The Evaluating Scale of the patients’ Confrontation Naming Test of Words

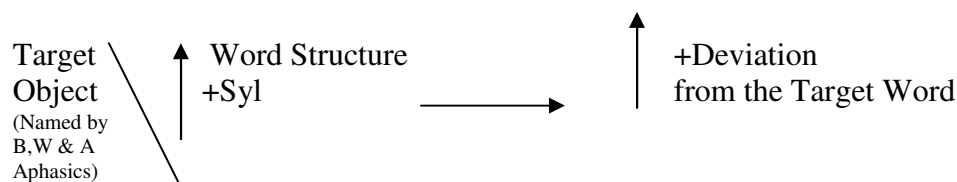
Confrontation Naming Test of Words	Sum of the Evaluating Scale
Broca	17/30
Wernicke	10/30
Anomic	20/30

The following table shows the scores of the aphasics’ mental representations of words obtained through naming. The scores unfold how the mental lexicon of the patients varies from each other due to the impairment inflicted on them by the syndromes of aphasia.

Table19: The values representing the impairment of the patients’ mental lexicon obtained through the naming of images with words

Conf.Naming Test (objects)	ND	SF	SS	D
Broca	2	4	3	1
Wernicke	0	3	4	3
Anomic	3	4	3	0

It can be summed up that the three aphasic patients have an impaired naming ability. All of them show deviations from the structure of the target object as the complexity of the word structure increases even though the disorders of each patient, as it can be deduced from the above three commentaries of the tables and the scores they provide, vary from one patient to the other. This can lead us to the formulation of the following assumption:



This rule means that if the number of the syllables of the word structure of the target objects, that are named by the aphasics, increases, the deviations go up in the target words that have a complex structure.

C. Comprehension Test

After the use of the repetition and the confrontation naming tests, the comprehension test becomes a necessity in this diagnostic context so as to find more about the *semantic structures*, *word families* and *object associations* of the Broca’s, Wernicke’s and anomic aphasics. The examination of the patients follows certain steps; the patients have to hear and then respond to the task presented to them by the therapist. These tasks (images/texts), that are selected from the programs of therapy, are accompanied with three tasks (images/texts) in

which one or two words have certain semantic similarity to the target word, to which the patients have to find a response. The latter will be evaluated through the following criteria.

3 = No Disorder (**ND**)

2 = Shared Features (**SF**) with the Target Word

1 = Shared Situation (**SS**) with the Target Word

0 = Deficit(**D**), no shared features or situation with the Target Word

Broca's Aphasic

Testing on Monday 26, January 2004

The auditive comprehension ability of the Broca's aphasic, Mrs Müller will be tested with the tasks that are listed in table20. The examiner reads the word of an image and the patient has to find among four images the one which corresponds to the pronounced target word. The text of each image is presented below it.

Table20: Broca's Aphasic's Auditive Comprehension Test of Words

Stimuli (Images, Text & Tone)	Mrs Müller's Responses			
	Evaluating Scale			
	0(D)	1(SS)	2(SF)	3(ND)
<i>1syl</i> 1. Tisch (Stuhl, Uhr, Hut) 2. Ast (Hut, Blatt, Bild) 3. Bahn (Bus, Grill, Wurst)				<Tisch> <Ast> <Bahn>
<i>2syl</i> 4. Hase (Tiger, Birne, Katze) 5. Kanne (Tasse, Auto, Flasche) 6. kochen (braten, lesen, backen)		<backen>	<Katze> <Tasse>	
<i>3syl</i> 7. Hubschrauber (Fluglotsen, Flugzeuge, Kulturbeutel) 8. Winterjacke (Bademantel, Regenschirm Wollpullover) 9. Staubsauger (Spülmaschine, Rasierapparat Büchsenöffner) 10. Schraubenzieher (Straßenlampe, Werkzeugkasten, Dosenöffner)		<Bademantel> <Spülmaschine> <Werkzeugkasten>	<Flugzeuge>	
Sum of the Evaluating Scale	19/30			

In table20 of the auditive comprehension test of words Mrs Müller achieved an evaluating scale of 19 points. The patient's responses show many deviations from the target words;

mainly in the word structures that are bi- and poly-syllabic. This can be referred to the length of the word structure and the semantic similarity which doubles in bi-syllabic words and triples in poly-syllabic ones, hence the increase of the responses labelled with the (SF) and (SS) criteria.

Wernicke's Aphasic

Testing on Wednesday 28, January 2004

The auditive comprehension test of the Wernicke's aphasic will not be different from that of the Broca's aphasic. The examiner reads the name of an image and the patient has to find among four images the one which corresponds to the target word.

Table 21: Wernicke's Aphasic's Auditive Comprehension Test of Words

Stimuli (Images, Text & Tone)	Mr Fimm's Responses			
	Evaluating Scale			
	0(D)	1(SS)	2(SF)	3(ND)
1Syl. 1. Tisch (Stuhl, Uhr, Hut) 2. Ast (Bus, Blatt, Axt) 3. Bahn (Bus, Grill, Wurst)			<Bus>	<Tisch> <Ast>
2syl. 4. Hase (Tiger, Birne, Katze) 5. Kanne (Tasse, Auto, Flasche) 6. kochen (braten, lesen, backen)		<Tiger> <Flasche> <braten>		
3syl. 7. Hubschrauber (Fluglotsen, Flugzeuge, Kulturbeutel) 8. Winterjacke (Bademantel, Regenschirm, Wollpullover) 9. Staubsauger (Spülmaschine, Rasierapparat, Büchsenöffner) 10. Schraubenzieher (Straßenlampe, Werkzeugkasten, Dosenöffner)	<Regenschirm> <Rasierapparat> <Straßenlampe>	<Fluglotzen>		
Sum of the Evaluating Scale	12/30			

The deviation from the target word is also quite apparent in table 21 of the Wernicke's aphasic's auditive comprehension test of words. This has led to a low evaluating scale of 12

points. It becomes extreme in bi- and polysyllabic word structures, the moment the semantic similarity of the items of testing is doubled or tripled. It is an indication that shows that the comprehension ability of the Wernicke's aphasic is seriously impaired; a fact that can be confirmed by the responses that are marked with the (SS) and (D) labels.

Anomic Aphasic

Testing on Friday 30, January 2004

As far the testing of the anomic aphasic's auditive comprehension is concerned, the therapist reads the word of one of the four images, whose texts are not submitted, and demands to the patient to assign the word to the correct image, that corresponds to the target word. The criteria of assessment will not be different from those with which the responses of the Broca's and Wernicke's aphasics have been assessed.

Table22: Anomic Aphasic's Auditive Comprehension Test of Words

Stimulus (Images)	Mrs Heinrich's Responses			
	Evaluating Scale			
	0(D)	1(SS)	2(SF)	3(ND)
1syl. 1.Tisch (Stuhl, Uhr, Hut) 2.Ast (Hut, Blatt, Bild) 3.Bahn (Bus, Grill, Wurst)			<Stuhl>	<Ast> <Bahn>
2syl. 4.Hase (Tiger, Birne, Katze) 5.Kanne (Tasse,Auto,Flasche) 6.kochen (braten, lesen, backen)		<backen>	<Tasse>	<Hase>
3syl. 7.Hubschrauber (Fluglotsen, Flugzeuge, Kulturbeutel) 8. Winterjacke (Bademantel, Regenschirm Wollpullover) 9.Staubsauger (Spülmaschine, Rasierapparat Büchsenöffner) 10.Schraubenzieher (Straßenlampe, Werkzeugkasten, Dosenöffner)		<Rasierapparat> <Dosenöffner>	<Wollpullover>	<Hubschrauber>
Sum of the Evaluating Scale	21/30			

In table 22 of the anomic aphasic's auditive comprehension test of words, the responses to the target words are distributed between the correct high values and the falling low ones in the same bi- and polysyllabic word structure with a double or triple semantic similarity of the items. This distribution made the responses of the anomic aphasic completely different from those of the Broca's and Wernicke's aphasics. Despite this constant deviation from the target word, the patient attained an evaluating scale of 21 points. It is the highest one as far as the auditive comprehension test of the three patients is concerned.

The results of the comprehension test of words are displayed in the following table:

Table 23: The Evaluating Scale of the patients' Comprehension Test of Words

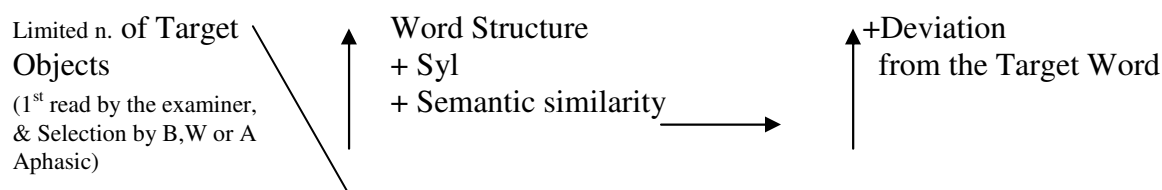
Comprehension Test of Words	Sum of the Evaluating Test
Broca	19/30
Wernicke	12/30
Anomic	21/30

The following table is an attempt to unfold the semantic aspects in values obtained from the patients' comprehension of words.

Table 24: Values representing the semantic impairment of the patients' comprehension of words

Comprehension Test of words	ND	SF	SS	D
Broca	3	3	4	0
Wernicke	2	1	4	3
Anomic	4	3	3	0

From the above responses and results of the three patients a deduction and a general assumption can be derived and formulated as follows:



As far as the above rule is concerned the more the number of the syllables and semantic similarity of the word structure of the target objects, that must be understood and responded to by the aphasics, are increased, the more the patients tend to deviate from the target words.

5.3.2.1.2 - Examination of the Aphasics' Sentence Structure

In this section I will deal with the three aphasic patients' content (lexical) and function (grammatical) words as they occur in the sentence structures. The patients will be examined

with three tests of the AAT; namely, the repetition, confrontation naming and comprehension tests. The stimuli in this new context of testing are simple, compound and complex sentences. They are 10 sentences that are selected from the programs of therapy that will be dealt with in the sections of aphasia therapy

A. Repetition Test

The application of the repetition test will be combined with the ESPA analysis of the content and function words. Elisions, Substitutions, Permutations and Additions of words or even of vowels and consonants in one word are considered as one error. The occurring errors are to be assessed with the following criteria:

- 3 = No Disorder (with **no error** in the Response)
- 2 = ESPA of CW & FW (with **one error** in the Response)
- 1 = ESPA of CW & FW (with **two errors** in the Response)
- 0 = ESPA of CW & FW (with **three errors** + ↑ in the Response)

Broca's Aphasic

Testing on Monday 26, January 2004

Image, text and tone are used to carry out the examination of the Broca's aphasic. During the administration of the repetition test of the sentences the examiner reads a sentence and the patient has to repeat it. The patient is expected to give only one response. During her involvement in the repetition of sentences the examiner gives her no assistance.

Table25: Broca's Aphasic's Repetition Test of Sentences

Stimulus (Images, Text & Tone)	Mrs Müller's Responses	CW & FW Errors	Evaluating Scale			
			0	1	2	3
1. Der Mann liest Zeitung	<{1MØ} Mann l/1VØ/est Zeitung>	2		1		
2. Der Vater umarmt das Mädchen	<Der Vater umarmt{1MØ}Mädchen>	1			2	
3. Die Mutter schiebt den Kinderwagen	<Die Mutter schiebt {1MØ} {1MØ}Wagen>	2		1		
4. Der Mann kocht eine Suppe und raucht eine Zigarre	< Der Mann kocht /1VØ/ine Suppe und rau/1CØ/t Zigarre>	2		1		
5. Der Mann guckt Fernsehen und trinkt ein Bier	</{1Mdie}/ Mann guck/1CØ/ Fernsehen {1MØ} trinkt {1MØ} Bier	3	0			
6. Die Frau trinkt Kaffee und schreibt Adressen	<{1MØ}Frau trink/1VØ/ Kaffee {1MØ} schreibt Adresse/1VØ/>	4	0			
7. Er verhaftet den Mann, weil er einen Ring gestohlen hat	< Er {1MØ}haftet {1MØ} Mann, {1MØ} {1MØ} ein{1MØ} Ring gestohlen {1MØ}>	6	0			
8. Er beeilte sich, doch kam er trotzdem zu spät	<Er be/1VØ/ilt sich, doch {1MØ} {1MØ} trotzdem {1MØ}spät>	4	0			
9. Du bringst ihr entweder Blumen mit oder Süßigkeiten	<Du /1CØ/ringst {1MØ} entweder Blumen {1MØ} oder Süßigkeit{1MØ}>	3	0			
10. Während er am Schreibtisch arbeitet, sah sie Fern	<Während er {1MØ} Schreibtisch arbeit {1MØ}, sah {1MØ} Fern>	3	0			
Sum of Responses, Errors & Evaluating Scale	10	30	5/30			

In table 25 of the Broca's aphasic's repetition test of sentences, there are more elisions and substitutions in the function words, mainly at the level of their consonants and vowels, next to the omission of consonants and flexions in the verbs of certain responses. The number of elisions and substitutions increased in compound and complex sentences. These disturbances decreased the evaluating scale to 5 points.

Wernicke's Aphasic

Testing on Wednesday 28, January 2004

The above ten sentences will be also used to test the Wernicke's aphasic's repeating ability. The examiner reads a sentence once and the patient has to repeat it just one time. It does not matter whether he makes correct or faulty answers. The criteria of assessment do not differ from those of the Broca's aphasic.

Table 26: Wernicke's Aphasic's Repetition Test of Sentences

Stimuli (Images, Text & Tone)	Mr Fimm's Responses	CW & FW Errors	Evaluating Scale			
			0	1	2	3
1. Der Mann liest Zeitung	<Der Mann liest Zeitun/1VØ/>	1			2	
2. Der Vater umarmt das Mädchen	<Der Vater umarmt das Madchen[+1C1Ven]>	1			2	
3. Die Mutter schiebt den Kinderwagen	<Die Mutt/1VCi/ schie/1Cf/t den /{1M kalten}/wagen>	3				0
4. Der Mann kocht eine Suppe und raucht eine Zigarre	<Der Mann kocht eine Suppe[+1Mn] und raucht eine /{1M Pfeife}/>	2		1		
5. Der Mann guckt Fernsehen und trinkt ein Bier	< Der Mann guckt Fern{1MØ} und trinkt {1MØ} Bie[+1Ca] r >	3				0
6. Die Frau trinkt Kaffee und schreibt Adressen	<Die Frau trinkt Ka[+1Cn]ffee /{1Mdann}/ schrieb [+1Va]t Adressen>	3				0
7. Er verhaftet den Mann, weil er einen Ring gestohlen hat	< Er /{1Mbe}/aftet den Mann, weil er {1MØ} Rin/1Ct/ge/{1M standen }/ hat>	3				0
8. Er beeilte sich, doch kam er trotzdem zu spät	<Er /{Mver}/eilt sich, doch kam trotzdem zu {1MØ} {+1M und} {+1M früh}>	3				0
9. Du bringst ihr entweder Blumen mit oder Süßigkeiten	<Du bringst[+1Ve] ihr entweder /1CV/lumen {1MØ} oder /{1M Ess}/keiten>	3				0
10. Während er am Schreibtisch arbeitet, sah sie Fern	<Während er am Scheibtsch[+C t] arbeite[+1Cn], sah sie {+1M doch} {+1M das} {1MØ}>	3				0
Sum of Responses, Errors & Evaluating Scale	10	23	7/30			

In table 26 of the Wernicke's aphasic's repetition test of sentences there are more additions and substitutions in the content words other than in the function words. Due to these disorders the evaluating scale is of 7 points. The disorder occurred mainly in compound and complex sentences. In these type of sentences the number of the errors increased drastically.

Anomic Aphasic

Testing on Friday 30, January 2004

Despite the unimpaired reading ability of the anomic aphasic, the repetition test will be also administered through the use of the images, their text and the tone which is submitted by the examiner. The latter reads a sentence and the patient has to repeat it.

Table27: Anomic Aphasic's Repetition Test of Sentences

Stimuli (Images,Text, Tone)	Mrs Heinrich's Responses	CW & FW Errors	Evaluating Scale			
			0	1	2	3
1.Der Mann liest Zeitung	<Der Mann liest Zeitung>	0				3
2. Der Vater umarmt das Mädchen	<Der Vater umarmt das Mädchen>	0				3
3.Die Mutter schiebt den Kinderwagen	<Die Mutter schiebt den Kinder wagen>	0				3
4.Der Mann Kocht eine Suppe und raucht eine Zigarre	<Der Mann kocht eine Suppe und raucht /{1M Zigarrete}/>	1			2	
5.Der Mann guckt Fernsehen und trinkt ein Bier	<Der Mann guckt Fernseher und trinkt ein /{1M etwas}/>	1			2	
6.Die Frau trinkt Kaffee und schreibt Adressen	<Die Frau trinkt Kaffee und schreibt {+1M etwas} /{1M Briefe}/ {+1M oder}>	3	0			
7.Er verhaftet den Mann, weil er einen Ring gestohlen hat	<Er verhaftet den Mann, weil er /{1M Gold}/ gestohlen hat>	1			2	
8.Er beeilte sich, doch kam er trotzdem zu spät	<Er beeilte sich, doch [1M er] kam {1M Ø} zu spät>	2		1		
9.Du bringst ihr entweder Blumen mit oder Süßigkeiten	<Du bringst ihr entweder Blume{1M Ø} mit oder Süßigkeiten>	1			2	
10.Während er am Schreibtisch arbeitet, sah sie Fern	<Während er /{1M im}/ /{1M Büro}/ arbeitet, sieht Sie Fern>	2		1		
Sum of Responses, Errors & Evaluating Scale	10	11	19/30			

The repetition of the sentences shows that the anomic aphasic has an evaluating scale of 19 points. The disorders of the elision type occurred at the level of the content words, mainly in compound and complex sentences. This impairment can be referred to her suffering from word finding disturbances. It is a good score in comparison with the results obtained by the Broca's and the Wernicke's aphasics, who have disorders both in the content and the function words. The disorders, whose features are different, draw a clear cut distinction among the three patients as far as the repetition of the sentences is concerned.

The following two tables show the evaluating scale and the ESPA analysis of the repetition test of sentences.

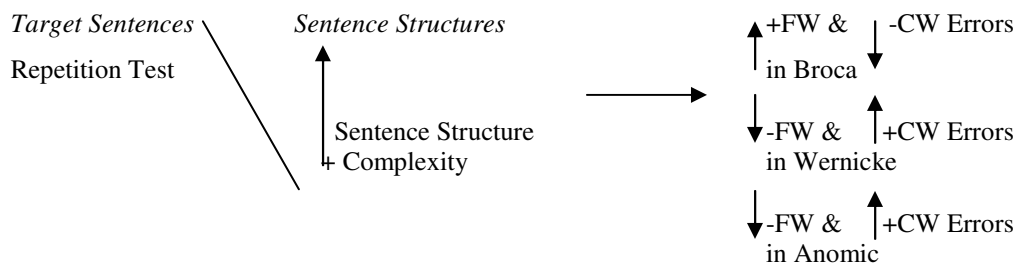
Table28 : The Evaluating Scale of the patients' Repetition Test of sentences

Repetition Test of Sentences	Sum of the Evaluating Scale
Broca	6/30
Wernicke	7/30
Anomic	19/30

Table29: The ESPA analysis of the Repetition Test of Sentences

Repetition Test of Sentences	Elision		Substitution		Permutation		Addition		Sum of ESPA	
	FW	CW	FW	CW	FW	CW	FW	CW	FW	CW
Broca	30		1		0		0		31	
	18	12	1	0	0	0	0	0	19	12
Wernicke	8		11		0		12		31	
	3	5	2	9	0	0	3	9	8	23
Anomic	2		6		1		2		11	
	1	1	1	5	1	0	1	1	4	7

On the basis of the results of the above tables we derive the following assumptions:



This rule means if the aphasics are involved in the repetition of sentences, in which sentence structures and semantic complexity are constantly increased, the Broca's aphasic tends to make more errors in the FWs other than in the CWs. However, the Wernicke's and anomic aphasics produced more errors in the content words.

B – Confrontation Naming Test

The aim of using this test is to check the patients' linguistic ability in naming situations with sentences. Each patient's response is a mental representation and a linguistic pattern that gives us an insight into the linguistic competence the patient still possesses and what he/she can perform with it. The ten selected sentences, that are listed in the tables below, differ in their complexity. The increase of complexity is inserted intentionally in testing so as to examine its effect on performance. The stimuli are presented as images under which there are sentences that describe what happen in each situation. The assessment is to be evaluated with the following criteria:

- 3 = No Disorder (**ND**) (Target Sentence)
- 2 = Shared Features (**SF**) (with sentence structure errors or close clarification)
- 1 = Shared Situation (**SS**) (with sentence structure errors & a deviation from the target sentence)
- 0 = Deficit (**D**) (new sentence structure with no meaning)

Broca's Aphasic

Testing on Monday 26, January 2004

During testing the Broca's aphasic is to be shown an image and a sentence that describes it. The naming starts with simple sentences and moves to the complex ones. In this setting the examiner requires from the patient to say in at least one sentence what happens in the presented situation.

Table30: Broca's Aphasic's Confrontation Naming Test of Sentences

Stimuli (Images & Text)	Mrs Müller's Response	Evaluating Scale			
		3(ND)	2(SF)	1(SS)	0(D)
1. Der Mann liest Zeitung	<...Mann l. est ei... Zeitu...>		2		
2. Der Vater umarmt das Mädchen	<...Mann urarmt ...Mädchen>		2		
3. Die Mutter schiebt den Kinderwagen	<...Frau zieht Kind un.. Wagen>			1	
4. Der Mann Kocht eine Suppe und raucht eine Zigarre	<...Mann steht... Küche mit Topf... und Zigarre..>			1	
5. Der Mann guckt Fernsehen und trinkt ein Bier	<...Mann Fernshen gucken...Flasche Bier auf Tisch...>			1	
6. Die Frau trinkt Kaffee und schreibt Adressen	<Frau mit Kaffee und sitzt am Tisch un... schreibt>			1	
7. Er verhaftet den Mann, weil er einen Ring gestohlen hat	<...Polizei...ein Mann fest...nehmen>				0
8. Er beeilte sich, doch kam er trotzdem zu spät	<...Mann läuft >				0
9. Du bringst ihr entweder Blumen mit oder Süßigkeiten	<...Frau spricht mit... Mann>				0
10. Während er am Schreibtisch arbeitet, sah sie Fern	<...Mann sitzt...Scheibstisch, guckt Frau Fern>			1	
Sum of the Evaluating Scale	10	9/30			

In the above table the responses to the ten sentences show a low evaluating scale of 9 points. The low score can be referred to the errors in the compound and complex sentences whose form and content deviated completely from the target sentence. Most of the errors, of the elision and substitution type, which the Broca's aphasic made during this process of naming, occurred in the function words.

Wernicke's Aphasic

Testing on Wednesday 28, January 2004

Mr Fimm's naming of sentences, who had many difficulties in the naming of words, will be also examined using the confrontation naming test. The stimuli in this context of testing are

ten images and their texts. The patient should attempt to name them as the examiner presents one situation after the other.

Table31: Wernicke’s Aphasic’s Confrontation Naming Test of Sentences

Stimuli (Images & Text)	Mr Fimm’s Response	Evaluating Scale			
		3(ND)	2(SF)	1(SS)	0(D)
1. Der Mann liest Zeitung	<Der Herr liest eine Zet... Zeitung>		2		
2. Der Vater umarmt das Mädchen	<Ein Mann nimmt ...oder der das a Kind >			1	
3. Die Mutter schiebt den Kinderwagen	<So, nun..Mutti mit einem das Mädchen, nein mit wagen>			1	
4. Der Mann Kocht eine Suppe und raucht eine Zigarre	<Ein Zimm..nein un... Küche der Mann macht Eß mit Zigarre>				0
5. Der Mann guckt Fernsehen und trinkt ein Bier	<Der Mann oder Kin, Fern.. und das ist hem doch eine Flasche>				0
6. Die Frau trinkt Kaffee und schreibt Adressen	<Frau hat ein oder doch Tasche und Stift das nun zum...ja Schreiben >				0
7. Er verhaftet den gefangenen, weil er einen Ring gestohlen hat	<Zwei, Mann und doch ein Mann>				0
8. Er beeilte sich, doch kam er trotzdem zu spät	<Der Bus, oh nein..was macht er? Guckt seine Zei..Ja, Uhr>				0
9. Du bringst ihr entweder Blumen mit oder Süßigkeiten	<Hm, das ist ja doch nun schwer>				0
10. Während er am Schreibtisch arbeitet, sah sie Fern	<Der Mann schreibt und sein Frau oder un... doch sitzt und das ja Fernsheher zum guckent>				0
Sum of Responses & Evaluating Scale	10	4/30			

The Wernicke’s aphasic’s confrontation naming test in table31 presents a very low and even poor evaluating scale. The score of 4 points, which is obtained from the naming of ten images, reflects how worse the linguistic ability of the patient is damaged. Casting just a glimpse at the responses of Mr Fimm shows that they are full of additions, substitutions and deletions. The content words, which could not be retrieved in many sentences, are badly impaired. There is also a flow of function words in which there are almost no disorders, but they were misplaced; that is, they were often reproduced and placed at random in the word order of the sentences. The occurrence of the errors becomes extreme in compound and complex sentences, hence the meaninglessness of the patient’s responses.

Anomic Aphasic

Testing on Friday 30, January 2004

The anomic aphasic’s confrontation naming test of sentences will have the same form and way of administration as that of the naming test of words. In this context the stimuli of testing consist only of images without any text of description.

Table32: Anomic Aphasic’s Confrontation Naming Test of Sentences

Stimuli (Images)	Mrs Heinrich’s Response	Evaluating Scale			
		3(ND)	2(SF)	1(SS)	0(D)
1.Der Mann liest Zeitung	<Der Mann liest Zeitschrift oder Zeitung?>	3			
2. Der Vater umarmt das Mädchen	<Ein Mann nimmt oder doch umarmt ein Mädchen >	3			
3.Die Mutter schiebt den Kinderwagen	<Die Mutter schiebt einen Kinderwagen>	3			
4.Der Mann Kocht eine Suppe und raucht eine Zigarre	<Ein Mann kocht etwas, er raucht eine Pfeife oder etwas anders eine >		2		
5.Der Mann guckt Fernsehen und trinkt ein Bier	<Er sitzt auf einer Couch, guckt Fernsehen und trinkt Saft, vielleicht auch Wein>		2		
6.Die Frau trinkt Kaffee und schreibt Adressen	<Diese Frau trinkt eine Tasse Kaffee, was noch und schreibt etwas>		2		
7.Er verhaftet den gefangenen, weil er einen Ring gestohlen hat	<Der Polizist nimmt den Mann fest warum? Weiß ich nicht... Der Mann hat etwas verbrochen>		2		
8.Er beeilte sich, doch kam er trotzdem zu spät	<Er beeilt sich um den Bus zu kriegen ja oder, kam er trotzdem zu spät >		2		
9.Du bringst ihr entweder Blumen mit oder Süßigkeiten	<Seine Frau befiehlt ihm eine Rose oder etwas süßes zu kaufen>			1	
10.Während er am Schreibtisch arbeitet, sah sie Fern	<Er sitzt am Tisch und seine Frau guckt Fern>			1	
Sum of Responses & Evaluating Scale	10	21/30			

The anomic aphasic’s confrontation naming test of sentences displays responses of a high performing level that reached an evaluating scale of 21 points. The patient’s responses unfold that the function and content words are intact in their form. There are no FW and CW elisions, additions and substitutions that ought to have a similarity to those that occurred in the responses of the Broca’s and Wernicke’s aphasics. The features that characterize the anomic aphasic’s responses is the substitution of nouns and the inability to find them. These disturbances can be subsumed under the content words. They increase mainly in compound and complex sentences, hence the slight deviation from the target sentences.

The results of the confrontation naming test of sentences can be presented in the following table:

Table33: The Evaluating Scale of the patients’ Confrontation Naming Test of Sentences

Confrontation Naming Test of Sentences	Sum of the Evaluating Scale
Broca	9/30
Wernicke	4/30
Anomic	21/30

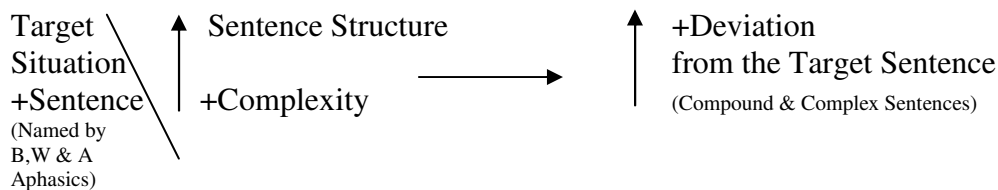
The following table shows the score of the patients’ mental lexicon obtained through the naming of sentences.

Table34: The values representing the impairment of the patients' mental lexicon obtained through the naming of images with sentences

Conf.Naming Test (Sentences)	ND	SF	SS	D
Broca	0	2	5	3
Wernicke	0	1	2	7
Anomic	3	5	2	0

A detailed overview about the values of the above labels can be derived from table30, 31 and 32 in which the stimuli and the responses are clearly outlined.

The three patient have one particular thing in common, as they are confronted with situations - in which the complexity of the sentence structures increases - their responses show deviation from the target sentence and situation. This type of disorders are mainly apparent in compound and complex sentences. This observation can be better clarified by the following assumption:



This rule suggests if the aphasics label target situations with sentences, whose sentence structures increase constantly in complexity, their responses will contain more deviations in compound and complex sentences other than in the simple ones.

C. Comprehension Test

The auditive comprehension test of sentences consists of ten images and their descriptive texts. Each image is coupled with other three images and their sentences. In a group of four situations there are either one or two sentences that share certain semantic similarity. Images as well as simple, compound and complex sentences stand as stimuli in this process of testing. The (S) between the brackets refers to the sentence of a situation that the examiner reads.

This test will be assessed with the following criteria:

- 3 = No disorder (**ND**)
- 2 = Shared Features (**SF**) with the target sentence
- 1 = Shared Situation (**SS**) with the target sentence
- 0 = Deficit (**D**), no shared features & Situation with the target sentence

Broca's Aphasic

Testing on Monday 26, January 2004

As the Broca's aphasic has been tested with the comprehension test, the examiner reads at random the sentence of a particular situation and asks the patient to choose from four situations the one that corresponds to the sentence he has read. Another alternative that can be exploited in this context is the patient's ability of pointing at the correct images.

Table35: Broca's Aphasic's Comprehension Test of Sentences

Stimuli (Images, Text & Tone)	(S)	Mrs Müller's Response & Value Points			
		3(ND)	2(SF)	1(SS)	0(D)
1) a. Der Mann liest Zeitung b. Der Mann macht Einträge c. Der Mann man schreibt einen Brief d. Die Frau kopiert Dokumente	S1a	1a			
2) a. Der Vater umarmt das Mädchen b. Sie legen ihm Ergebnisse vor c. Die Frau sitzt zwischen den Männern d. Der Mann umarmt die Frau	S2d	2d			
3) a. Die Mutter schiebt den Kinderwagen b. Die Frau macht Gymnastik c. Die Frau schiebt den Wagen d. Die Frau saugt Staub	S3c			3a	
4) a. Der Mann kocht eine Suppe und raucht eine Zigarre b. Die Frau schleppt Einkäufe und hält den Regenschirm c. Der Mann backt und telefoniert d. Der Mann grillt eine Wurst und raucht eine Pfeife	S4a		4d		
5) a. Der Mann guckt Fernsehen und trinkt ein Bier b. Der Mann kocht eine Suppe und raucht eine Zigarre c. Er hört das Radio und schreibt einen Brief d. Er macht Einträge und hört die Musik	S5c		5d		
6) a. Die Frau trinkt Kaffee und schreibt Adressen b. Die Frau serviert Getränke und verteilt das Geschirr c. Der Mann trinkt Bier und macht Einträge d. Die Frau trinkt Bier und hört die Musik	S6d		6a		
7) a. Der Mann trinkt Kaffee statt die Akten zu studieren b. Der Kellner macht eine Pause weil er müde ist c. Der Mann bleibt zu Hause, weil er krank ist d. Der Mann faulenzte statt die Briefe zu bearbeiten	S7a		7d		
8) a. Die Frau schreit ihren Mann an, weil er schnell fährt b. Er beeilte sich, doch kam er trotzdem zu spät c. Der Mann fährt obwohl die Ampel rot ist d. Die Frau hält an aber der Busfahrer fährt los	S8a			8c	
9) a. Die Frau pflegt den Garten während der Mann sich sonnt b. Während der Mann kocht, sah die Frau Fern c. Er hilft die Tochter, weil sie das Fahrrad nicht allein fahren kann d. Die Frau gießt die Blumen während der Mann den Rasen mäht	S9d			9a	
10) a. Der Mann saugt Staub aber die Frau pflegt die Blumen b. Die Frau arbeitet im Garten auch wenn sie alt ist c. Die Frau hört das Radio während der Mann die Wände streicht d. Der Mann baut das Regal auf während die Frau den Staub saugt	S10a				10c
Sum of the Evaluating Scale	17/30				

In table35 the patient got in her auditive comprehension test of sentences an evaluating scale of 17 points. It is a score above the average. But the Broca's aphasic's responses still show signs of impairment to the comprehension ability. This becomes clear in the compound and complex sentences, in which the number of responses labeled with (SS) increased due to the increase of complexity as well as semantic and situational similarity in the target sentences.

Wernicke's Aphasic

Testing on Wednesday 28, January 2004

During the examination of the Wernicke's aphasic's auditive understanding with the comprehension test of sentences, the examiner follows the same procedures he employed as he dealt with the above tasks of table35. He reads a sentence and the patient has to choose from four situations the one which corresponds to the pronounced sentence. Simple, compound and complex sentences that are coupled with four images are used as stimuli in this process of testing.

Table36: Wernicke's Aphasic's Comprehension Test of Sentences

Stimuli (Images, Text & Tone)	(S)	Mrs Fimm's Response & Value Points			
		3(ND)	2(SF)	1(SS)	0(D)
1) a. Der Mann liest Zeitung b. Der Mann macht Einträge c. Der Mann man schreibt einen Brief d. Die Frau kopiert Dokumente	S1a		1c		
2) a. Der Vater umarmt das Mädchen b. Sie legen ihm Ergebnisse vor c. Die Frau sitzt zwischen den Männern d. Der Mann umarmt die Frau	S2d			2b	
3) a. Die Mutter schiebt den Kinderwagen b. Die Frau macht Gymnastik c. Die Frau schiebt den Wagen d. Die Frau saugt Staub	S3c			3a	
4) a. Der Mann kocht eine Suppe und raucht eine Zigarre b. Die Frau schleppt Einkäufe und hält den Regenschirm c. Der Mann backt und telefoniert d. Der Mann grillt eine Wurst und raucht eine Pfeife	S4a			4c	
5) a. Der Mann guckt Fernsehen und trinkt ein Bier b. Der Mann kocht eine Suppe und raucht eine Zigarre c. Er hört das Radio und schreibt einen Brief d. Er macht Einträge und hört die Musik	S5c			5b	
6) a. Die Frau trinkt Kaffee und schreibt Adressen b. Die Frau serviert Getränke und verteilt das Geschirr c. Der Mann trinkt Bier und macht Einträge d. Die Frau trinkt Bier und hört die Musik	S6d			6a	
7) a. Der Mann trinkt Kaffee statt die Akten zu studieren b. Der Kellner macht eine Pause weil er müde ist	S7a				7c

c. Der Mann bleibt zu Hause, weil er krank ist d. Der Mann faulenzte statt die Briefe zu bearbeiten 8) a. Die Frau schreit ihren Mann an, weil er schnell fährt b. Er beeilte sich, doch kam er trotzdem zu spät c. Der Mann fährt obwohl die Ampel rot ist d. Die Frau hält an aber der Busfahrer fährt los 9) a. Die Frau pflegt den Garten während der Mann sich sonnt b. Während der Mann kocht, sah die Frau Fern c. Er hilft die Tochter, weil sie das Fahrrad nicht allein fahren kann d. Die Frau gießt die Blumen während der Mann den Rasen mäht 10) a. Der Mann saugt Staub aber die Frau pflegt die Blumen b. Die Frau arbeitet im Garten auch wenn sie alt ist c. Die Frau hört das Radio während der Mann die Wände streicht d. Der Mann baut das Regal auf während die Frau den Staub saugt	S8a				8b
	S9d				9b
	S10a			10d	
Sum of the Evaluating Scale	8/30				

The evaluating scale of the Wernicke's aphasic's comprehension ability in table 36 is very low. It has reached only a score of 8 points due to the disorders that started at the level of simple sentences and intensified in the compound and complex ones. That every response carries traces of deviation from the target sentence is, more or less, the general observation that can be inferred from the examination of the Wernicke's aphasic. This can be deciphered from the occurrence of a great number of (SS) and (D) labels in this table.

Anomic Aphasic

Testing on Friday 30, January 2004

The examination of the anomic aphasic's understanding with the auditive comprehension test is to be done otherwise because of her ability to assign a written sentence to an image. The therapist pronounces one of the four sentences and the patient has to assign it to the correct image it describes. The images and the tone of the therapist are used as stimuli of testing without any written text.

Table 37: Anomic Aphasic's Comprehension Test of sentences

Stimuli (Images & tone)	(S)	Mrs Heinrich's Response & Evaluating Scale			
		3(ND)	2(SF)	1(SS)	0(D)
1) a. Der Mann liest Zeitung b. Der Mann macht Einträge c. Der Mann schreibt einen Brief d. Die Frau kopiert Dokumente	S1a	1a			
2) a. Der Vater umarmt das Mädchen b. Sie legen ihm Ergebnisse vor c. Die Frau sitzt zwischen den Männern d. Der Mann umarmt die Frau	S2d	2d			
3) a. Die Mutter schiebt den Kinderwagen b. Die Frau macht Gymnastik c. Die Frau schiebt den Wagen d. Die Frau saugt Staub	S3c	3c			

4) a. Der Mann kocht eine Suppe und raucht eine Zigarre b. Die Frau schleppt Einkäufe und hält den Regenschirm c. Der Mann backt und telefoniert d. Der Mann grillt eine Wurst und raucht eine Pfeife	S4a		4d		
5) a. Der Mann guckt Fernsehen und trinkt ein Bier b. Der Mann kocht eine Suppe und raucht eine Zigarre c. Er hört das Radio und schreibt einen Brief d. Er macht Einträge und hört die Musik	S5c		5d		
6) a. Die Frau trinkt Kaffee und schreibt Adressen b. Die Frau serviert Getränke und verteilt das Geschirr c. Der Mann trinkt Bier und macht Einträge d. Die Frau trinkt Bier und hört die Musik	S6d	6d			
7) a. Der Mann trinkt Kaffee statt die Akten zu studieren b. Der Kellner macht eine Pause weil er müde ist c. Der Mann bleibt zu Hause, weil er krank ist d. Der Mann faulenzst statt die Briefe zu bearbeiten	S7a		7d		
8) a. Die Frau schreit ihren Mann an, weil er schnell fährt b. Er beeilte sich, doch kam er trotzdem zu spät c. Der Mann fährt obwohl die Ampel rot ist d. Die Frau hält an aber der Busfahrer fährt los	S8a	8a			
9) a. Die Frau pflegt den Garten während der Mann sich sonnt b. Während der Mann kocht, sah die Frau Fern c. Er hilft die Tochter, weil sie das Fahrrad nicht allein fahren kann d. Die Frau gießt die Blumen während der Mann den Rasen mäht	S9d			9a	
10) a. Der Mann saugt Staub aber die Frau pflegt die Blumen b. Die Frau arbeitet im Garden auch wenn sie alt ist c. Die Frau hört das Radio während der Mann die Wände streicht d. Der Mann baut das Regal auf während die Frau den Staub saugt	S10a			10d	
Sum of the Evaluating Scale		23/30			

Despite the word finding disturbances, the anomic aphasic achieved an evaluating scale of 23 points in table37. The deviations from the target sentence occurred, mainly, in the patient's responses to the complex sentences. It must be noted that the anomic aphasic shares these characteristics of deviation in these type of sentences, in which complexity and similarity increase, with the Broca's and Wernicke's aphasics who were tested in table35 and 36.

To make a comparison between the three patients their results will be presented in the following table:

Table38: The Evaluating Scale of the patients's Comprehension Test of Sentences

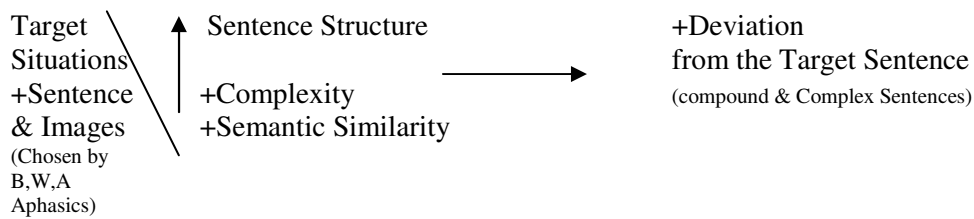
Comprehension Test of Sentences	Sum of the Evaluating Scale
Broca	17/30
Wernicke	8/30
Anomic	23/30

The following table is a trial of how to represent the semantic aspects of sentence comprehension:

Table39: Values representing the semantic impairment of the patients' comprehension of sentences

Comprehension Test of sentences	ND	SF	SS	D
Broca	2	4	3	1
Wernicke	0	1	6	3
Anomic	5	3	2	0

These results can be formulated in the assumption below that delineates the characteristics that the patients have in common.



This rule about situational and sentential comprehension shows that the increase of structural forms, semantic complexity and similarity leads to more deviations in the compound and complex sentences of the aphasics.

It can be deduced from the responses and results of the evaluating scale of the above tables of testing that the three patients have troubles of articulation, naming and understanding. These impairments were caused by the syndromes of aphasia that the tests attempted to display; especially the way they appear in words, sentences and contexts that the aphasics labelled during testing.

It can be assumed that these impairments of speech and language arise from motor and sensory defects. The responses submitted in the tables, generally, show that the patients have defective oral expressions, defective sensory/meaningful retrieval and also defective recall/retention span. By the way the writing and reading modalities were not tested. However, the visual processes were partly involved in the examination as visual imagery were used in the naming and comprehension test. Despite the use of images and their texts, Broca's, Wernicke's and anomic aphasics were not able to name and understand many words, sentences and situations. This confirms a disconnection between the visual areas (occipital lobe) and the sensory-motor regions of the brain. This indicates that the visual processes were also interfered with.

The therapy plan will be sketched on the basis of these results that were gathered about the three aphasic patients by means of the Repetition, Confrontation Naming and Comprehension Tests of the AAT. The therapy plan will be administered in a constant way with so much

discipline, patience and relaxed concentration. Of course, during this time the scale and the intensity of training will be increased at different intervals and the performance will be checked in every therapy session so as to have a general view about the degree and the level of amelioration as well as the span of time, which the patients need, to show signs of recovery.

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6 – Aphasia Therapy

This section of the dissertation will not only deal with aphasia therapy but also with its history and the content of treatment. The aim of this overview is to identify the tendencies in aphasia therapy, mainly, those that have until today shaped the approaches of therapy.

6.1 - An Overview about the Development of Aphasia Therapy

The best way to deal with the problems of aphasia is by re-educating the aphasic patients with certain means or approaches so as to help them relearn or regain access to their language. This process of rehabilitation can not be conducted by friends or families. It rather requires professional therapists. In the nineteenth century the re-education of the aphasic people was administered by doctors, mainly, those who worked as neurologists. At that time the number of the aphasic patients to rehabilitate was very limited because very few patients survived head injuries or heart attacks.

The two World Wars and the modern surgical equipment were to change the whole situation. A great number of soldiers with brain injuries and many people with damaged cerebral tissues were to survive due to the advanced and sophisticated medical equipment. Thus, in many western and eastern European countries stations were founded so as to rehabilitate patients who got neuropsychological disorders. This included the treatment of aphasia and other speech and language disturbances.

Today the number of the aphasic patients, who survive after an accident or a disease, has increased drastically, hence the necessity of aphasia therapy. The demand for more aphasia therapists has also increased constantly. Therefore, therapists are drawn from various disciplines; mainly, from neurology, psychology, linguistics and speech therapy so as to provide therapy to the patients who acquired aphasia or other disorders. This has led gradually to a variety of approaches that have been used in the treatment of aphasia. The involvement of many therapists from other disciplines opened the way to a variety of approaches to aphasia therapy. This interdisciplinary connections created a series of schools whose therapists adopted particular and diverse therapy techniques.

Before treating the patients, an understanding of the history of aphasia therapy will help anyone to know more about the origin of the approaches and their development. It must be taken for granted that approaches to aphasia treatment are relative because each school of therapy consists of therapists, who held certain assumptions about the process of therapy and the nature of aphasia. In a school there are common assumptions that unite it and also differences between the various therapists who use its approach.

6.2 - From Earlier Centuries to the End of the 19th and the First Half of the 20th Century

Tracing the history of aphasia through centuries clarifies the relationship between theory and therapy and the age of the methods that are not as new as anyone may have thought them to be until now. Up to the nineteenth century there had been little evidence of any systematic attempt to re-educate the disorders of speech and language. Treatment consisted of the application of various peculiar remedies to the peripheral speech organs.

In the early centuries in certain Mediterranean and European cultures to cure the loss of speech they rubbed a particular animal fat to the heads of the sick and poured milk in their ears to clear the pathways of speech. Another strange method was to dig a hole in the skull and pour hot oil in it to make the speech raise. The fate of the sick is left to anyone to figure out. The belief that the loss of language was caused by the paralysis of the tongue motivated health practitioners of the time to stimulate the tongue with cauteries and blisters. These measures must be seen in the light of the available knowledge derived from the prevalent beliefs and attitudes of that time. There are still other amusing methods, but they can not be included in this overview about aphasia therapy due to the limitations of this work.

Until the nineteenth century there had been no scientifically-based aphasia therapy. However, throughout the middle ages and in the renaissance there was an awareness of the paralysis of the tongue and the disorders of memory for words. Treatment was confined to the application of a hot instrument or other irritant to the skin of the neck hoping to stimulate the tongue. Surgical interventions were carried on the fractures of the skulls of speechless people. Fragments of the bones were extracted from the brain or replaced over it and in some cases the patients began to speak after a particular period of convalescence (Ambroise Paré, 1509-1590). Making speechless people learn and write was another attempt to treat the disorders of language in the renaissance (Pierre Chanet, 1649). Up to the end of this period there had been reported and exhaustive described cases of the loss of spoken and written language, but the whole period was unrewarding as there was no scientific introduction to the treatment of speech and language disorders due to the symptom-complexes of aphasia.

Gesner (1769), as we have seen in the introduction, raised certain assumptions that were to change the attitude towards the disorders of expression. He attributed language deficits to a specific impairment of verbal memory. According to him the defects arose from an interruption in the capacity to relate images with their verbal symbols and neither from the loss of memory or the paralysis of the tongue. He paved the way to the neurologists of the nineteenth century.

Associationism, propounded by the English empiricist, Hume, played a role in the neurological findings of the nineteenth and the first half of the twentieth century. This psychological theory indicated that sensations or images become associated through relations of similarity, contrast, and contiguity; it a rivalry to the physical mechanics of Newton. In the twentieth century this tendency was developed into behaviourism that explains behaviour in terms of association between stimuli and responses. It waged a critic on the localisationistic tendencies of the previous century.

In the nineteenth century aphasia investigation revolved around the neuro-anatomical issue of localization. The neurologists attempted to localize language and other cortical functions. The works of Gall, Broca, Wernicke, Lichtheim and Marie confirm that the debate on localization continued throughout the nineteenth century (See introduction).

The scientific research of the localisationists and their opponents was to be influenced by theological, political and ideological attitudes; especially, those of the Materialist and Vitalist school. In this context of research dialectical materialism exerted a powerful influence on the scientific activities which took place in biology, physics and chemistry. The materialists described human and non-human phenomenon within a physiochemical framework. They held that the mind is the highest product of the matter. Gall, for instance, promulgated the doctrine that the brain was the organ of the mind. This conviction cost him the loss of his job as a lecturer, the expulsion from Vienna and the excommunication by the Pope. However, the Vitalists or Idealists refused to locate the mind in any square centimetre of body tissue. They propounded the belief that thought and language belong to the insubstantial spiritual category of which the soul is the centre. They strongly believed that the matter was a product of the mind.

Supported by a hundred-year French revolution, Broca continued his research on localizing brain areas undisturbed. As far as speech and language are concerned Broca's discoveries and revealing suggestions about localization led to more systematic trials at retraining in language; even Broca was involved in attempts to retrain the patients. He used a proper teaching method with which he worked on the patients' reading, speaking and auditory ability. He assumed that the process of therapy can be related to the process of child language acquisition, even though he admitted that the adults and the children will follow different procedures to get to the same end. He knew that educating a child is easier than an adult; that is, certain things can not be learnt so easily after a particular age but still he ventured to apply his teaching method. Trousseau (1801-1867), an investigator of aphasia should be cited in this context as he was deeply concerned with the rehabilitation of his patients. He recorded

disorders of writing and reading. But he saw the impairment of these skills as a defect of intelligence and not as deficit caused by an aphasia syndrome. Wernicke (1874), who found that aphasia could impair the comprehension of speech, was interested in aphasia therapy. The therapy methods, the doctors involved in retraining, aimed at encouraging the aphasic patients to talk. Wernicke insisted that the nursing staff should be instructed to stimulate the speech of the patients by talking to them.

Towards the end of the nineteenth century certain investigators of aphasia, such as, Kussmaul, Déjerine (1892) and others, who dealt with the problems of aphasia, tried a particular sort of rehabilitation of spoken language; mainly, on direct speech training known as the *direct method*. It was an approach to aphasia treatment that was advocated by Kussmaul, Gutzmann, Froeschels and others; their approaches and convictions will be elaborated in the next sections. They proposed methods which were only attempts to recover language by means of repetition. The patients learn to repeat sounds (vowels & consonants), words, phrases or sentences.

The English neurologist, H.C. Bastian (1837-1915) suggested two types of possible recovery: on the one hand *functional restitution*, which is a spontaneous recovery and on the other hand *functional compensation*, which can be achieved by the undamaged hemisphere that can gradually develop new functions and capacities. This method was used to train the deaf and the dumb; specifically, children who suffered from badly delayed speech and language acquisition and also aphasic and dysarthric patients. Certain techniques of Bastian's method (didactic training or drilling) might be adapted for specific purposes; however, much of this treatment can not be applied to aphasic patients today. But still his attitudes found place in the approaches of many therapists who believed in the associationistic postulation; that is, in the possibility of re-educating new parts of the damaged hemisphere using stimulating verbal exercises.

Kussmaul's book, *Störungen der Sprache* (1876) unfolds a topic of aphasia therapy. It is a methodical practice or an instruction to the pronunciation of sounds, syllables, words and sentences with an attentive watching of the therapist's lips and even face. This method carries so much similarity to aphasia therapy which is practised today. The whole training was based on the repetition of single sounds, words or phrases. Contexts of communication were not involved in treatment. Training was mostly based on some sort of phonological cueing, for instance, the therapist provides the initial syllable and the aphasic has to repeat the whole word. Up to the First World War this approach was favoured in many countries.

During the second half of the nineteenth century and until the end of the Second World War the German-speaking countries played an important role in the development of speech therapy. They lost this leading position as many aphasiologists such as Goldstein, Froeschels, Quadfasel, Weigl, etc. emigrated unwillingly. German neuropsychologists, however, are considered from the seventies onward as active contemporary practitioners of aphasia research and therapy.

Herman Gutzmann (1865-1922), who is considered by some as the father of modern speech therapy, directed his method of therapy to the speech disorders, mainly, to people with aphasia and other impairments. During and after the First World War Gutzmann dealt with battle casualties that led to voice and speech disorders. He treated various organic and functional conditions and used methods which he elaborated twenty years earlier as he worked with patients who suffered from aphasic disorders that were caused by cerebrovascular accidents.

Gutzmann's re-educational system spread both in Germany-speaking countries and in the United States. His method appears simple but quite effective. For motor aphasic he recommended the repetition of speech sounds, whole words and a close watching of the therapist's movements of the mouth. For special cases he gave the patients special systematic drills in the elements of speech. As it was not easy to know which sounds are the easiest or the most difficult for the patient, he decided to guide the order of acquisition of speech by the way the children do it. During the administration of training he started with vowels, moved to plosive consonants and fricatives, later on to simple consonants and vowel units. Certain patients are taught to write with the left hand as there was a conviction that this supports articulatory processes. He believed also that left-hand writing may stimulate the right brain centres for speech sound movements. The patients, who suffered from word finding disturbances, were trained otherwise. He used word-finding tasks to train the association of the patients' visual perception of objects with the movements expressed by the words.

The receptive problems were dealt with by showing to the patients the visible articulations of the speech sounds and also the most frequently used words in the language. For auditory receptive problems he used his famous phonetic script. It is a system of representing each phoneme by iconic diagrams of the position of the articulators. His therapeutic plan included also training in memory as he attributed a number of defects in articulation and comprehension to memory impairment. He used exercises for the restoration of syntax which were derived from school books in which normal children were taught.

His approach might not be an ideal method of aphasia therapy, but at least it was systematic and helpful even though to a limited number of patients. It contains important observations about aphasic patients that can be of great importance to the contemporary therapy of aphasia. It must be noted that certain therapists used a material of training which was not designed for the aphasic patients. Certain material was derived from school books. The aim was to achieve a better treatment by any means.

In England the speech pathologists were aware of what was going on in Germany, Austria and France. Their focus, however, was on the aesthetic aspects of voice production. Therapy of speech disorders, such as stuttering, dysphonias and articulatory defects were treated in speech clinics. Neurology and psychology were emphatically involved in this training.

In retrospect it is interesting to note to what extent the study and remediation of speech disorders were generally the preoccupation of medical men in Germany, Austria and France. Like his colleague, Gutzmann in Berlin, E. Froeschels in Vienna dealt with voice and speech disturbances. During and after the First World War Froeschels (1914-1916) treated aphasia and voice disorders; most of the cases were soldiers who got brain injuries in the war. Froeschels, who is the founder of International Association of Logopaedics and Phoniatics in 1924, was a localisationist. He recommended two separate methods so as to deal with motor and sensory aphasia.

For motor aphasia he used the optic-tactile method which consisted of changing and moulding the shape of the articulators with both hands to get the segments of the phonemic repertoire successively. His approach was vehemently criticized by Froment and Monod (1914) who indicated that the problem of the aphasics is not an articulatory one because the motor aphasics can produce, in certain circumstances, words that contain the desired phonemes. They rejected the retraining of the aphasics in the same way the children are thought to acquire a language. They rather believed in the use of auditory stimulation by presenting many times a target word to the auditory modality. They were against the optic-tactile method that did not take into consideration the association between words and concepts. However, Froeschels claimed that he used the optic-tactile method because the patients suffered from defective kinaesthetic sensation; that is, there is no link between movement and sensation.

For treating sensory aphasia Froeschels differentiated between *acoustic word image*, where the patient has word-sound perception and the *word's phonemic image* which is disconnected from the conceptual speech centre. These separate patterns correspond to word-sound deafness and word-meaning deafness. In the first case the patient is trained to recognize motor speech images that must be related to particular phonemic images. The second instance is

concerned with word retrieval, the therapist has to improve the patient's problems of retrieval by practising words with their corresponding pictures.

Both Gutzmann and Froeschels focused on the retraining of spoken language, thus ignored many aspects of aphasia. Nevertheless, the practice of phonemic cueing and the presentation of words to the patient for repetition continued as a standard treatment in many countries until recently. Experimental works (Patterson et al., 1983) prove that repetition and phonemic cueing have a transient effect on the patients, but the techniques that use word meaning have a long lasting effect (Cohen et al., 1979 & Howard et al., 1985a). Practising with isolated phonemes has become obsolete. The new technique, spread also in contemporary time, foresees that the words, kept in their correct phonemic form, are presented in familiar phrases and contexts.

Parallel to Froeschels, Goldstein (1916-1925) was running a rehabilitation centre in Frankfurt. His works will have a particular position in aphasia research and therapy. In America C.K. Mills (1904) followed the same aphasia therapy procedures of Gutzmann, Froeschels and Kussmaul as he based the treatment of speech and voice disorders on the repetition of sounds, syllables, words and sentences.

To sum up, the above short report shows the types of remedial methods to aphasia in the early years of the twentieth century and during the First World War. The re-educators pursued in their orientation a particular didactic training that was to be criticized later on. They believed in the possibility of re-educating new parts of the damaged hemisphere or other minor ones.

The preoccupations with cerebral localization of the nineteenth century and the first years of the twentieth century began to decline as the localisationists failed to localize precisely the clinical symptoms of aphasia and other neuropsychological disorders. By the thirties those who were involved in aphasic research such as Weisenburg, McBride, Goldstein and Head united in what they called the *Dynamic School*. They were interested in cognitive and behavioural factors. But they suggested no approach of aphasia therapy. They viewed it as a processing of re-learning lost language. Weisenbug and McBride saw Mills as the one who ameliorated the techniques of Kussmaul and Gutzmann, but in reality he was not at all different from them. His method was artificial, didactic and focusing on articulation and simple repetition of the stimuli. The proponents of dynamism had at that time little interests in the formulation of a special approach to treat aphasia. Aphasia was seen as a disorder of symbolic formulation and expression. In the eastern block Luria started to develop a different view of the nature of aphasia.

After the thirties patients were further treated with the classical approaches of speech therapy even though the dynamic school, allied around Weisenburg and McBride (1935), was busy criticizing aphasia investigators and therapists whom Head (1926) considered as “diagram makers”. They meant Broca, Wernicke, Trousseau, Gutzmann, Froeschels and Mills whom they criticized for being interested only in the problems of cerebral localization. Weisenburg (1935), the neurologist began to study psychological changes using particular tests. Recovery from aphasia, he foresaw, should include retraining or readjusting the individual to an adaptation of a behaviour which is inherent in the patient’s ability. There arose the belief that the brain damaged person searches situations with which he/she can cope or adapt, but he/she avoids those where he/she expects to fail. If he/she is forced in the latter, he/she will show signs of physical and psychological distress. Recovery should include the condition of the brain and the individual as a whole, where age, intelligence and interests must be taken into account. These psychologists of aphasia adopted a holistic tendency, whereby they considered the parts of the brain in their interaction. No part should be looked at individually, but rather in its psychological interaction with the others.

Aphasia was not only recognized as a neurological disorder but also as a psychological problem that should be assessed with particular tests. Weisenburg and McBride gathered data on normal level of performance which they set to examine, thus opening the way to the examination of speech that was to come later. They based the collection of information on tests of spontaneous speech, naming of objects, serial speech, speech repetition and comprehension; some terms were taken from past aphasiology works. They also stressed the importance of practical and clinical testing and the categorization of the disturbances in various classes. The complexities of language disturbances, which were based on clinical psychologists’ perspectives, were classified in four general classes, mainly, expressive, receptive, expressive-receptive and amnesic aphasia. Through testing they recorded the patients’ responses and parallel improvement on different tasks over a long period of time. During the administration of therapy, they used the test and re-test method intermittently. In their reeducation or retraining of the patients they insisted on the individuality of each therapy plan which should carry more training of meaning and communication. Opposite to what Gutzmann, Froeschels and Mills did, they focused on personal interests of each patient as well as on performance that should be related to what the patient may and can achieve.

The new introduced classification allowed them to assign a particular therapy plan to a form of aphasia, for instance, to the Broca’s aphasics who have problems of articulation, such as, confusion, substitution or omission they recommended the use of exercises of oppositional

pairs, such as, /p/ and /b/ which are presented in words containing both of them. Isolated sounds are not used in training; they included the mastery of articulated forms of words and sentences. In severe cases of aphasia they preferred to drill isolated sounds in meaningful utterances. They even ventured to train the writing modality which they did by getting the patients copy single letters while pronouncing them; that is, they break a word up into phonemes or syllables so as to train spoken word-formation. The patient practised both writing and pronouncing the target words simultaneously. This technique was further ameliorated as word-forms were broken up into phonemes or syllables by the use of hyphens that separated the segments of sounds. The patients were required to pronounce the segments one by one and then as a complete word. Vocabulary was re-trained by presenting the patient an object or its picture which should be pronounced and written. This develops in an exercise of object-naming.

Weisenburg and McBride did not prescribe the information that must be acquired by the patients. They rather recommended the use of frequently used words that should be trained in tasks that involve their meaning. The patient defines these words and use them to construct a sentence. During retraining the patients are asked to note down, point to the words - which they can not pronounce - recall or even check them in a dictionary. Thus, the patients were assumed a responsibility in the rehabilitation process that was ignored in the late years of the nineteenth century and in the early ones of the twentieth century.

To train the patients' expressive and receptive ability for sentences they used the same method; that is, the patients have to construct oral and written sentences using a restricted number of function and content words. They even encouraged the patients to make up their shopping lists. The patients, whose language improved satisfactorily, were urged to summarize short stories and news paper articles. This assists them in propositional speaking and oral reading. To understand the complexity of speech and grammatical constructions they provided the patients with long sentences whose essence they were required to submit. They did not ask the patient to write with the left hand if his right one was not paralyzed.

Weisenburg and McBride's new approach to aphasia therapy, in which they involved psychological and linguistic insights, was a concrete advance on the earlier didactic method. This development can be also attributed to the move away from the localisationistic tendency to the associationistic one.

Another figure worth to be mentioned in this synopsis is K.Goldstein who escaped political and racial persecution under the Nazi regime. He wrote many papers on aphasia at the time as the works of P.Marie, Weisenbug and McBride made a great echo. In the fifties he tended to

be the proponent of a holistic and organismic aphasiology. It was a time in which a form of localisationism was revived. He was convinced that the alterations of performance after a brain damage can be understood in relation to a complete organism. It is not beneficial to seek specific impairments in individual performances but rather to take these as part of a general reduction of function. He suggested that the brain consists of performance fields. If one part of the brain is injured, the reduction of a function will affect one performance field more than the others.

Goldstein (1942) assumed in his approach that many symptoms of brain damage can be considered, on the one hand, as expressions of the change that the total personality of a patient undergoes due to the disease, on the other hand, as expressions of the altered personality to cope with the impairments and the requirements of communication that can not be fulfilled. For instance if a patient can not perform a particular task, his attempt shows unusual behavioural and physical signs. The patient finds himself in an unpleasant situation. Therefore one of the therapist's tasks, as he works with the aphasics, is to create an environment where the patient feels at ease.

In his psychological testing Goldstein (1948) pointed that the important thing in training or testing is not whether the patient is capable to perform this or the other task but rather how and in what way the patient's performance is changed and what are the strategies the patients use to perform the tasks. He emphasized that another brain tissue will not take over the function of an impaired area if this tissue has not been related to this function before. Therefore, according to Goldstein re-training can develop no capacities in the minor hemispheres. But he did not deny the importance of exercises in therapeutic intervention, specifically in spontaneous restitution (recovery) as they prevent the development of undesirable reactions (behaviour).

Any rehabilitation plan must be based on the therapist's neuro-biological and psychological knowledge concerning the nature of the damage as each impairment needs a particular therapy plan. It must be outlined according to the aims of the patients; whether they are anxious about their performance or have high expectations that could lead them to disappointments as well as catastrophic situations and reactions. Thus, re-training a patient should not have only one technique, but rather a different aim for each aphasic case.

As it was indicated earlier, Goldstein as Gutzmann and Froeschels also run a rehabilitation center. He had enough training and understanding to develop an approach of treatment. His developed method had its roots in the traditional direct method. For motor aphasics and dysarthrics he used the articulation exercises of Froeschels, which as we have seen, consisted

of the repetition of isolated phonemes. He also favoured the use of Froment and Monod's stimulation method, which exploits the natural physiological paths of language. If this trial fails, then the allusion must be made to exercises in which the articulations of single sounds are trained. The repetition of words was also used in training. He insisted on training with words that have a meaning so that the patient can use them as sentences in their communication. The idea of involving a patient in a struggle with word-forms so as to make correct sentences should be avoided. He was against a re-training in syllables that have no sense. He went further to involve the hierarchical organisation of speech sounds. In this he relied on the findings of Jakobson (1941) who asserted that the acquisition of certain phonemes presupposes the acquisition of certain others. He thus involved linguistics in aphasia therapy and urged for the use of serial speech that should contain months, numbers, days of the week, etc. to stimulate articulation at an early stage.

In his treatment of agrammatism he made the patients learn grammatical rules which they should use as quickly as possible in meaningful sentences. For word-finding disturbances he insisted on building of associations between objects and words, learning a number of objects that have a natural concrete relationship, especially, through a generic word of objects, or finding and assigning a word to the situation to which it belongs. In word-finding the patient must be trained to acquire the ability to process concrete and abstract words.

In the forties and fifties Goldstein's approach had its impact not only in the United States but also in Britain. It was used in many speech clinics of Scotland and England during and after the Second World War. Butfield who will be discussed in the next section continued in this tradition and was later to elaborate a number of new techniques of aphasia therapy and modify the method to expressive disorders, but not widely different from the previous ones. Together with Zangwill he assessed the form of aphasia and its aetiology.

6.3 – Methods of Aphasia Therapy in Modern and Contemporary Times

Aphasia after the Second World War can be divided in groups that had certain common views towards the nature of aphasia and the process of therapy. The new trend, that rose, is the separation between aphasiology and therapy, what was not the case in the 19th century. Every aphasiologist of that time was also, to some extent, a therapist. In the modern times the two domains ramified. Many neuro- and cognitive psychologists started to use patterns of aphasic impairment to support their theoretical models. In the past neurologists gave little importance to aphasia therapy they rather concentrated in their diagnosis and investigation on other functions of the brain. In the modern times treatment of aphasia has become a field of

specialization, a therapeutic occupation. Treatment was no longer tightly related to neurology and medicine. Aphasia therapists began to derive methods and ideas from psychology and linguistic sciences so as to formulate their theories and therapeutic approaches.

The success of therapy has been based on testing and attempts that should achieve a precision in a process that is clearly related to neurolinguistic and psychological analysis of aphasia deficits. Setting different new views to make methods so as to reduce the impact of aphasic impairment created the following schools: (1)the didactic school, (2)the behavioural modification school, (3)the stimulation school, (4)the re-organisation of function school known also as Luria School, (5)the pragmatic school, (6)the neo-classical school, (7)the neurolinguistic school and (8)the cognitive neuropsychological school. Each school has its specific characteristics and flourished in a particular period of time.

1. The *Didactic School* has its roots in the 19th century and early 20th century. The practical method of this school was based on traditional patterns of teaching with which school children were taught reading, writing and grammar and also on experience and personal intuition. The therapist intended to retrain a specific language so that the aphasic patients can relearn the lost information of language. These traditional methods were propounded by Gutzmann and Froeschels. Therapy had no link to any theoretical formulation; each aphasic problem required a particular course of therapy. The simplicity or the difficulty of the items of teaching had no justification because to decide which tasks were easier or difficult to the individual aphasic patients is even today very difficult. The whole approach was purely empirical and didactic. Nonetheless, in some cases of aphasia it achieved certain improvement, but the patients spent so much time, effort and money on their reeducation; a context in which the family was also required to play its role.

For instance, the French didactic reeducation system (Lhermitte & Ducane, 1965) had two aims: restoring and enriching the lexical repertoire as well as ameliorating situation-related language. The former is retrained with a didactic method. The latter exploits dialogue and narrative speech in which audio-visual series were used. The patients had to read and summarize the texts, taken from manuals that were used to teach the foreigners a foreign language. The French method appears to have gone beyond what was expected from aphasia therapy. The impact of linguistics on this approach can not be ignored as the therapists thought impairment in many cases was caused by a break between the concepts and the words. Thus they ventured to retrain impaired word forms with similar words using repetition as a way of training. In this context the patients had to hear their recorded errors and correct them. For the written language they made the patients copy and recite paradigms, complete

sentences and writing to dictation. To train grammar and syntax they used contextual and semantic cues.

In this period there had been so many didactic methods. The therapists used approaches in which they added unsystematic elements that had little or almost no effect on the problems of aphasia. The aphasia therapy plan displayed more linguistic sophistication rather than systematic therapy processes. It was a programmed instruction in which the therapists emphasized the mastery of isolated linguistic segments rather than the reacquisition of a meaningful situation-related language.

(2) The *Behavioural Modification School* exploited Skinner's theory of operant conditioning that emphasizes the use of reinforcement in forming and producing verbal behaviour (Skinner, 1957 & Chomsky, 1959). The proponents of this school considered language from a stimulus-response perspective, hence, on the one hand, they avoid the use of any linguistic terms and, on the other hand, they emphasize the inability of the impaired brain to organize the stimuli so as to submit the responses. Therefore, the task of the therapists is to improve the patients' language by teaching them various strategies of how to retrieve their language (Sidman, 1971).

This approach has been used as a method of teaching strategies that may change the behaviour of the patients. It offers no theoretical account of aphasia. The instruction, forwarded to a patient, needs the specification and expectation of a behaviour that will be shaped by what will be learned by the patients' inherent abilities and disabilities. The instruction of the patients is carried out by the following series of small steps: correct responses are reinforced and the stimulus that supports the patients is reduced, stages of training that are unnecessary for the patients are left out and early ones in which they still make errors are revised. It is an interaction between the feed-forward and the feed-back processes (Costello, 1977; Holland, 1967, 1970) in which the behaviour modifier and the appropriate reinforcer are involved. It has the potential advantage that by a precise specification of the aims, methods of therapy and aphasics' reactions to them, we can learn more about how to do therapy.

The best solution to eradicate mal-adaptive behaviour is to reinforce the correct response until it takes over (Holland, 1967). In this context aphasic impairments are treated by behaviour modification as a learning process. Therefore aphasics learn not only verbal tasks but also non-verbal ones, such as visual discrimination, filmstrips, pointing to auditory command, etc. (Brookshire, 1969).

Many studies of aphasia therapy that used the behaviouristic method flourished in the United States over recent years (Kearns & Salmon, 1984; Thompson, McReynolds & Vance, 1982).

These studies focused on the use of micro-computers-based programmes for the treatment of certain problems of recognition, comprehension, writing and word retrieval. In this context the role of a therapist is primordial because of the principle of reinforcement that requires that correct responses should be rewarded and therapy steps graded to shape the patient's behaviour. Finally, the behaviour modification school is not guided by any theory of aphasia therapy.

(3) The *Stimulation School* was founded at the beginning by Froment & Monod (1914) who attacked the didactic method. This school had at its basis the idea that a psycho-physiological method in one way or another reawakens auditory verbal images. They proposed two principles: auditory stimulation and progression in language from involuntary responses (elicited by the therapists) to voluntary and appropriate speech. Their proposals were based on the belief that the aphasics' language procedures are not lost but they can not be attained by the aphasics. After the Second World War this school was revived in the United State and else where in Europe due to the survival of many head-injured soldiers who were barely in need of language rehabilitation.

Joseph Wepman (1951) and Hildred Schuell (1965) were the pioneers who triggered the idea that aphasia therapy should not be a teaching but a stimulation that should be preceded by testing. The rehabilitation method of Wepman was controlled by the use of standard tests that show the patients' progressive achievements in the modalities of language and arithmetic. Wepman's aphasia therapy was built on three concepts: stimulation, facilitation and motivation. These headings are related and complementary to each other; to process the stimulation, the aphasic must possess a physiological readiness, an internal condition that facilitates the taking in of the stimulation that must be processed. The stimulation and facilitation procedures are assisted by the patient's motivation which is supported by the previous success in therapy and the patient's awareness of his problems and expectations. The patient's performance decreases under discouraging condition if his/her motivation and success remained absent. Wepman's distinctive contribution lies in directing his attention to the importance of the aphasic patient's needs, aspirations and emotional state.

In the stimulation school language must be recovered and not relearned. In the early first steps the patients are flooded with oral language which is based on the naming of objects. In this stimulating context the aphasics' correct responses are not required, but any patients' trials are accepted. Verbs, adjectives, adverbs, reading and writing are used to open the channels of stimulation. Treatment is thus oriented to the wishes and needs of the patients rather than to a re-training of their specific linguistic difficulties. Recovery is determined by the patients'

recognition of their problems and interaction with the stimulation; mainly by their involvement in the process of trials and errors (Wepman, 1958a, 1958b).

In the seventies Wepman moved away from the reflection on aphasia as a language deficit that must be stimulated - of course taking into account the patients' psychological state - to considering the aphasic patients as having an impairment in thought. Therefore, the patients must be stimulated to think so as to produce any verbal behaviour they still possess. This situation created a shift from the stimulation of language to a thought-centred therapy that considers communication as a basis to treatment (Martin, 1981a).

Schuell (1965) was to take over the language stimulation model and develop it. She avoided the previous formulations of aphasia. She considered aphasia as a general problem that varied in severity that must be defined by objective test results. Aphasia became a single problem in which there was a continuum of severity. According to her, therapy should be based on intensive auditory stimulation, in which visual stimulation can be involved if the patients find it useful, because all aphasics have auditory comprehension problems she attributed to a deficit in the auditory-verbal short-term memory (Schuell, 1953). In this context the therapist must use an adequate stimulation that should consist of frequently used material of speech and language. The aim of the therapist is to elicit responses from the patients and vary rate, loudness and length of the stimulating material. The errors occurring in the responses should not be corrected. In a session of stimulus and response the aphasic is rather urged to produce a maximum number of verbal trials where therapist's task consists of the repetition of an auditory stimulation many times.

Behaviouristic influence is quite prevalent in Schuell's approach. This has led to the establishment of the attitude that aphasia therapy should exploit the aphasics' remaining linguistic ability. The therapist's attention and focus on therapy should not be directed to the aphasics' deficits and weaknesses but rather to their capacities (Holland, Schwindell & Fromm, 1983). Schuell's auditory stimulation approach was harshly criticized by Shallice and Warrington (1977), Levelt (1983) and Henderson (1982) as they found that there is more than auditory stimulation in aphasia. However, she is to be remembered for her practical treatment approach that contains a wide range of therapeutic techniques and materials.

While the stimulation therapists argued for the effectiveness of the auditory input, an East Berliner, Egon Weigl, a neuropsychologist put forward the deblocking term (Weigl, 1961). He postulated that any intact ability must be used to deblock any impaired one. Even later stimulation therapists accepted that the process of facilitation in therapy increases if the therapists present the stimuli to the patients in several modalities (Ulatowska & Richardson,

1974). Weigl (1970, 1979) claimed that deblocking can be applied to a whole semantic field, for instance, the word “tree” may deblock “garden”, “forest”, “rose”, “water”, etc. A great contribution of the stimulation therapists and their school, despite their consideration of aphasia as a unitary and undifferentiated disorder that must be treated by auditory stimulation, is the discovery that more language may lie intact in the aphasics’ neural network than they express.

(4) The *Luria School*, known also as *Re-organization of Function School* in Eastern Europe, indicated that the damaged brain areas that are responsible for language and other higher functions can not be repaired after a stroke, an accident or a disease despite a limited form of neural regeneration (Devor, 1982). At the time prevailed the notion of centres that were to be replaced by the view of neural networks which consisted of a number of components that as a whole could carry out a complex function. The concept of Anokhin (1935, 1974) indicated that a functional system, that comprises groups of interconnected network of neurological structures whose dynamic functions are united in a common task, can be recreated and reorganized in a different form where one component was impaired or destroyed. Luria (1947) took this notion of a functional system to solve the conflict between the proponents of localisationism and its opponents, of course, in a dialectic synthesis (Luria, 1966). He pointed to the selective impairment of the intellectual activities and the possibility of restoring the functions, but only under certain conditions that can be created by the therapist. Thus, a new functional system can be established in the brain. It differs from the original one but it is expected to fulfil the same tasks, even though less efficiently.

Pavlov’s model (1949) of cortical analysers, that have a visual, auditory, motor and kin-aesthetic nature, was a basis to Luria’s interpretation of specific impairments of skills and their reconstruction. Thus, during an examination he attempted to find which cortical analyser is impaired and form a therapy plan that uses intact analysers to reconstitute the impaired function. As his colleagues in Western Europe, who dealt with the casualties of the Second World War, he worked also in a rehabilitation centre for head-injured soldiers. His preoccupations with the activities of rehabilitation led him in 1947 to publish “*Traumatic aphasia*” and in 1948 “*The restoration of function after brain injury*”. His findings about aphasia were much more advanced than else where.

As far as aphasia therapy is concerned he dealt with syntactic impairments using a particular Lurian model of treatment. He used various auxiliary and visual schemes to restore speech and make target sentence structures. He also employed external aids that consisted of pieces of paper that stand for three main sentence components that correspond to a particular

thematic picture. For afferent aphasia, whose defects lay in the kinaesthetic basis of speech articulation, he applied the intact visual analyser to support the production of articulation. For sensory aphasia, where the acoustic analyser is defective, speech sounds are analyzed with the help of kinaesthetic and visual images. He managed to integrate his remedial approaches in a coherent system.

In his model he emphasized the biological operations of cognitive functioning and simplified the linguistic complexities of speech production and comprehension, mainly at the syntactic level. Hatfield (1981), Brown (1972) and Blumstein, Baker and Goodglass (1977) criticized him for attempting to create a psychological theory from a clinical practice.

(5) Due to the rise of pragmatics in the seventies the *Pragmatic School* insisted that treatment should enable the aphasic patients to make an optimal use of all their available resources in communication. The whole approach is based on the view that aphasics in real life situations communicate much better than they are able to say or understand (Prinz, 1980; Willcox, Davis & Leonard, 1978). They argued that formal tests can not find out some important aspects of communication that are not inherent in the text. These can be linguistic and non-linguistic implications of the message that contains prosodic information and involves the interlocutors' gestures as well as facial expressions and the circumstances of the context.

For instance, if the aphasic patients can not employ the syntactic structure of a sentence, they use contextual, situational and pragmatic cues to come to an interpretation (Caramazza & Zuriff, 1976; Schwartz, Saffran & Martin, 1980). In communicating a particular message aphasics resort to the use of various channels of communication to complement and correct their speech. They use commands, requests, questions, performatives and propositions to convey messages (Holland, 1982; Meuse & Marquardt, 1985).

A variety of formal aphasia assessments were developed to measure the patients' ability to communicate rather than their technical language proficiency. These assessments were the Functional Communication Profile (FCP; Sarno, 1969), Communicative Abilities in Daily Living (CADL; Holland, 1980) and the Edinburgh Functional Communication Profile (EFCP; Skinner et al., 1984). The first one is built on the observation of the impaired patients in communication, the second method inserted role play in situations of treatment and the third one submitted an overview about the communicative resources of the elderly aphasic patients. These tests faced many problems; they could not quantify the variety of messages that were used to convey different situations and an indefinite number of contexts.

Aphasics use different self-cueing in word retrieval. The pragmatic approach widened this context of therapy. It emphasized that attention must be paid to how successfully the aphasics

use their resources to perform communicative acts that rely on the patients' verbal and non-verbal strategies and on the ability of the interlocutors (communicator) who should understand and interpret the aphasics' informative responses (Prinz, 1980). Therefore Martin (1981b) pointed that the aphasics should be trained to be good communicators and their interlocutors as good interpreters. Aten, Cagliuri and Holland (1982) introduced a way of treatment to improve the patients' communicative ability. In a fixed period of time they discussed with the patients the strategies they could use to communicate in different contexts, such as greeting, giving information, shopping, etc. These were trained in role play. At the end of the period of treatment the patients showed signs of improvement.

Davis and Willcox (1981, 1985) pushed it still further as they used the PACE approach (Promoting Aphasics' Communicative Efficiency) which unfolds that both therapists and patients should have a pile of pictures of certain objects, and intermittently they have to communicate to each other the object on the card which the other can not see. This approach can not be used to train certain severe forms of aphasia. This is a reason that pushed certain therapists to use exercises to train certain skills and then build from these elements certain contexts and situations of communication.

Tsvetkova (1980) indicated that language is a social tool. Together with Glotzman (1981) she suggested that groups of patients should work together to overcome the hindrances of aphasia through role play. This gives them a feeling of self-confidence, a positive self-image and a desire to communicate. However, some pragmatic therapists sometimes confuse the aims of their methods of treatment and the means that can be used to achieve these ends. It must be taken for granted that this approach is still in the early stage of development. Studies carried out on the pragmatic approach confirm that the linguistic disabilities of the aphasic patients did not change while their communicative capacities in role play clearly ameliorated.

(6) P. Marrie (1906), H. Head (1926), H. Schuell (1965) and other Western aphasiologists criticized the findings of Broca, Wernicke, Lichtheim, Bastian and others as they localized each aphasic syndrome in particular cortical or sub-cortical lesion sites. In the East (former Soviet Union) and elsewhere in Europe (Germany, France, Italy, etc.) aphasic syndromes were described, differentiated, localized and analyzed. In the sixties onwards a group of scientists, who were interested in aphasia, was built in Boston around Harold Goodglass and Norman Geschwind. They referred to the works of the 19th century aphasiologists, set to revive the schemata of Wernicke, Lichtheim and Bastian and dealt with the studies of other investigators, thus founding the *Neo-Classical School*. The Boston school differentiated between fluent and non-fluent aphasia. The former is associated with the post-Rolandic

lesions and the latter with the pre-Rolandic ones. Aphasic syndromes were re-described and defined both in terms of localisation and impairment of linguistic levels. The latter were triggered by the post Chomskyan linguistic influence.

For instance, Broca's aphasia was caused by an impairment to the syntactic component with articulatory problems of input and output; it is a lesion they localized in the inferior part of the frontal lobe. Wernicke's aphasia has deficits on a lexical-semantic level with temporal lobe lesions. Conduction aphasia is characterized by an output of phonological deficit which is associated with lesions deep to the supramarginal gyrus. Anomic aphasia was difficult to associate with any neural tissues but it is localized between the temporal and parietal lobe. It is a word-finding disturbance that shows the patients inability in lexical retrieval. There are still other aphasic syndromes that could be slotted in these categories. It must be noted that the aphasics of one group show differences in the degree of impairment.

The opinion of this school variegated; Geschwind (1965) explained aphasic deficits from a neurological localisationistic point of view, but Gardner (1977) advocated the idea that similar lesions and common psychological deficits define an aphasic group, hence psychology and neurology were involved in one school to explain the aphasic deficits. In aphasia therapy, they postulated, intact structures can be used to support the production and comprehension of language. The therapeutic approach of the neo-classical school derived many concepts of language therapy from the stimulation school. Therapy should be based on diagnoses to find the group to which a patient belongs, observations of the patients' behaviours, reactions to therapy and other factors that involve self-corrections, responses to different cues, alterations of the tasks that have an impact on the patient. Thus, therapy becomes oriented to the impaired functions.

Many members of the neo-classical school use the main assumption of the stimulation therapy which means that correct responses should be drawn out of the patients by any means. In the treatment of the aphasics, as their predecessors did, they used serial speech, rhymes, rhythm, songs, poems, prayers, etc. (Spark, 1978; Goldstein, 1948).

Sparks, Helm & Albert (1974) doubted the neuroanatomical basis of the above therapy method but still they suggested that it helps the patients to use the intact right hemisphere abilities so as to improve the performance of the impaired left one. This related them to the localisationists' notions; that is, the right hemisphere can be stimulated to take over certain damaged functions of the left.

Baker et al. (1975) and Gardner et al. (1976) developed a Visual Communication (VIC) system of written symbols to make the global aphasics express their feelings, needs and

wishes with a non-verbal system, but normal people could not understand this system or learn it so as to communicate with the aphasics. Helm and Benson (1978) went forth and proposed the Visual Action Therapy (VAT) in which global aphasics are taught to associate drawings with objects and actions to produce symbolic gestures. Even sign language was used to make the patients master the vocabulary of signs which can be combined with the oral language to improve the production of speech.

Helm and Barressi (1980); Helm-Estabrooks et al. (1981b) proposed the use of global aphasics' involuntary utterances as a basis for treatment. For this occasion they used the Voluntary Control of Involuntary Utterances (VCIU). The patients are provided with words to read that the therapists have heard them to produce as involuntary utterances. If the patient reads the word correctly it remains in the patient's vocabulary set. If he/she makes an error, for instance, instead of reading "dog" he/she reads "cat", he/she is then given the word "cat" to read and the word "cat" will be added to the vocabulary set of the patient. Thus, the vocabulary can be built up. To train the agrammatic aphasics Helm-Estabrooks suggested the use of HELPSS (Helm-Elicited Language Program for Syntax Stimulation). In this agrammatic training a hierarchy of syntactic structures are elicited by story completion; the patient practises the repetition of the sentences produced by the therapist as a story completion, later on the patient should try them alone.

Shewan and Bandur (1986) introduced the Language Oriented Therapy (LOT). Their approach is similar to that of the Stimulation School as they suggested that the patients should be trained in tasks that are at the limit of their abilities. According to them treatment must be directed to the tasks in which the patients make errors. During treatment they dealt with different modalities: spoken language comprehension, written language comprehension, spoken and written language production, comprehension and production of gestures. They not only use the auditory channel, as the stimulation school did, to stimulate the patient but also concentrate on each individual's hierarchical difficulties and areas within the modalities. For each area they suggested a hierarchy of tasks that are used for treatment. The therapists should find the particular types of cues that suit to each patient. The aphasics are provided with cueing strategies to get over their aphasic limitations.

The neo-classical school advocated the conviction that the various types of aphasia resulted from a failure in the access to language and its use rather than from a loss of it. This same view was held by the stimulation therapists. To sum up, the neo-classical approach to aphasia therapy is stimulation, but in each aphasic group it is defined in terms of the level of linguistic impairment and the localisation of the lesion. This school revived and developed a variety of

therapy methods in which secondary unimpaired abilities, such as gestures, singing, visualizing, etc. were used to support the linguistic performance of the aphasic patients.

(7) It very difficult to determine the origins and the aims of the *Neurolinguistic School* as it encompasses a great number of linguists, aphasiologists and investigators from other disciplines of scientific research. They had particular interests in aphasia. Hécan and Dubois (1969, 1971) attempted a linguistic classification of aphasia. They made no allusion to the neuro-linguistic view for re-education. Luria was the first to use phonetic distinctions so as to interpret certain problems of sensory aphasia, he also drew attention to syntactic complexity in comprehension and repetition.

Jakobson (1956) referred to aphasia disorders along the syntagmatic axis (contiguity disorders) and the paradigmatic axis (similarity disorders). Therapists gathered elements of language, mainly of theoretical and applied linguistics, and began to combine them in linguistic units to re-educate the patients. On the paradigmatic axis the focus was on the selection of an appropriate lexical item by the patient and its insertion in a sentence. Blumstein (1973) and Green (1970) attempted to apply the notion of phonological features to the analysis of the deviations in speech production. Weigl and Bierwisch (1970) and Whitaker (1971) began to use post-Chomskyan linguistic to analyze aphasic deficits in the lexicon, morphology and syntax.

Stachowiak, Kotten, Ohlendorf and Engl in Bonn and Poeck, Huber and de Bleser in Aachen are the best representatives and even pioneers of the neurolinguistic school as far as aphasic impairments are concerned. Leischner (1959), who worked for a long time as a director of the Rheinische Landeslinik für Sprachgestörte, was also interested in linguistic aspects of aphasia and its therapy since the nineteen fifties. His colleague Peuser (1974, 1978), who was also active in the same centre, sketched a therapeutic scheme that can be used to treat different aphasic types. He insisted that the therapists should use in the therapy processes the deblocking term to deblock the comprehension of linguistic symbols with the help of pictures. In the therapy sessions there must be a progression from the substantives and the elementary verbs to the pictorial representations of complex situations. Whole sentences and abstract relational words can be deblocked by means of pictures. The Aachener group developed a range of therapeutic programmes for various forms of aphasia.

The fact that they built their therapeutic programs on a linguistic basis does not mean that they teach patients linguistic segments, but they rather instruct them to use linguistic processes and rules by which words and sentences are produced. Their therapy programs are designed to deal with specific linguistic problems of a group of aphasics who may have the

same linguistic deficits (Poeck, Huber, Kerschensteiner, Stachowiak, & Weniger, 1977; Weniger, Huber, Stachowiak, & Poeck, 1980). To put it in a nutshell, for aphasia therapy they developed approaches that were based on linguistic parameters, methods, theories and terminology. They have included different therapy techniques in the process of treatment.

(8) The *Cognitive Neuropsychology School* has its roots in the sixties, but its foundation took place in the seventies. Research studies of J. C. Marshall and F. Newcombe were a great contribution to the development of this school. It became famous as it introduced the use of the grapheme-to-phoneme correspondences in reading. The cognitive neuropsychological approach was based on five principles each with unique characteristics: Firstly, the patients' problems, as they used language, were located within an information processing model. Secondly, cognitive neuropsychologists postulate that if one or more components of an information processing system is affected by the damage of the brain, other remaining components will still function (Shallice, 1979). Thirdly, they used data from single subjects; their aim is to look at the intact and impaired patterns of individual patients because the score of a group does not tell us so much about the ability of the individual patients (Marshall & Newcombe, 1973; Howard, Patterson, Franklin, Morton & Orchard-Liste, 1984). Fourthly, the investigators of the cognitive neuropsychological school do not use the localisation of the lesions in the brain areas as a basis so as to clarify their concepts; any explanation they provided was based on the information processing model and the selection of the impaired components of this model (Allport, D.A. & Funnell, E., 1981). The models of the cognitive neuropsychology school may resemble the theories of the 19th century diagram makers, such as Wernicke, Lichtheim, Bastian and others who postulated that there was a one-to-one correspondence between neural structures (sites) and psychological processes; that is, the arrows they used between the boxes (centres) stood for neural pathways relating the centres. However, the cognitive neuropsychologists' theories have nothing to do with the assumption of the 19th century. In their diagrams they assume that information processing modules do not correspond directly to particular tissues of the brain. Their diagrams specify how information is processed in language comprehension and production. They pushed the idea of localisation to a secondary place (Mehler, Morton & Jusczyk, 1984). Fifthly, the features of the cognitive neuropsychological method to aphasia is the focus on psycholinguistic variables that disturb the performance of the patients and also on the type of errors that occur in the tasks.

Cognitive theories of reading were applied to clinical data (Coltheart, 1985). The method stretched to areas that dealt with the disorders of writing (Hatfield & Patterson, 1984), word comprehension (Butterworth, Howard & McLoughlin, 1984), spoken word production (Ellis,

1985) and word repetition (Allport, 1984). A humble progress was made in the investigation of the disorders of word production at the phonetic and phonological levels and the difficulties of syntax in sentence comprehension and sentence production (Butterworth & Howard, 1987). Certain syntactic and morphological features were re-trained in which linguistic elements were involved (Tissot, Mounin & Lhermitte, 1973; Jackendoff, 1972). Semantics was included in the re-training of the patients, whose understanding ability was not badly impaired, and also in the comprehension of certain structures that support communication (Hatfield & Elvin, 1978; Elvin & Hatfield, 1978).

What the cognitive neuropsychologists did was an attempt to understand specific information processing deficits of individual patients so as to define the problems of each of them and use their remaining abilities in treatment. As far as treatment is concerned they have shown excellence in the treatment of word reading and word writing. Certain therapists, who took into account the processing of information, defined the impaired processes of the patients as a loss of specific information, rules and procedures. Thus, they helped them to re-learn the lost information. They even re-organized the linguistic functions or facilitated the access to the defective routines of language. Therefore, the re-education schemes were based on restructuring the patients' skills through psycholinguistic models that depend on the cognitive processes.

Like the pragmatic school the aim of treatment is improving communication rather than the acquisition of some forms of language. In this case treatment makes use of the patient's strategy; that is, in a therapy session where he/she has not developed a specific one the therapist proposes a strategy taking into account the patient's remaining information processing skills.

To sum up, the investigators, who dealt cognitive neuropsychology, adopted a variety of treatment methods that relied on the analysis of the patients' disorders. These methods consisted of a direct re-learning of processes, a re-organisation of the function and a facilitation of the defects. Their aim is to unfold that they are interested in the improvement of the patients' linguistic and communicative abilities.

6.4 – Treatment of Aphasia

The effect of language treatment on recovery is as difficult to determine as the effect of any other single factor involved in the process of this type of treatment. Darley (1972) outlined in an important paper the issue, does treatment enhance recovery beyond that which is already attained in spontaneous recovery? The answer to this question involves a comparison of some

kind between the time before treatment and the period of time after its administration. There have been other questions that go back into the somewhat varied strategies of treatment that were made in the nineteen forties. At that time began the variations of treatment and the comparison of its diversities. There have been different procedures that were derived from different viewpoints. These assumptions have been based on the understanding of neurological and cognitive basis of aphasia, the theories of recovery and the experiences that were gathered from working with the aphasic patients.

Another point, which must be referred to in this context, is the awareness of the patient and the family. Both of them must be convinced that aphasia treatment takes a long time which is usually measured in weeks or months. This treatment needs a special relationship between the therapist and the patient. All in all, the treatment of language may have an invariable interactive structure, but most of the variations found in treatment programs have a common set of goals, principles and procedures.

6.4.1 – The Aim of Treatment and its Beginning

The primary and expected objective of treatment of aphasia is to improve the patient's use of language in both comprehension and expression. In the case of my work I will attempt to improve the patients' articulatory language, comprehension, word finding and naming ability. Each therapy procedure and plan will be directed to the impaired language of the individual patients with whom I opted to work. The written language to some extent will be left out with the exception of certain typing exercises that will be involved in the last session of the first phase of therapy. It must be remarked that the two phases of therapy administration will be subjected to the eclectic approach.

It must be taken for granted that in the course of treatment the objectives of recovery should be realistic. The patients should be instructed to stay within the scope of what they can achieve because very few patients return to their initial linguistic abilities - as they had been before the disorders set in. The goals of treatment are reduced down to the purposes for which language is used. The purpose of language - that appears in every situation to have the greatest and most general importance to the patients and their families - resides in its involvement in situations of direct interpersonal communication. There are other uses of language that include the comprehension of the electronic media, reading of the printed words and writing of the texts. These channels of communication are useful and can not be avoided by the aphasics as they involve the principle of interaction between a sender and a receiver and the binding between the social and the linguistic contexts.

It is quite common among the psycholinguists that language makes thoughts and imagination, remembering and planning ahead to become a reality. But direct interpersonal communication is the primary need of the patients and the main interest of the therapists. It is a source that motivates the designation of any treatment plans. Hence the fundamental aim of treatment is the improvement of the patient's ability so as to interact with his/her surrounding where he/she can exchange thoughts and feelings in communicative situations. In these conversational contexts the sender and the receiver of a message share the responsibility of becoming aware that the sender's message is received. As the aphasics do not dispose of these processes of language, the therapist feels obliged to attempt to restore, through training, the impaired connections in the pathways of the brain.

The treatment is directed towards improving the patient's use of language where the patient uses it most of the time. It should be oriented to the development of the patient's communicative skills and structured to reflect the patient's use of language in his/her daily. The patient should acquire the ability to use language where the therapist is not present to help him/her. It is an independence in the acquisition and use of communicative skills.

Another aim consists of maintaining the achievements attained in a regular and sustained treatment plan. This type of maintenance therapy can be achieved once a maximum recovery has been reached. It is an attempt that may minimize the return to the development of bad communicative habits. It must be ensured that acquired communicative strategies continue to exist in the patient's communicative components. Another objective, that plays a great role in treatment, involves facilitating the patient's psychological and emotional adjustment to the disturbances arising from aphasia. Part of the adjustment requires the development of realistic expectations about the outcome of treatment and recovery. A lot of patients hope and believe that through treatment they could return to their initial language capability. But in many cases of aphasia this unrealistic expectation ends with frustration and discouragement over time. A new self-image should be mediated by the therapist to the patients about their speech and physical appearance. The patients must be instructed to build a positive view about their awkward and agrammatical language and strange formulated utterances. Consequently, aphasia can be dealt with in the best manner if the patients, their families and the therapists share the objectives and aims of treatments cited above.

The plan for treatment begins with the assessment of the patient's language at bedside. This can be done with a small carefully structured conversation that consists of some simple questions requiring yes or no answers or pointing to responses. The aim of the test is to check whether the patient understands the stimuli he/she is confronted with. Any attempt to force the

patient to speak may lead to frustration and discouragement due to the temporary deficits that appear during the first three weeks that follow an accident, a disease or a heart attack. About when to begin treatment Rubens (1977b) wrote: "*I like to see aphasic patients enter therapy as early as possible, and I believe that therapy should be as intensive as the general medical situation will allow*" (p.1). The common belief that prevails among the therapists is the conviction that early treatment is accompanied with more recovery.

Duffy (1972) and Wepman (1972) adopted however another attitude. They proposed that the drills of treatment should be delayed a few weeks after the rise of the aphasic disorders. The latter advocated this view but he did not cancel the therapist's involvement in the speech and language of the patient altogether. At this stage the therapist provides a supportive psychological role. More or less he recommended delaying treatment for at least three months due to the following considerations: firstly, the patient is emotionally unstable during the first days of aphasia emergence; secondly, the spontaneous recovery of the patient extends from three weeks to six months the time the vascular system needs to restabilize and for the edema to subside. Therefore, the primary consideration unfolds undoubtedly that any therapist's intensive therapeutic interventions may be psychologically harmful to the patient; the secondary one indicates that the therapist may be treating problems that will disappear in the nearest future.

These views of Wepman were based on suppositions that can be valid for some patients and not for the others. These viewpoints can be refuted by other suggestions and observations. Firstly, the spontaneous recovery from a diaschisis - a contemporary failure of the functions of a whole cell assembly - usually lasts two or three weeks and no three or six months; that is, temporary deficits clear away in a short period of time. Secondly, any psychological problems, which Wepman assumed to raise from treatment, have not been proved. These problems may be attributed to a natural reaction due to the acquisition of aphasia rather than to a reaction to treatment. The greatest problem and psychological harm to the patients may result from a delay of treatment. It is possible that patients may develop permanent depressions and poor communicative habits if the patients get a delayed treatment of three or six months. All in all, most of the therapists believe that treatment should begin when the patients feel they are physically and psychologically ready to follow regular and systematic drills.

6.4.2 – Approaching Treatment

As far as treatment is concerned Wepman(1972) drew a distinction between the direct and the indirect method. The direct method focuses on the interaction between the therapist and the patient. It is a stimulus-response training of specific language processes during which the therapist draws specific language responses from the patient. The tasks of training are well-structured so as to treat the deficits of auditory comprehension, word retrieval or correct sound production. In the programmed sessions of treatment the therapist uses the method of stimulation to facilitate the patient's comprehension and expression of the tasks. However, the indirect method is not structured. It has the form of an informal conversation about any daily themes that may help the patients recover.

6.4.2.1 - Direct Treatment

This kind of treatment is made of tasks whose aim is to drill specific language functions. The task is determined in terms of the stimulus presented by the therapist and the response given by the patient. The moment the therapist sketches the patient's deficits, he/she plans the tasks that will have a particular effect on the impairment of language. The direct treatment consists of the *meetings* between the patient and the therapist, *planning* of the tasks, *interaction* between the patient and the therapist and *progression* of treatment.

As far as the *meetings* are concerned the aphasic may be seen in three to five meetings in a week. Each meeting, that lasts thirty to sixty minutes, begins with familiar tasks to which the patient provides successful responses. This beginning stands as a refreshment that precedes the introduction of new materials and procedures. At this stage it is very important to close a meeting with simple tasks so that the patient will leave a therapy session in a merry and encouraging mood.

The *planning* of treatment is derived from the identification of the patient's primary deficits, his strengths and weaknesses. For instance, if a primary deficit lies in the repetition, naming, or comprehension, the aim will be to improve the patient's abilities that are related to these modalities. Communicative strengths are expanded and used so as to raise the level of weaker abilities. Training is direct to the intact brain regions that are used to compensate for the neurally damaged structures. The planning consists of the *procedural task approach* and the *strong approach*. During the first approach the progression of treatment becomes a movement from the easiest to the most difficult tasks that form a therapy program. The moment the patient achieves an efficiency in a task, he/she will be provided with a difficult one. The results of treatment, from which the materials of testing can be picked up, become a standard with which the scale of recovery is to be measured. The second approach involves the

planning of procedures that contain a wide range of language variables that are directed towards the deficits that are identified during testing. For instance, if a patient is not in a position to understand grammatical relations, the treatment will be oriented towards a variety of syntactic relationships that are presented both auditorily and visually. In the same approach if a deficit is shared by all language modalities, it will be treated with a variety of exercises hoping to achieve an appropriate improvement. One of the important advantages of the strong approach is the possibility to use various tasks to treat a particular deficit.

In all cases of treatment tasks, the stimulus might be a word, a phrase or a sentence. The stimuli can be expressive or receptive tasks that are oriented towards word retrieval, stimulation of syntax and formulation of meaning. The therapist tends to base the content of the tasks on the patient's preferences and individual use of language in daily communicative situations. Any designed or structured tasks in the direct treatment are means used to stimulate the patient's reading, comprehension, repetition, expression and writing so as to achieve particular ends. The patient's responses should be interpreted positively because they boost the improvement of speech and language functions.

The *interaction* between the therapist and the patient and the *progression* of the periods of treatment stand as milestones in the whole processes of aphasia therapy. During the direct treatment the patient and the therapist are involved in a standard form of interaction, determined by the trials or the errors of each task. This interaction, as it was unfolded during testing, consists of the therapist's stimulus, the patient's response and the therapist's feedback to the patient's response. It defines the nature of the tasks presented by the therapist to the patient.

The individual treatment that stretches over a period of time is considered as a progressive continuation, that involves the modifications of the tasks whose complexity increases gradually. Computer training programs set a certain precision in defining the progression of treatment. They emphasize the principles of programmed instruction that is initiated and controlled by the therapist. The programmed training has been tried in the sixties at least by the following clinical therapists: Brookshire, 1968; Sarno, Silverman & Sands, 1970; Lozano & Gaeth, 1977; Culton & Ferguson, 1979. The introduction of this type of treatment did not go by without notice. Wepman (1968) criticized this method of treatment. He labelled it as a teaching machine that interferes with the patient-therapist's relation. Anyone who happened to use it was accused of fearing to establish a contact with the patients. However, Holland (1970) retorted to this criticism otherwise. She precisely unfolded that the application of the programmed treatment helps the therapist in defining the interaction between the patient and

the therapist and structuring the development of this interaction during the administration of therapy (Bollinger & Stout, 1976; Keenan, 1977). Programmed training stimuli, defined with respect to structured tasks, such as picture naming or description, are always steps of treatment in the long term. The final goal of this treatment is to help the patient use language in "...everyday life without the help of a picture, a word card, or a therapist" (Taylor & Marks, 1959: 16).

The *progressio* of treatment are carefully graduated steps that are created by a therapist's control of the stimuli and a patient's realistic responses to them. The progression of treatment becomes variable from one patient to the other. Some patients can bear the change of one variable more easily than another variable. Certain patients tolerate only one variable change; however, others have a high success rate when more than one variable is changed from one step to the next. The time, needed to insert new variables in the progressive steps of treatment, depends on the abilities of each patient because the patients' linguistic abilities are not similar. The steps are developed out of increases in a stimulus length. This means that the constituents of a sentence, that have the form of an individual stimulus, are trained in steps towards the production of a complete sentence. The patient must master one step before moving to the next. The movement from one step to the other varies from patient to patient; even among those who suffer from the same syndrome of aphasia.

6.4.2.2 - Indirect Treatment

The indirect treatment approach is intended to improve particular impaired language functions. This treatment has been related to a variety of clinical activities that are less formally structured than specific tasks of direct treatment. The important feature of the indirect treatment is the fact that they are a sum of activities that are not directed towards a single language process. These activities consist of a group conversation, social groups, role-playing and field trips.

Wepman (1972 & 1976) introduced in the indirect treatment the following label, a "non-language content-centred discussion therapy". It is a procedure in which the therapist and the patient talk about topics that are interesting to the patient. The work of the therapist is to keep the patient within the framework of the topic giving him the impression that the focus, in this discussion, should be on ideas and neither on words nor sound segments. The patient is led away from attempting to find the accurate words, phrases and sentences towards thought processes that underlie the use of words. The therapist, who does not draw any particular verbal expressions from the patients' language, does not ask the patients to think about the use

of language. The aim of this treatment is to improve the patients' verbal expressions without focusing directly on it.

Although some patients may show some positive changes in verbal expression by the use of Wepman's method of spontaneous discussion, a tangible improvement could not be achieved by this approach. It is considered as a form of therapy that has no planned structure. This indirect treatment represented only a shift in thinking about treatment as certain patients had a dissatisfaction with the results of the direct treatment. DiSimoni (1981) propounded the idea that Wepman's discussion of aphasia therapy contains more psychotherapy and family counselling rather than treatment of speech and language.

6.4.3 - Environmental Influence on Treatment

There many reasons which limit an aphasic's motivation to communicate. The following situations illustrate this case: depressions due to isolation in nursing residences, limited opportunities to communicate due to the syndromes of aphasia and lack of positive reinforcement to the aphasics' communication. Therefore, the effectiveness of communication with an aphasic patient can be improved not only by changing the methods of treatment for the patient but also by altering the patient's environment. The latter should include communicative settings and partners. This orientation was labelled by Lubinski (1981a) as an Environmental Language Intervention. For instance, if the aphasic patient lives at home, this setting becomes supportive. The familiar surrounding and the family as a whole contribute to the patient's well-being and recovery by minimizing depression and offering the occasions to communicate. On the contrary, if the patient lives in a nursing home, the factors that decrease communication are enormous. This situation may have a negative effect on the aphasic's progress of treatment. Lubinski (1981b) rendered this aspect as a communication-impaired environment that imposes the following situational guidelines on the patients: where, when, to whom and what kind of communication might occur is governed by the nursing institution, where there is often very little private conversation, as the administration and the staff do not encourage communication among the residents and between the residents and the staff. This may be attributed to the fact that most of the residents have a form of aphasia or dementia that restrict communicative opportunities.

The opposite of these prescribed guidelines, according to Lubinski, is the fact that successful communication occurs in an environment that, on the one hand, values and reinforces private conversation and social communication and, on the other hand, reduces the constraints that prohibit communication. In this context the task of the therapist is to evaluate the condition of

the settings, where the aphasics live, and advice the staff to make the necessary changes so as to learn to communicate with the patients. Moreover the therapist should contribute to the education of the institutional staff about the syndromes of aphasia and the ways of communicating with the aphasic residents so as to develop and use communicative strategies that suit to the environment in which the aphasics live.

The success of communication, in the aphasics' environment, is a cooperative effort in which the institutional staff, which is advised and guided by the therapist, allows the patients to speak, listens to what they say and submits responses that reinforce the patients' communicative ability, despite the inherent deficits in the aphasics' speech and language. Thus, the speech and language modalities of the nursing staff are improved and tuned in order to enhance the patients' comprehension and production of language. The aphasics' interlocutors are recommended and advised to use a slow speaking rate, simplified adult words, sentences and utterances so as to be legible.

6.4.4 - Influence of clinical Environment on Treatment

Clinical treatment should not be formalized in clinical procedures without any referential contexts. It should reflect the patients' real life circumstances. If there is no connection between the patients' real life and a clinical treatment, exercises and drills may never improve the patients' communicative ability outside the clinics (Florance, et al. 1980). This should be taken as a basis of any therapy program that ought to contain the materials which the patients encounter in everyday experience. The therapists should approach speech and language therapy, given to the aphasic patients in clinical environments, with the expectations that its results should facilitate individual and social interactions outside the clinics. Thus, the patients are led automatically to the memorization of the materials of therapy (Holland, 1978). Moreover the therapists ought to have a general overview about the patients' communicative contexts and demands outside the clinic so as to make therapy plans that include the needs of the individual aphasic patients. The therapists should inquire about the contexts where the patients spend their time in order to provide them with the necessary linguistic materials that support their contextual communication. Therefore, the success of communication does not depend on what the patients do but also on the active participation and intervention of the therapists. The latter should be in a position to understand the patients and communicate with them.

To sum up, the therapists must be equipped with diagnostic and therapeutic approaches that have been scientifically tested. The approaches should be used effectively so that the patients'

linguistic abilities improve not only in the arid clinical contexts, where the materials of training, such as sounds, words, sentences, pictorial images, recorded speech or computer program, are used to stimulate the patient to learn but also in the communicative situations of every day life. Taking into account these introductory guidelines about the treatment of language, I will attempt to employ a method of therapy that makes use of computer programs that support aphasia therapy. This new technique of therapy has been continually introduced in many German and foreign clinics.

6.5 – Summarizing the Effectiveness of Aphasia Therapy

A systematic aphasia therapy improves and maintains undoubtedly certain linguistic abilities of the aphasic patients, even those suffering from chronic aphasia. The patients should be treated with different methods of therapy. Their use is often determined by the type of aphasia, severity of the lesion and rate of recovery. More general, the effectiveness of aphasia therapy is affected, to a large extent, by the following factors: aetiology of the lesion, type and severity of aphasia, site, age, handedness and patients' environment.

To test any variables a number of patients must be selected, tested and treated so that the therapists can generalize the obtained results to other patients who might have similar aphasic symptoms. However, the above mentioned factors about the effect of therapy make the process of generalization very difficult because aphasia therapy differs from one aphasic patient to the other. This can be referred to the symptoms of aphasia, the kinds of tasks that are involved in the procedures of therapy and the rate of task severity. An example that should be cited in this context is the case of an aphasic patient who is confronted with a picture to name. In a session of therapy he may find the name of the object, but in the next one he will be unable to recall it. This case unfolds that a good performance in certain items on one day does not guarantee that the same performance will be submitted on the same items a couple of days later.

Therapy must be carried systematically to achieve improvement in specific functions or tasks. This must be preceded by standardized tests of aphasia that examines performance with a small number of items. Many therapists aim to improve the aphasics' ability to communicate, using linguistic and non-linguistic approaches that must be defined by testing. Each standard test tends to evaluate particular abilities of the patient so as to define the real rate of performance.

Language tests prove that patients are heterogeneous, their therapy plan, despite the similarity of its tasks, must be altered to re-train the remaining ability. It must be changed to suit to the

impairment of the patient. The form of treatment can be homogeneous but varied from one patient to the other to satisfy their wishes, needs and expectations. Sometimes only a small number of patients benefit from treatment due to the inappropriateness of its administration or the general physical and psychological state of the patients. These hinderances can lead now and then to a break of therapy. This discontinuity of treatment brings very little effect on the syndromes of aphasia.

A homogeneous therapy plan can be very effective for one patient but not for the others. No one can define the real factors of this effectiveness. Thus, theoretical generalization can not be generalized to other aphasics. It has become apparent that in many cases of aphasia, improvement can not be attributed to spontaneous recovery because of the severity of the aphasic syndromes and diversity of therapy. Therapists and volunteers, who were involved in therapy processes, have until now confirmed this fact. Therefore, the administration of treatment should be heterogeneous, despite the homogeneity of the tasks involved in re-training, planned and carried out regularly two or three times in a week over a particular period of time. It must be sufficiently intensive and lengthened now and then to provide reasonable therapy effects. These testing and therapeutic measures can lead, to a large extent, to the improvement of aphasics' communicative ability. It is considered as a matter of fact that communicative functions of the patients, who receive no therapy if they do not improve spontaneously, disintegrate and worsen in the course of time.

It must be taken for granted that it is almost impossible for a therapist to have access to a group of patients that can be treated with a therapy program whose tasks are closed entities that allow no change. Effects of therapy in aphasia can be measured by a treatment of single patients and a comparison between them. There are enough studies about the performance of the aphasics on particular tasks and the manner how to carry out their therapy. But studies that unfold the treatment of single patients with particular methods are rare because they do not lead to any theoretical generalizations that can be applied to the aphasic patients. Single treatment is advantageous as it can be adapted to the abilities, wishes and needs of the patients. It helps the therapist in assessing the effectiveness of therapy and checking the performance of the patient in particular tasks.

Computer programs supporting aphasia therapy account, to a large extent, for the individuality of the aphasic patients. A detailed analysis of the forms and contents of the programs unfold that they are inspired by the behaviour modification, neo-classical, neuro-linguistic and cognitive neuropsychology schools. These programs use a multi-modality approach. The patients are required to name, read, write and understand. The tasks of one exercise can be

directed to re-train the patients' listening, understanding, speaking and writing ability. They use a wide variety of different treatment techniques to make therapy more effective. The tasks or the items of re-training should be presented with those that the patient can name, repeat, write and understand successfully.

Re-training of tasks must be repeated many times where different techniques of administration provide a basis to aphasia therapy. The production of the responses in the course of therapy should be considered as therapeutic events in the process of treatment despite the morpho-phonemic, syntactic, lexical, semantic deviations and the errors they contain. But effective techniques should help the patients develop particular strategies of acquisition so as to produce correct responses. An effective technique is the one that creates a long time change in the patients' level of performance. Some techniques although they are qualified as therapy techniques have only a transient effect on the patients. They can not alter the communicative and linguistic competence of the aphasics.

The techniques of therapy, that are used to re-train repetition, naming, comprehension, writing and articulation, as well as morpho-phonemic, lexical and semantic constituents, become effective when used repeatedly and intermittently over a period of time. Processes of production and comprehension, which interact with one another, are involved in this technique. The stimuli, that elicit correct responses from the aphasics, are considered by the therapists as a therapeutic process. But the effect of therapy depends on how a therapist elicits a word, a sentence and an utterance from an aphasic. In this situation of interaction the therapist considers the appropriate techniques and the types of disorders from which the patient suffers.

As it was unfolded in the section of the therapists' schools, the strategy of a therapy technique is based at least on three options; specifically, restoration, reconstitution or compensation. Each of these therapy approaches has its own characteristics. Restoration is used as direct improvement of the damaged aphasic's language capabilities. For instance, if a patient can not read because he can not identify the letters visually, he will be re-trained in tasks that will improve the identification of the letters. Reconstitution tends to use the intact abilities to reconstitute the impaired processes. If a patient can not read, the re-training can be carried out by tracing the letters or hearing the language being spoken. Compensation stands above restoration and reconstitution as it attempts to get the aphasics use whatever capabilities that remained unimpaired. It involves every modality in re-training.

These strategies are related to the direct, indirect or supporting approach. The direct method is the traditional approach which is directed towards a re-training of the aphasics' impaired

speech and language abilities. For example, the Broca's aphasics, who have articulatory difficulties or deficits, will be re-trained in exercises of articulation; however, the anomic aphasics, who suffer from word finding disturbances, will receive a re-training in the retrieval of names. In these contexts of therapy the therapists use any tasks, items or cues they consider to be appropriate to the disabilities of the patients.

The indirect method is oriented towards performance. For example, if the anomic aphasics have word retrieval deficits, the therapists use compensation tasks to re-train the patients; they help them to get access to the whole semantic aspects of a sentence so as to find a word.

The supporting approach, involved in the aphasia therapy, uses the unimpaired ability of the aphasics to assist them in the organization or activation of the disturbed capacity. For instance, rhymes and pieces of music are used to facilitate articulation; gestures and sign language are employed in certain cases to improve comprehension.

Having found the strategy and the method to use in the improvement of speech and language, the therapists should involve a structure in treatment, for instance, aphasics with severe aphasia should be re-trained, first of all, in the recognition of letters that form a word before starting to re-train them in reading, writing and forming of words and sentences.

The therapists of the Behaviour Modification School use picture naming in the procedures of therapy structures or stimulus items to elicit simple responses from the aphasics. They postulate that the agrammatism of speech should be stimulated with the imperative and then continued with wh-questions and intransitive sentences so as to activate the transitive ones. According to them a therapy structure should be based on hierarchy of the deficits that were acquired by the individual patients. Therefore, the aphasic's ability can be used as a basis to define this hierarchy so as to plan a hierarchical treatment. No one can determine how long a training unit will take or how often it will be repeated. The therapist has to meet this decision due to his observations and tactful interventions in the hierarchy of a therapy. But if a particular ability is improved through particular tasks, then the difficulty of the tasks, items and stimuli should be increased to include another modality or more of them. This can be considered as move from the first to the second step of therapy.

6.6 – Aphasia Therapy through Computer Programs

6.6.1 – Description of the Programs

TV, Video and Play-Recorder have been already involved in the examination and therapy of speech and language because they facilitate the presentation of the stimuli and the recording of the responses. In the last two decades some linguists and therapists have ventured to

introduce computer programs in the treatment of aphasia and other disorders due to the rapid progress in the the mutli-media. The uniqueness of these programs is the combination of the visual, auditory and written aspects of language in one task that can be used to stimulate the different modalities of language. Moreover the programs offer a patient the possibility to intervene in the exercises of training and, to some extent, control the tasks that are used as stimuli during the administration of therapy.

One of these programs is *LingWare* (Phoenix Software). It is a computer program that supports aphasia therapy. It has been developed in Bonn and spread in other Germany speaking countries. Speech pathologists, neuropsychological doctors and therapists use it to support the training of the patients' impaired language. It is employed, mainly, in the clinics as well as in indoors therapy settings to improve the oral and the written linguistic ability of the aphasics. Its development and employment in the clinics has been supported by the *Bundesministerium für Forschung & Technologie* (BMFT). This shows that the impact and the importance of speech and language therapy, in which certain therapists involve computer therapy programs, has been increasingly acknowledged and encouraged in its use.

LingWare rose from a co-operative work between Prof. Franz J. Stachowiak and the *Phoenix Software GmbH*. Stachowiak, the head of the Department of Speech and Language Therapy of the *Rheinischen Landesklinik* in Bonn, has been also working with many famous linguists, therapists and speech scientists so as to put the whole sections of this program together. The basis of this development was a period of ten years of experimental research and practice from 1983 to 1989. Since 1990 *Phoenix Software* committed itself to a constant improvement and a complementary development of LingWare. All these efforts and research works, that took into account the new knowledge about speech and language therapy, have been encouraged and supported by the BMFT.

This program consists of therapy systems that were divided in the following sections: naming, labelling, dictation, numbers, letters, minimal pairs, categories, situations, syntax and understanding, as well as STACH I & II (SprachTherapie für Aphasiker mit Computer Hilfe) and a user's administration site.

Another program for which I will account in this research paper is *NeuroLing*. It is a neuro-linguistic program, composed by the clinical linguist, Dr. Susanne M. Neumann and her assistant, Heinz B.Voigt. Examiners and therapists use it to help the aphasics recover from aphasia. It has many sections; among them two important parts about word formation and sentence construction. These parts, which will be involved in the procedures of therapy, are of great importance as far as my work is concerned (See Section: 6.6.3.1.3).

Both programs, LingWare and NeuroLing are intended to help the impaired patients. They will be used as a new method that should stimulate the patients' neural network of language and as an instrument that can support the therapists in their attempts and efforts to make the patients gain certain control over their speech/language and develop basic strategies of communication. In the two programs there are linguistically and psychologically founded and proved therapy concepts. The latter are embedded in computer based and programmed systems. A number of advantages result from these programs that are systematically structured. Instances of illustration in this context are the combination of different exercises, the repetition, naming, understanding and writing of words and sentences; and the description of various situations. The tasks introduced in the programs offer the possibility of enlarging and varying the form and content of the exercises.

Most of the patients are fascinated by the training procedures of the two programs. Both the therapists and the patients welcome them wholeheartedly as instruments that support the therapeutic procedures of speech and language. The acceptance of the programs has been constantly increased by the systematic presentation of the exercises and the tasks of each of them. Moreover the patients are motivated to use computer training programs, despite their impairment and limited knowledge about how to deal with a PC. This motivation was increased by the intentional expectation that they can continue their intensive speech/language training after having been instructed by the therapist. This continual and controlled training can take place in the whole exercises and tasks that are offered by the program.

Bundesverband for rehabilitation of the aphasics recommends that computer training programs should be involved in speech therapy, especially the use of LingWare, NeuroLing and a series of other programs that may improve other speech and language disorders such as dysarthria and dyslexia.

6.6.2 – Administration of Therapy

Language disturbances caused by aphasia need particular therapy programs and a well planned therapeutic training. The tasks, involved in training, must be selectively chosen to suit to the anticipations and expectations of each patient. The materials involved in the procedures and settings of therapy must be directed to train and improve the remaining functional abilities of the impaired and non-impaired areas. Sounds, words, sentences and pictures are used to stimulate the brain cells of the language regions so that new synaptic connections may grow among neighbouring and remote neurons that are involved in the

processing, analysis, storage and control of the stimuli as well as the submission of the appropriate responses.

What will be unfolded in the first and second phase of therapy are concrete instances that show how computer training programs, that contain particular treatment procedures, contribute to the improvement of the aphasics' speech and language. The programs are predicted to satisfy the individual needs and interests of each patient. They can combine the use of the tone, the text and the images in one task so as to stimulate the different modalities of language. This characteristic was not inherent in the classical therapy, hence the diversity and the advantage of this type of programmed treatment.

It must be taken for granted that each patient is unique; he/she has his/her own etiology and suffers from a particular syndrome of aphasia. These are at least two reasons why each ought to be treated with a clear cut therapy program that may increase communication and reduce the effect of impairment on the aphasics' communicative ability.

6.6.3 – Applying Therapy to Three Individual Aphasics

As it was mentioned above, the use of some subtests of the AAT - inferences can be drawn from sections: 5.3.2.1.1 & 5.3.2.1.2 - unfolded that each patient, Mrs Müller, Mr Fimm and Frau Heinrich has a particular syndrome of aphasia. This diagnosis helped me proceed with the sketching of therapy plans that must fit with the linguistic ability that each patient still possesses.

During the administration of therapy Mrs Müller (Broca's aphasic) will be trained in oral imitation and expression tasks; articulatory and functional tasks, Mr Fimm (Wernicke's aphasic) will also get oral imitation and expression tasks but the focus will be oriented to the meaning of the content words, Mrs Heinrich (anomic aphasic) will receive the same oral and expression tasks and a training in word finding or retrieval. The number of correct and faulty tasks will be registered and compiled in values that will be useful for a comparison between the results that are to be obtained in the second phase of therapy and those of the period of Re-Testing. Of course, attention must be paid to the mood and the processing ability of each patient. If a patient is not at ease and/or becomes tired, therapy will be broken and postponed to another day.

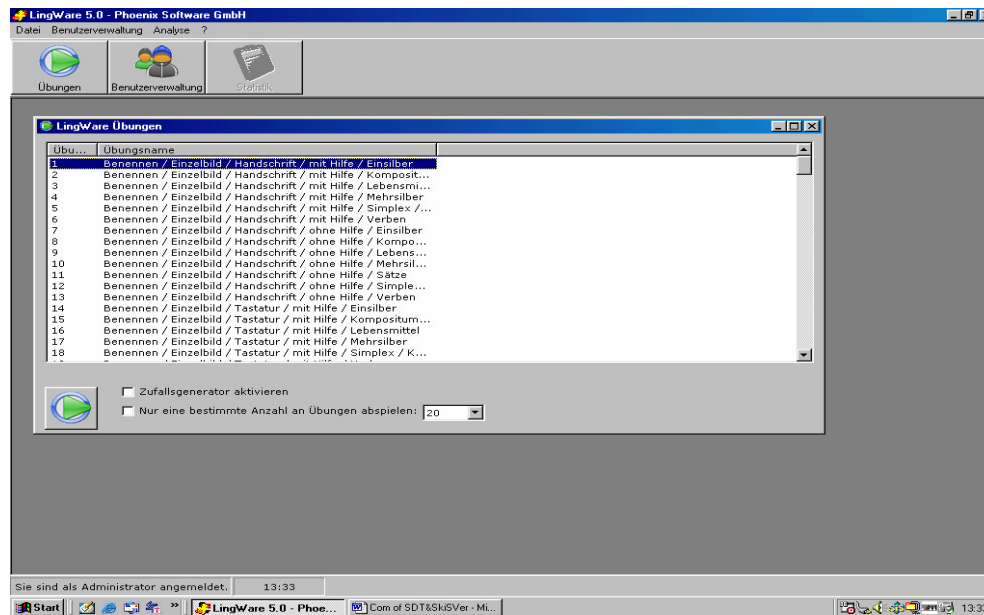
The time of training, in which the sessions of therapy are to be carried out, will always be constant. It is to be confined to two periods of training with two hours per a week and a short break between the two phases of training. It must be also taken into account that some

exercises of LingWare and NeuroLing will be used as samples of Re-Testing so as to find more about their own effect on recovery.

6.6.3.1 – Tasks of Training for the Aphasics

6.6.3.1.1 – First Phase of Aphasia Therapy

The moment one runs LingWare 5.0 of phoenix Software, the program displays the following window:



It shows that LingWare 5.0 consists of 185 exercises that can be divided in exercises of Naming, Labelling, Dictation, Typing, Word Finding and Understanding. The tasks of which the exercises are made vary from one exercise to the other. Each exercise can be started with a double click. The first phase of the therapeutic training will include a limited number of 24 exercises that are divided over a period of four weeks. Each therapy setting of 60 minutes, that takes place two times per a week, contains three exercises. As it will be deduced from the following tables of the first phase - which present the stimuli, the trials, the errors and the evaluating scale of each exercise - the number of the tasks is limited to 20 items.

In the first phase of therapy Broca's, Wernicke's and anomic aphasics, as it was mentioned above, will be trained in 24 exercises. Each of exercise has particular characteristics that can be summarized in the following overview:

The **first hour** of therapy is oriented to the *repetition* ability of the three patients, Mrs Müller, Mr Fimm and Mrs Heinrich. They will be trained in three exercises that differ from one another in form and content. In *exercisel* they will be trained in **mono-syllabic words**

without an article, in *exercise2* in **compound words** and **simple sentences** and in *exercise3* in **words** that have **finite** and **infinite articles** with **mono-** or **polysyllabic words**.

The **second hour** of the first week is also a continuation of training to the *repetition* ability. In *exercise4* and *5* the three patients will be trained in **mono-syllabic** and **compound words**. *Exercise6* is used to train their repeating ability of **simple sentences**.

The **third hour** of the second week will be devoted to a training in *naming*. The patients will be confronted with tasks of three exercises that have been trained in the first and second session of training. *Exercise7* consists of **mono-** and **bi-syllabic words**, *exercise8* of **compound words**, **phrases** and **simple sentences** and *exercise9* of **bi-syllabic** and **compound words**.

In the **fourth hour** training will be continued in exercises of *naming*. In *exercise10* the three patients are to be trained in **bi-syllabic words**, the tasks are presented in pictures together with an article without any content words. *Exercise11* is a move towards to sentence formation. It consists of **simple sentences** in the present tense, whose content words - that are presented in the form of images - are omitted from the sentences. *Exercise12* is similar to the first one of this setting. It is made of **articles**, **bi-** and **poly-syllabic words**. The content words of this exercise are omitted and the articles are presented.

In the **fifth hour** of the third week of therapy the patients will be trained in the *naming* and *repetition* of different tasks. First of all, in *exercise13* they have to **name** the **verbs** and slot them in simple sentences and **repeat** each sentence in which a verb has been inserted. In *exercise14* the patients will be confronted with the images of mono-syllabic words. These tasks of training are presented to the patients only with **one consonant**, the image of a **word** and its **indefinite article**. Just after the naming of an image, the patients have to repeat it together with its article. In *exercise15* the patients will have to **name** the image of **compound words**, **phrases** and certain **constituents** of the **sentences**, and if possible **repeat** the solved task. The attempt to repeat the tasks, after naming them, remains optional, but necessary at this stage because they stand as a **re-training** of the tasks that have been dealt with in the previous sessions.

The **sixth hour** of the third week encompasses three exercises that will be also used to train the patients' *naming* and *repeating* ability. They stand at this stage of therapy as a re-training of the previous exercises because of their form and content which were mainly derived from the first and second week of therapy. This type of rehearsal is primordial at this stage. It renders a general overview to the therapist about the effectiveness and intensity of therapy; and the way how to restructure and plan the therapy processes in the next sessions.

Exercise16, 17 and *18* contain mainly **bi-syllabic** and **compound words**. The administration of therapy will be changed so as to orient its effect to the modality where the impairments tend to occur.

The **seventh hour** of the fourth week of therapy should not be seen as a repetition of the previous tasks. This session will be devoted to the **naming of situations** and **objects**. Even though the entire lexical and grammatical words, phrases and sentences were already trained in the previous settings, the manner of therapy administration will be different. Therapy will be carried out through exercises that consist of sentences and words that have the following word and sentence structure: *exercise19* consists of **NP+VP/ NP+VP+NP/ NP+VP+PP/ NP+VP+Adj** structures; *exercise20* is made up of **content words, definite and indefinite articles; mono- and bi-syllabic words; exercise21** contains **compound words with infinite and definite articles and sentences** which have **NP+VP/ NP+VP+NP/ NP+VP+PP** structures.

The **eighth hour** of the fourth week will be dedicated to a therapeutic training of the patients' **writing** abilities (an attempt in typing). They will be mostly trained through the material of the previous weeks. The following questions should be posed in this context: Are the patients in a position to turn acoustic and visual stimuli - that stood for grammatical, lexical words and word retrieval - into a written language? Has the training of the last four weeks had an effect on the writing capacities on the three patients? The patients at this stage are not required to write complete words, phrases and sentences. The demand to be made on them is to complete the omitted phonemes and morphemes of the content words. In *exercise22* and *23* the patients have to type mainly **bi-syllabic** and **compound words** and in *exercise24*, which consists of sentences, they are required to type the **omitted phonemes** of the **content words**.

In each exercise of training the patient is allowed to make at least three trials. If he/she goes beyond them, he/she will be stopped, given the answer of the task and then required to move to the next task of the exercise. The aim of this assistance is to avoid discouraging the patient. It is not so important whether the patients make correct or faulty answers. The primordial aspect of this trial and error process is not only to make a statistic registration and unfold it in smart and colourful figures but also to stimulate the patients, motivate them in their efforts and give them a feeling that they are close to an answer. Moreover any patient, especially the Wernicke's aphasic, who during training goes astray and produces a torrent of meaningless words, sentences, utterances and forms, must be stopped to avoid the waste of time and the rise of any unwanted habits during a session of training.

At the end of each hour of training there is a commentary on the trials, errors, evaluating scale and the types of disorders that occurred in the responses of the aphasic patients.

Tasks of LingWare

* The **first hour** of therapy training consists of three exercises that are used to train repetition. The patients Mrs Müller, Mr Fimm and Mrs Heinrich will be trained in the following types of exercises: in the first exercise, training will be conducted with mono-syllabic words and an article; in the second one with compound words and simple sentences; and in the third one with mono- and bi-syllabic words that have finite and infinite articles.

Broca's Aphasic

Therapy on Mo. 02, February 2004

The tasks of this first exercise are programmed in a way to display different window-forms. As we clicks on the exercise, we get the image, for instance, of a book beside it we have now and then the article and the first letter of the noun. During the training of the Broca's aphasic, the (a), (b) and (c) window-forms of the tasks will be skipped because at this stage of training they may cause many problems due to their inherent complexities. Such a start should be avoided at the beginning of any therapy sessions. The start will be made with the (d) window-form to facilitate the process of training. The following example shows how the tasks of the first exercise of training are to be presented:



Weiter: weiß

[7]

d

In this first session of training the therapist reads the word “*Buch*”, which is displayed by the (d) window-form, because at this level of training the program submits no acoustic assistance

about the objects. The task of the patient is to repeat the word. The twenty tasks of exercise 1, which are presented in table1, have the same form and do not differ in the way they will be administered. The whole exercise can be seen in the *Image Appendix* in which the whole tasks are illustrated.

Table 1: Broca's Aphasic's Repetition of mono-syllabic words

Exercise 1 of LW Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Eis	2	1<e/ IV Ø/s>		2		
2. eine Uhr	2	1<ein/ IV Ø/ Uhr>		2		
3. Tee	1	0(ND)	3			
4. eine Kuh	2	1<ein/ IV Ø/ Kuh>		2		
5. Bier	2	1<B/ IV ä/er>		2		
6. ein Bett	1	0(ND)	3			
7. ein Buch	2	1<ein bu/ IC k/>		2		
8. Mehl	1	0(ND)	3			
9. Fisch	2	1<[+ ICP]fisch>		2		
10. ein Topf	3	2<e/ IV Ø/n to/ IC Ø/f>			1	
11. ein Wirt	3	2<ein / IV f// IV e/rt			1	
12. ein Schirm	2	1<ein Schi/ IC Ø/m>		2		
13. Brot	1	0(ND)	3			
14. ein Stuhl	2	1<ein / IC s/tuhl>		2		
15. Fleisch	2	1<F/ IC Ø/eisch>		2		
16. ein Schrank	3	2</ IV Ø/in Sch/ IC Ø/ank>			1	
17. ein Zelt	3	2</ IV Ø/in / IC s/elt>			1	
18. ein Pferd	2	1<ein / IC Ø/ferd>		2		
19. ein Strumpf	3	2<ein St/ IC Ø/um/ IC Ø/f>			1	
20. Wein	2	1<we/ IV Ø/n>	3			
Sum of Trials, Errors & Evaluating Scale	41	21	39			

Table2 contains images that must be responded to by compound words, phrases and sentences. The image below presents the type of tasks the patient is to be confronted with. During the administration of this therapy session - whose tasks are listed in the table below - the (a), (b) and (c) window-forms are to be left out to avoid involving the patient in complications of typing and reading just at the beginning of training.



Weiter: weiß

[1]

d

To have a look at the whole images of each task, allusion must be made to *Image Appendix*. In context of therapy, it is often recommended that a special attention should be given to word, phrase and sentence formations as well as to the images they refer to. The therapist presents through LingWare an image, and its text and then pronounces the latter. The patient has to visualize, hear and repeat the stimuli. These procedures of trials, errors and evaluation are illustrated in table2 as well as in the whole tables to come.

Table 2: Broca's Aphasic's Repetition of compound words, phrases and sentences

Exercise 2 of LW Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Aktenordner	2	1<A/ICØ/tenordner>		2		
2. der Taschenrechner	2	1< der Tasche/ICØ/rechner>		2		
3. die Bohrmaschine	2	1<die Boh/ICØ/maschine>		2		
4. der Rasierapparat	2	1<der Rasie/ICØ/apparat>		2		
5. der Rasenmäher	2	1<der Rasenmäh{1MØ}>		2		
6. der Tischtennisschläger	3	2<der Tischtennissch/ICØ/äge{1MØ}>			1	
7. ein weißer Kreis	3	2<{1MØ} weiß{1MØ} Kreis>			1	
8. ein grünes Viereck	3	2<{1MØ} grün{1MØ} Viereck>			1	
9. ein rotes Dreieck	4	3<{1MØ} rot{1MØ} D/ICØ/eick>				0
10. ein blauer Kreis	2	1<ein blau{1MØ} Kreis>		2		
11. ein gelbes Viereck	2	1<ein gelb{1MØ} Viereck>		2		
12. ein schwarzer Kreis	2	1<ein schwar/ICs/er Kreis>		2		
13. Der Mann läuft	2	1<{de/ICØ/} Mann läuft>		2		
14. Der Hubschrauber fliegt	3	2<{de/ICØ/} Hubschrauber flieg/e/t>			1	
15. Die Frau telefoniert	3	2<{1MØ} Frau te/ICIVØ/foniert>			1	
16. Der Junge liest ein Buch	3	2<{1MØ} Junge liest {1MØ} Buch>			1	
17. Die Oma schreibt einen Brief	3	2<{1MØ} Oma schreibt {1MØ} Brief>			1	
18. Der Mann trinkt Bier	2	1<{1MØ} Mann trinkt Bier>		2		
19. Der Vater kocht	3	2<{de/ICØ/} Vater ko/ICk/t>			1	
20. Das Mädchen läuft zu seiner Mutter	3	2<{1MØ}Mädchen läuft zu {1MØ}Mutter			1	
Sum of Trials, Errors & Evaluating Scale	51	31	29			

Table3 will be used to train mono- and bi-syllabic words, which are pronounced by the therapist and repeated by the Broca's aphasic. This exercise is similar to the first one. The whole tasks are picked up from a semantic field that belongs to food categories. The following window-form, of exercise3, illustrates this aspect:



Weiter: weiß

[1]

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The images of the twenty tasks of exercise3 can be seen in the *image appendix*.

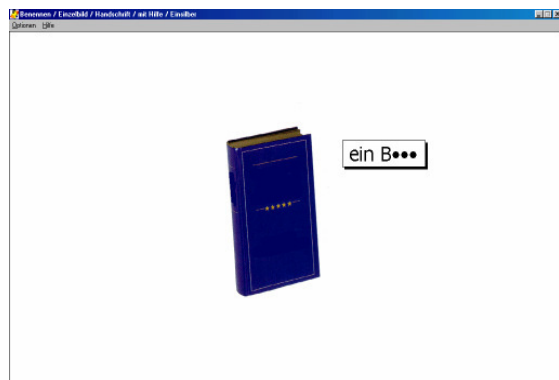
Table 3: Broca's Aphasic's Repetition of mono- and bi-syllabic words

Exercise 3 of LW Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Eis	1	0(ND)	3			
2. Mehl	1	0(ND)	3			
3. Reis	1	0(ND)	3			
4. Nudeln	2	1 <Nudel{1MØ}>		2		
5. ein Fisch	1	0(ND)	3			
6. Fleisch	1	0(ND)	3			
7. Brot	1	0(ND)	3			
8. Butter	1	0(ND)	3			
9. Käse	2	1 <K/1Vε/se>		2		
10. ein Kuchen	3	2 <ein /1VØ/in Ku/1Ck/en>			1	
11. Obst	1	0(ND)	3			
12. ein Apfel	2	1 <ein /1Vε/pfel>		2		
13. eine Birne	3	2 <ei/1CØ/ Bi/1CØ/ne>			1	
14. Kirschen	2	1 <Kirsche/1CØ/>		2		
14. Trauben	2	1 <T/1CØ/auben>		2		
16. Zucker	2	1 <1Cs/ucker>		2		
17. Kekse	2	1 <Ke/1CØ/se>		2		
18. Brötchen	2	1 <B/1CØ/ötchen>		2		
19.eine Brezel	4	3 <eine B/1CØ/e[+1Ct]/1CØ/el>				0
20. Bohnen	3	2 <B/1Vie/1CØ/nen>			1	
Sum of Trials, Errors & Evaluating Scale	37	17	43			

Wernicke's Aphasic

Therapy on Mo.02, February2004

Table4 consists of twenty tasks. The latter will be used to carry out the patient's aphasia therapy. It must be noted that the text of the images are presented in a form that has consonant and vowel deletions. The therapist pronounces the text of an image and the patient repeats it. The typing of any phonemes of the tasks is to be avoided at this early stage, even though the program demands from the patient in the first two window-forms "Bitte schreiben Sie jetzt". The whole images that will be presented to the patient will have the following form.

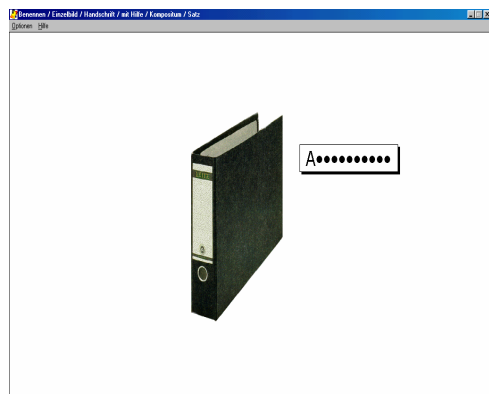


[7]

Table 4: Wernicke's Aphasic's Repetition of mono-syllabic words

Exercise 1 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. E..	1	0(ND)	3			
2. eine U..	1	0(ND)	3			
3. T..	1	0(ND)	3			
4. eine K..	1	0(ND)	3			
5. B...	3	2 <Bi/IVØ/r[+1Ve]>			1	
6. ein B...	3	2 <ein Be[+1Cl]/ICØ/t>			1	
7. ein B...	1	0(ND)	3			
8. M...	2	1 <Me/ICØ/l>			1	
9. Fi....	2	1 <Fi[+1C k]sch>		2		
10. ein T...	2	1 <ein To/ICØ/f>		2		
11. ein W...	2	1 <ein /ICV/ert>		2		
12. ein Sch...	3	2 <ein /IC S/irm[+1Ve]>			1	
13. B...	1	0(ND)	3			
14. ein St...	2	1 <ein Stuh[+1Ct]l>		2		
15. Fl....	1	0(ND)	3			
16. ein Sch....	2	1 <ein Sch[+1Ck]rank>		2		
17. ein Z...	2	1 <ein /ICs/elt>		2		
18. ein Pf...	2	1 <ein /ICØ/ferd>		2		
19. ein St....	3	2 <ein St/ICØ/umpf[+1Ve]>			1	
20. W...	2	1 </ICv/ein		2		
Sum of Trials, Errors & Evaluating Scale	38	18	42			

Morphemes, consonants and vowels are omitted from the texts of the images of table5, which contains compound words, phrases and sentences. The latter are pronounced by the therapist and repeated by the patient.



Weißte Taste für die richtige Lösung!

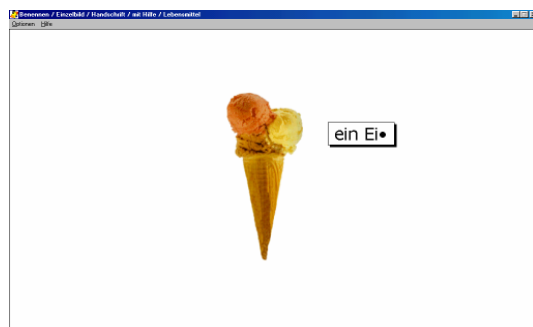
[1]

Table 5: Wernicke's Aphasic's Repetition of compound words, phrases and sentences

Exercise 2 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. A.....	2	1 < Akten /{1Mkoffer}/ >		2		
2. der T.....	2	1 <der Taschen /{1M ordner}/>		2		
3. die B.....	2	1 <die Bohrmaschin/IVØ/>		2		
4. der R.....	4	3 <de/ICØ/ Rasie/ICØ/appa/ICØ/at>				0
5. der R.....	3	2< /IMden/ Ra/1Ct/enmäher>			1	
6. der T.....	4	3< der Tische[+1Cch]nnisschl/ICe/ [+1C n]ger				0
7. ein w.... Kreis	1	0(ND)	3			
8. ein g..... V.....	1	0(ND)	3			
9. ein r... D.....	1	0 (ND)	3			
10. ein b..... K.....	2	1 < ein b/ICØ/aves Kreis>		2		

11. ein g..... V.....	3	2 <ein /2CØ/ünes V/2VØ/reck >			1	
12. ein sch..... K....	3	2 <ein /1CØ/arze[+1t]r Kreis>			1	
13. Der Mann l....	2	1 <Der Mann läu/1C ch/t >		2		
14. Der Hub..... f.....	2	1 <Der Hubschrauber flie[+1Cn]gt>		2		
15. Die Frau t.....	1	0(ND)	3			
16. Der Junge l.... ein Buch	2	1 <Der Junge lie[+1Cp]st ein Buch>		2		
17. Die Oma sch..... einen B....	3	2 <Die Oma sch/1CØ/eibt einen B/1CØ/ief>			1	
18. Der Mann t..... ein B...	3	2 <Der Mann t/1CØ/ink[+1Ve]t ein Bier >			1	
19. Der Vater k....	2	1 <Der Vater ko/1Ck/t>		2		
20. Das Mädchen l.... zu seiner M.....	3	2 <Das Mädchen /1C1VØ/[+1Cr]uft zu seiner Mutter>			1	
Sum of Trials, Errors & Evaluating Scale	46	26			34	

In table 6 the therapist trains the patient in mono- and bi-syllabic words. The images are submitted together with an article and the first vowel or consonant of the words. The latter are pronounced by the therapist and repeated by the patient. The blank in the texts, which are placed under the images, has its role in this therapy process. It makes the patient be aware of the positions of the sound units, which describe a particular image.



[1]

Table 6: Wernicke's Aphasic's Repetition of mono- and bi-syllabic words

Exercise3 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Ei.	1	0(ND)	3			
2. M...	2	1 <Meh[+1Ct]l>		2		
3. R...	1	0(ND)	3			
4. N....	1	0(ND)	3			
5. ein F....	2	1 <ein Fi[+1Ck]sch>		2		
6. Fl....	1	0(Nd)	3			
7. B...	1	0(ND)	3			
8. B....	2	1 <Bu[+1Cn]tter>	3			
9. K....	2	1 <Kä[+1t]se>		2		
10. ein K.....	1	0(ND)	3			
11. O....	2	1 <O/1CØ/st>		2		
12. ein A...	2	1 <ein A/1CØ/fel>		2		
13. eine B....	2	1 <eine Bi/1CØ/ne>		2		
14. K.....	2	1 <K/1Ce/rschen>		2		
15. T.....	2	1 <T/1CØ/auben>		2		
16. Z.....	2	1 </1CT/ucker>		2		
17. K....	2	1 </1Cb/ekse>		2		
18. B.....	3	2 <B/1CØ//1Ve/tchen>			1	
19. ein B.....	3	2 <ein Br/1Vu//1Ct/el>			1	
20. B.....	2	1 <Boh/1Cd/en>		2		
Sum of Trials, Errors & Evaluating Scale	36	16			44	

Anomic Aphasic

Therapy on Tu.03, February 2004

Mrs Heinrich's therapeutic training will be administered otherwise because of her unimpaired reading and repeating ability. In the exercises of the tables below she gets only the images and their texts from which the phonemes and the vowels are omitted. These texts and images are presented in the following window-form. Other window-forms of the same image are not to be displayed. In this therapy session the therapist reads only the presented parts of the text leaving out the phonemes of the blanks. The patient repeats the pronounced sounds and completes the deleted phonemes. The exercise of mono-syllabic words, in which the anomic aphasic will get her first training, can be seen in table7.



Weißte Taste für die richtige Lösung!

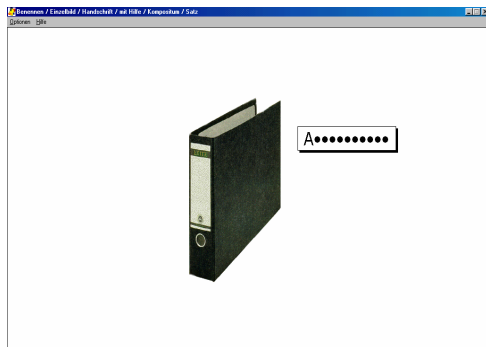
[7]

b

Table 7: Anomic Aphasic's Repetition of mono-syllabic words

Exercise 1 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. E..	1	0(ND)	3			
2. eine U..	1	0(ND)	3			
3. T..	1	0(ND)			1	
4. eine K..	3	2 <eine Katze, ein Haustier>			1	
5. B...	1	0(ND)	3			
6. ein B...	3	2 <ein B....man kann darauf schlafen, Couch>			1	
7. ein B...	1	0(ND)	3			
8. M...	3	2 <M....zum Backen, für den Kuchen...>			1	
9. Fi....	1	0(ND)	3			
10. ein T...	2	1 <eine Tasse >		2		
11. ein W...	2	1 < ein WachMann>		2		
12. ein Sch...	2	1 <ein Sch...., wenn es regnet braucht man einen Schirm>		2		
13. B...	1	0(ND)	3			
14. ein St...	1	0(ND)	3			
15. Fl....	2	1<Schweinfleisch>		2		
16. ein Sch....	2	1 <Ja für die Kleidungen, ein Schrank>		2		
17. ein Z...	1	0(ND)	3			
18. ein Pf...	1	0(ND)	3			
19. ein St.....	2	1<ein Stück....ein Strumpf>		2		
20. W...	2	1 <W.... eine Flasche Saft>		2		
Sum of Trials, Errors & Evaluating Scale	33	13	47			

The therapeutic training will be continued in table8 in the same way it was applied in the above exercise; that is, the therapist reads the texts that are presented as stimuli and the patient has to repeat and complete them at the same time.



Weißer Taste für die richtige Lösung!

[1]

b

Table 8: Anomic Aphasic's Repetition of compound words, phrases and sentences

Exercise2 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. A.....	1	0 (ND)	3			
2. der T.....	2	1 <der Rechner, nein Taschenrechner>		2		
3. die B.....	2	1 <die B.... eine Maschine zum Bohren>		2		
4. der R.....	2	1 < der Rasiermaschine, Rasierapparat>		2		
5. der R.....	2	1 <der R...für den Rasen, ein Rasenmäher>		2		
6. der T.....	2	1 <der {1MØ}Tennisschläger>		2		
7. ein w.... Kreis	1	0(ND)	3			
8. ein g.... D.....	2	1 <ein grün, [+keiner Kreis] ...Dreieck>		2		
9. ein r... D.....	2	1 <ein rotes [+mit drei]Ecken >		2		
10. ein b.... K....	2	1 <ein blauer K... kein Eck >		2		
11. ein g.... V.....	2	1 < ein gelbes V.....eck>		2		
12. ein sch..... K....	2	1<das ist keinViereck,{1MØ}schwarzer Kreis>		2		
13. Der Mann l....	2	1 <Der Mann /{1Mrennt}/ >		2		
14. Der Hub..... f.....	2	1<Der Hubschrauber fliegt{+3M über den See}>		2		
15. Die Frau t.....	2	1<Die Frau {+2M sitzt und} telefoniert>		2		
16. Der Junge l.... ein Buch	3	2<Der Junge {+2M guckt oder} liest /{2M einen R/>			1	
17. Die Oma sch..... einen B....	3	2<Die Oma schreibt /{3M in einem Heft}/>			1	
18. Der Mann t.... ein B...	1	0 <[+1MGewiss], trinkt der Mann ein Bier>(ND)	3			
19. Der Vater k....	2	1<Der Vater kocht {+1M etwas} >		2		
20. Das Mädchen l.... zu seiner M....	3	2<(Pause) /{2MEin Kind}/ läuft zu /{2M einen Man}/>			1	
Sum of Trials, Errors & Evaluating Scale	40	20	40			

The tasks in which the patient will be trained in table9 will not be different from those of table7 and 8, mainly, in the way of their administration. They can be considered as a re-training of mono- and bi-syllabic words. In general, they share a great deal of structural and semantic similarities with the tasks that were dealt with in table 7.



Weißte Taste für die richtige Lösung!

[1]

b

Table 9: Anomic Aphasic's Repetition of mono- and bi-syllabic words

Exercise3 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Ei.	1	0(ND)	3			
2. M...	1	0(ND)	3			
3. R...	1	0(ND)	3			
4. N....	1	0(ND)	3			
5. ein F....	1	0(ND)	3			
6. Fl....	1	0(ND)	3			
7. B...	1	0(ND)	3			
8. B....	2	1 <{+2M Käse oder} Butter>		2		
9. K....	2	1 < {+3M ja das ist} Käse>(ND)	3			
10. ein K.....	2	1 < ein K../{1MTorte}/ >		2		
11. O....	2	1<{+2M verschiedene Früchte}>		2		
12. ein A...	1	0< {+3M also das ist ein} Apfel>(ND)	3			
13. eine B....	4	3<eine B.... {+4M das ist kein Apfe}l, {+2M Melone oder...>				0
14. K.....	2	1<{+2M Trauben oder} Kirschen>		2		
15. T.....	1	0< {+3M das sind die} Trauben>(ND)	3			
16. Z.....	2	1<{+2M es könnte} Zucker {+3M oder Mehl sein}>		2		
17. K....	1	0<{+1M} kleine Kekse>(ND)	3			
18. B.....	2	1<{+1MBrot nein, {+3M das ist ein} Brötchen>		2		
19. ein B.....	2	1< ein /{1W Brot}/		2		
20. B.....	1	0 <{+3M klar weiß ich} ...>(ND)	3			
Sum of Trials, Errors & Evaluating Scale	31	11	49			

Commentary on the 1st Hour

The first therapeutic training of the Broca's aphasic, Mrs Müller in three exercises shows, mainly, disturbances at the level of consonants, vowels, morphemes and lexical words. They are either left out, repeated or added during the repetition of the tasks. The first and partly the third exercise, which consist of mono-syllabic words have a low rate of errors and trials but a high score of the evaluating scale. The second exercise in which phrases, simple sentences, bi-syllabic, compound words were trained carry morpho-phonemic and lexical errors, especially those of the deletion type. The latter made the number of trials and errors higher and the score of the evaluating scale lower.

The repeating ability of the Wernicke's aphasic is not altogether intact. The patient's responses show the places of the word and sentence structures where the morpho-phonemic additions, substitutions and deletions occurred. The results of the evaluating scale and the

number of trials and errors do not vary, to a large extent, from those obtained by the Broca's aphasic (see Tab.4, 5 & 6).

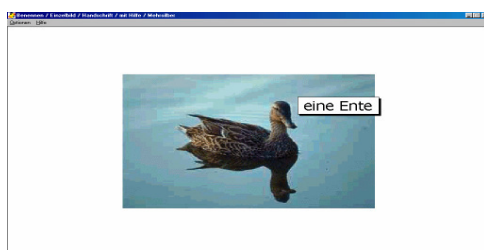
The anomic aphasic, Mrs Heinrich although, in certain context, she attempts to paraphrase the words, her responses unfold no phonemic and morphemic omissions in the word structures and no lexical and grammatical deletions in the sentences. Thus, the results, she got in exercises (Tab.7, 8 & 9) of the first hour of therapy, give us an insight that her repeating ability carries no impairment. It can also be inferred from this session that even though the administration of therapy was different from that of the Broca's and Wernicke's aphasics, the number of errors remained quite low. The occurrence of certain errors in the responses can be referred to other linguistic deficits.

* In the **second hour** of the first week of therapy the patients will get a training in bi-syllabic and compound words that are presented, successively, in the fourth and fifth exercise. The sixth exercise introduces the patients to the use of the present tense in simple sentences.

Broca's Aphasic

Therapy on Wed. 04, February 2004

In this training unit Mrs Müller's therapy administration will be carried out in the following way: the therapist reads a word or a sentence and Mrs Müller has to repeat it. She gets certain cues of assistance that consist of pictorial stimuli, their texts and various situations. Each task of exercise4 of table10 has a particular pictorial form in LingWare (see *Image Appendix*). The image below illustrates the form and the content of the tasks. The other window-forms of the same task are omitted to skip the writing modality and give the patient the opportunity to visualise the images and their texts while the therapist pronounces them. Therapy at this level of the first phase concentrates, mainly, on the repetition of the lexical words. The writing modality is postponed to a future session.



Weiter: weiß.

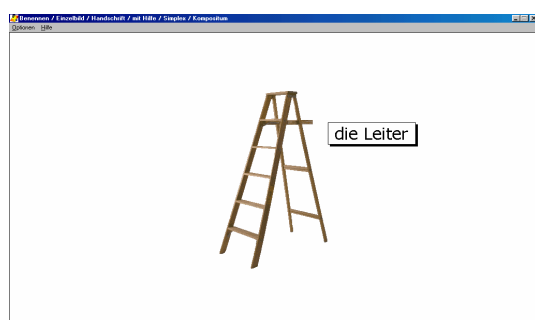
[3]

d

Table 10: Broca's Aphasic's Repetition of bi-syllabic and compound words

Exercise 4 of LW Stimuli (Images, Text & Tone)	Trials	Responses Errors	Evaluating Scale			
			3	2	1	0
1. ein Auto	1	0(ND)	3			
2. ein Affe	1	0(ND)	3			
3. eine Ente	1	0(ND)	3			
4. eine Hose	1	0(ND)	3			
5. ein Stück Seife	2	1 <ein Stü/ICf/ Seife>		2		
6. ein Apfel	1	0(ND)	3			
7. ein Mantel	1	0(ND)	3			
8. ein Gürtel	3	2 </IVØ/in /IKØ/ürtel>			1	
9. eine Schnalle	2	1 <ein/IVØ/ Schnalle>		2		
10. eine Krone	2	1 <ein/IVØ/ Krone>		2		
11. eine Bluse	1	0(ND)	3			
12. ein Brötchen	2	1 <ein B/ICØ/ötchen		2		
13. ein Traktor	2	1 <ein T/ICØ/aktor>		2		
14. ein Stempel	2	1 <ein Stem/ICØ/el>		2		
15. ein Flieger	3	2 <ei/ICØ/ Fliege/ICØ/>			1	
16. ein Bleistift	3	2 <ein B/ICØei/stift>		2		
17. ein Kühlschrank	3	2 <e/ICØ/n Kühl[+IVe]schrank>			1	
18. ein Hubschrauber	3	2 </IVØ/in Hu/ICf/schrauber>			1	
19. ein Blumenkohl	3	2 </IVØ/in B/ICØ/umenkohl>			1	
20. ein Aktenordner	4	3</IVØ/in /{1M Taten}/ord/ICØ/er>				0
Sum of Trials, Errors & Evaluating Scale	41	21	39			

Exercise 5 in table 11 is similar to the one in table 10. The steps of therapeutic administration do not vary from the above one; that is, the images are presented and their words are pronounced by the therapist together with a suitable article. The patient is then required to repeat them. The first window-forms of the tasks are skipped as they forward no texts.



Weiter: weiß

[4]
d

Table 11: Broca's Aphasic's Repetition of bi-syllabic and compound words

Exercise 5 of LW Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der Teller	1	0(ND)	3			
2. der Koffer	1	0(ND)	3			
3. der Gürtel	2	1 <der /ICØ/ürtel>		2		
4. die Leiter	1	0(ND)	3			
5. der Hammer	1	0(ND)	3			
6. der Hubel	2	1 <der H/IVe/bel>		2		
7. der Stecker	2	1 <der /ICØ/tecker>		2		
8. der Toaster	2	1 <der To/IVØ/ster>		2		
9. der Wecker	2	1 <der /ICB/ecker>		2		

10. der Schalter	2	1 <der Scha/1CØ/ter>		2		
11. der Bagger	1	0(ND)	3			
12. der Schreibtisch	3	2 <de/1CØ/ Sch/1CØ/eibisch>			1	
13. der Drehstuhl	2	1 < der Dreh/1CØ/tuhl>		2		
14. der Kühlschrank	3	2 <der K/1V u/hlsch/1CØ/ank>			1	
15. der Hubschrauber	2	1 <der /1C Sch/ubschrauber>		2		
16. die Wasserwaage	2	1 <die Wasserw/1V e/ge>		2		
17. der Küchentisch	3	2 </{1M die}/ Küchen/{1M fisch}/>			1	
18. der Backofen	1	0(ND)	3			
19. der Farbfernseher	3	2 <der Farbfer/1CØ/sehe/1CØ/>			1	
20. die Schallplatten	2	1 <die Schallp/1CØ/atten>		2		
Sum of Trials, Errors & Evaluating Scale	38	18			42	

In exercise 6 of table 12 the Broca's aphasic will be trained in simple sentences of the present tense. The therapist forwards the images and their texts and pronounces the latter. The patient is asked to repeat the sentences. As it was done in the above exercises, the (a), (b) and (c) window-forms will be also omitted during the administration of training.



Weiter: weiß

[1]
d

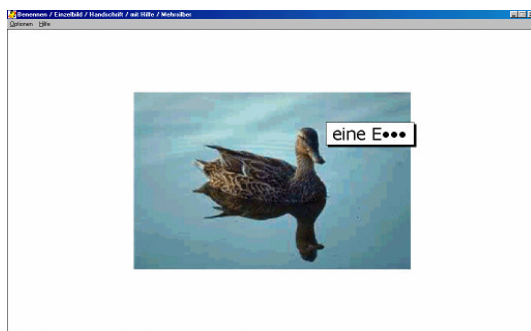
Table 12: Broca's Aphasic's Repetition of sentences

Exercise 6 of LW Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna lacht	1	0(ND)	3			
2. Jürgen raucht	1	0(ND)	3			
3. Vater Kocht	1	0(ND)	3			
4. Er schläft	1	0(ND)	3			
5. Vater und Sohn baden	2	1<Vater {1MØ} Sohn baden>		2		
6. Eva kämmt sich	2	1<Eva kämmt si/1Ck/>		2		
7. Sie schreibt einen Brief	2	1<Sie schreibt ein{1MØ} Brief>		2		
8. Er trinkt Bier	1	0(ND)	3			
9. Der Junge läuft schnell weg	3	2</{1Mdie}/Junge läuft schnell {1MØ}>			1	
10. Der Hubschrauber fliegt über den See	4	3< {1MØ} Hubschrauber f/1CØ/iegt über {1MØ} See>				0
11. Die Schülerin lernt für das Abitur	3	2< die Schüler{1MØ} lernt für {1MØ} Abitur>			1	
12. Anna hört Radio	1	0(ND)	3			
13. Petra gießt die Blumen	2	1<Petra gießt {1MØ}Blumen>		2		
14. Der Mann liest Zeitung	2	1<{1MØ} Mann liest Zeitung/1CØ/>		2		
15. Anna nascht Bonbons	2	1<Anna nasch/{1M en}/ Bonbons>		2		
16. Der Mann klatscht Beifall	3	2<de/1CØ/ Mann kla/1CØ/scht Beifall>			1	
17. Die Frau geht einkaufen	2	1<die Frau geht {1MØ}kaufen>		2		
18. Robert friert	1	0(ND)	3			
19. Peter schließt die Tür	4	3<Peter sch/1CØ/ießt {1Mder} T/1V u/r>				0
20. Jan brät eine Wurst	3	2<Jan br/1V e/t ein/1VØ/ Wurst>			1	
Sum of Trials, Errors & Evaluating Scale	41	21			39	

Wernicke's Aphasic

Therapy on Wed. 04, February 2004

The therapist presents the pictures and reads the words of the following images to the patient. The latter has to repeat them without writing in the blanks of the individual content words or sentences. The (a) (c) and (d) window-forms of the image are omitted from the procedures of therapy to train the patient's attention in combining phonemes to make words and words to make correct simple sentences. The image below - presented in the following Window of LingWare - illustrates how to carry out this form of training in exercise4 of table13.



Weißer Taste für die richtige Lösung!

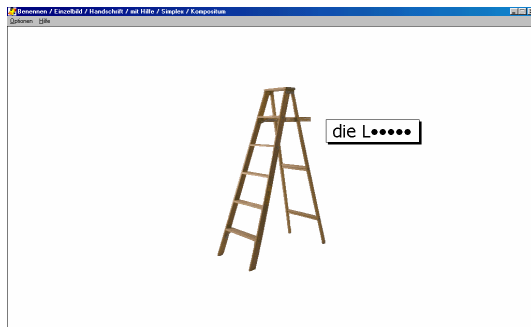
[3]
b

Table 13: Wernicke's Aphasic's Repetition of bi-syllabic and compound words

Exercise 4 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein A.....	1	0(ND)	3			
2. ein A.....	1	0(ND)	3			
3. eine E.....	1	0(ND)	3			
4. eine H.....	2	1<eine Ho[+1C l]se>		2		
5. ein Stück S.....	1	0(ND)	3			
6. ein A.....	1	0(ND)	3			
7. ein M.....	1	0(ND)	3			
8. ein G.....	1	0(ND)	3			
9. eine Schn.....	2	1<eine Schnalle[+1Cn]>		2		
10. eine K.....	2	1<eine Kron/1VØ/>		2		
11. eine B.....	3	2<eine /1CD//1Vo/se>			1	
12. ein B.....	2	1<ein Br/1Vo/tchen>		2		
13. ein Tr.....	2	1<ein Traktor[+1Ct]>		2		
14. ein St.....	2	1 <ein /1CØ/tempel>		2		
15. ein F.....	4	3<ein F/1CØ/ug[+1C1Vlo]z/1VØ/ug >				0
16. ein B.....	2	1<ein /{1MBunt}/stift>		2		
17. ein K.....	4	3<ein K/1Vu/h/1CØ/sch/1CØ/ank/				0
18. ein Hub.....	4	3<ein H/1Ve/bschraub[+1Cf]e/1Cl/>				0
19. ein Bl.....	4	3<ein Bume[1Cl]nk/1Va/hl[+1Ct]				0
20. ein Ak.....	4	3<ein Akt/1VICØ/ ordne/1Cn]/>				0
Sum of Trials, Errors & Evaluating Scale	44	24	36			

In exercise 5 of table 14 the patient is offered only the (b) windows of the tasks, the (a), (c) and (d) ones are skipped. He should repeat the pronounced words - which are bi-syllabic and

compound - and their articles. Writing in the blanks of the words and the sentences is postponed to another session.

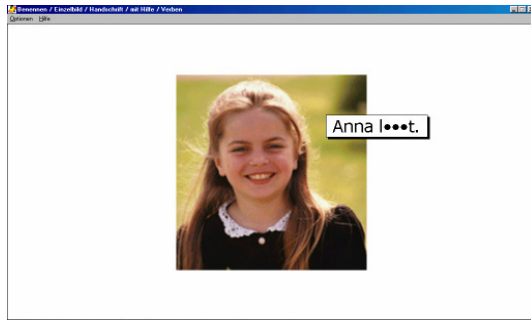


[4]
b

Table 14: Wernicke's Aphasic's Repetition of bi-syllabic and compound words

Exercise 5 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der T.....	1	0(ND)	3			
2. der K.....	1	0(ND)	3			
3. der G.....	1	0(ND)	3			
4. die L.....	2	1<die Leite/1CØ/>		2		
5. der H.....	2	1<der Hamm[+1C]er>		2		
6. der H.....	2	1<der H/1Vo/bel>		2		
7. der St.....	2	1<der Ste[+1Cf]cker>		2		
8. der T.....	2	1<der To/1VØ/ster>		2		
9. der W.....	2	1<der W/1Vi/cker>		2		
10. der Sch.....	3	2<der Scha/1Cf//1Cn/er>			1	
11. der B.....	2	1<der Bagg/1Va/r>		2		
12. der Sch.....	2	1<der Schreib/1Mfisch/>		2		
13. der Dreh.....	3	2<der Dreh[+1Ck]/1CØ/tuhl>			1	
14. der K.....	3	2<der K/1Vu/hlsch/1CØ/ank>			1	
15. der Hub	2	1<der H/1Ve/bsch/1CØ/auber>		2		
16. die Wa.....	3	2<die Wasserw/1Ve/ge[+1Cn]>			1	
17. der K.....	2	1<der K/1Ve/ch/1VØ/n/1CØ/tisch>		2		
18. der B.....	2	1<der Ba[+1Ct]ckoffen		2		
19. der F.....	2	1<der Farb[+1V1C el] fernseher>		2		
20. die S.....	2	1<die Schall[+1C1Vter]platten		2		
Sum of Trials, Errors & Evaluating Scale	39	19	41			

In table15 the sentences of the (b) window-forms of the images are presented to the patient in a form that has phoneme deletions at the verb level. As it was done in the above exercises of training, the sentences are to be pronounced and the patient has to repeat them. The patient is not required to fill any phonemes in the blanks of the verbs. He is trained only in the repetition of the sentences and the deleted parts of the verbs to which his attention should be oriented.



Weiße Taste für die richtige Lösung!

[1]
b

Table 15: Wernicke's Aphasic's Repetition of sentences

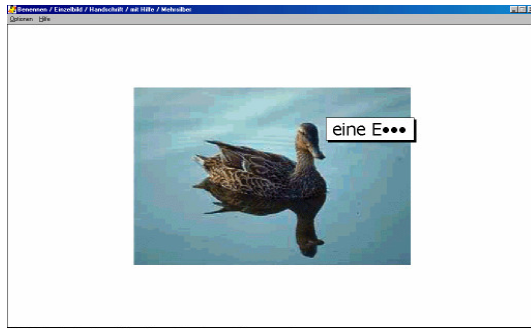
Exercise 6 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Points			
			3	2	1	0
1. Anna l.....t	1	0(ND)	3			
2. Jürgen r.....t	1	0(ND)	3			
3. Vater k.....t	1	0(ND)	3			
4. Er sch.....t	1	0(ND)	3			
5. Vater und Sohn b.....	3	2 < Vater und Sohn bade[+1Ct]n>			1	
6. Eva k.....t sich	1	0(ND)	3			
7. Sie sch.....t einen Brief	3	2<Sie schreib{1Men} einen Brie[+1Cl]f>			1	
8. Er t.....t Bier	2	1<Er trinkt Bi/1CØ/r>		2		
9. Der Junge l.....t schnell weg	3	2<Der Junge läuft schnell {+2Mauf dem} weg			1	
10. Der Hubschrauber f.....t über den See	4	3<Der Hu/1Cf/schrauber /{1Mschwimmt}/ über /{1Mdas}/ See>				0
11. Die Schülerin l.....t für das Abitur	3	2<Die Schüler{1MØ} lern/{1Men}/ für das Abitur>			1	
12. Anna h.....t Radio	1	0(ND)	3			
13. Peter g.....t die Blumen	3	2<Peter /1Cf/[+1Cl]ießt die Blumen>			1	
14. Der Mann l.....t Zeitung	2	1<Der Mann liest Zeit/{1Men}/>		2		
15. Anna n.....t Bonbons	2	1<Anna nascht Bons{1MØ}>		2		
16. Der Mann k.....t Beifall	4	3<Der Mann kla/1CØ/scht Bei[+2C1Vdes] {1M Ø}>				0
17. Die Frau g.....t Einkaufen	2	1<Die Frau geht {+1Mzum} einkaufen>		2		
18. Robert f.....t	1	0(ND)	3			
19. Peter s.....t die Tür	2	1<Peter sch/1CØ//ießt{+1Mhinterher}die Tür>		2		
20. Jan b.....t eine Wurst	3	2<Jan br/1Ve/t einen /{1MToast}/			1	
Sum of Trials, Errors & Evaluating Scale	43	23	37			

Anomic Aphasic

Therapy on Thu. 05, February 2004

The therapist shows Mrs Heinrich the pictures of the word forms and sentence structures, which are listed in table 16, 17 and 18. Her task is to repeat the words and the sentences that correspond to them. Tone assistance is partly submitted to her as the therapist pronounces only the text which is presented by the images.

In exercise 4 she will be trained in bi-syllabic and compound words. She is offered the images and their texts from which consonants and vowels are omitted. She has to pronounce the words without inserting any phonemes in the blanks.



Weiße Taste für die richtige Lösung!

[3]

b

Table 16: Anomic Aphasic's Repetition of bi-syllabic and compound words

Exercise 4 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein A.....	1	0(ND)	3			
2. ein A.....	1	0(ND)	3			
3. eine E.....	3	2 <ein E./{1MVogel}, ein /{1MHuhn}/ >			1	
4. eine H.....	1	0(ND)	3			
5. ein Stück S.....	2	1 < ein Stück S... (pause) das ist Seife >	3			
6. ein A.....	2	1 < ein A...weiß ich...{+1MObst}, ein Apfel>		2		
7. ein M.....	2	1 <ein M.....{+1Mregen} mantel>		2		
8. ein G.....	2	1 <eine {+1M schnalle} ein Gürtel >		2		
9. eine Schn.....	1	0(ND)	3			
10. eine K.....	1	0(ND)	3			
11. eine B.....	1	0(ND)	3			
12. ein B.....	2	1 <ein {+1MBrot} nein...kleines..Brötchen >		2		
13. ein Tr.....	2	1 <ein /{1MTransporter}/, ein Traktor>		2		
14. ein St.....	2	1 <ein St..das Ding ist, /{1MStift}/.....nein...Stempel>		2		
15. ein F.....	2	1 < ein F...(Pause)... /{1WHubschrauber}/>		2		
16. ein B.....	2	1 <ein /{1MBunt}/stift oder das ist einfachein Bleistift >		2		
17. ein K.....	2	1 <ein Kühler{1MØ}...ja Kühlschranks>		2		
18. ein Hub.....	2	1 <ein Hub..... (pause) schrauber>		2		
19. ein Bl.....	2	1 <ein Blumen...(pause) nicht nur...Kohl...oder>		2		
20. ein Ak.....	2	1 <ein Akte...(pause) für die Blätterum die zu ordnen>		2		
Sum of Trials, Errors & Evaluating Scale	34	14	46			

In the following exercise the patient will be trained in bi-syllabic and compound words. The procedures of therapy administration will not differ from those used in table16. The window-form below illustrates the form and the content of this exercise.



Weiße Taste für die richtige Lösung!

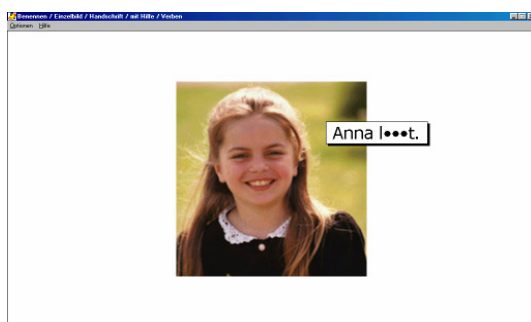
[4]

b

Table 17: Anomic Aphasic's Repetition of two syllabic and compound words

Exercise 5 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der T.....	1	0(ND)	3			
2. der K.....	1	0(ND)	3			
3. der G.....	1	0(ND)	3			
4. die L.....	1	0(ND)	3			
5. der H.....	1	0(ND)	3			
6. der H.....	3	2<der H/1V/bel..... (long pause)..... /{1WHand}/.....>			1	
7. der St.....	2	1<der Steck/{1Mdose}/, oder..nur Stecker>		2		
8. der T.....	2	1<der To/2V3CØ/ nein wie heißt es... ein Toaster>		2		
9. der W.....	2	1<der Weck/1VCØ/ach nein das ist ein Wecker>		2		
10. der Sch.....	2	1<der /{1Wstecker}/, nein... nein ein Schalter>		2		
11. der B.....	3	2<der B/2V3CØ/.../{1WTraktor}/.....>			1	
12. der Sch.....	3	2<der Sch/2C2VØ/....{1MØ}Tisch >			1	
13. der Dreh.....	2	1<der Dreh{1MØ}.....(pause) stuhl >		2		
14. der K.....	1	0(ND)	3			
15. der Hub	3	2<der Hub/2M.../{1WFlieger}/...nein Hub- schrauber >			1	
16. die Wa.....	3	2<die {1MØ}Waage, genau weiß ich nicht>			1	
17. der K.....	2	1<der /{1Mkanten}/tisch>		2		
18. der B.....	1	0(ND)	3			
19. der F.....	2	1<der {1MØ}Fernseher>		2		
20. die S.....	2	1<die Schalle{1MØ}>		2		
Sum of Trials, Errors & Evaluating Scale	38	18	42			

In exercise6 of table18 the therapist reads only the text whose form is presented in the next table. The blanks, which are inserted in the verbs, will not be pronounced. The patient has to repeat the sentences relying on the images and their texts as well as the therapist's pronunciation of the displayed text. The latter stands as a supporting assistance in the process of therapy to the patient's repetition ability.



Weißer Taste für die richtige Lösung!

[1]

b

Table 18: Anomic Aphasic's Repetition of sentences

Exercise 6 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna l.....t	1	0(ND)	3			
2. Jürgen r.....t	1	0(ND)	3			
3. Vater k.....t	1	0(ND)	3			
4. Er sch.....t	2	1<Er {1W schnarcht}>		2		
5. Vater und Sohn b.....	3	2<Vater und Sohn bad{1M}...{+1Pim Bad}>			1	
6. Eva k.....t sich	3	2<Eva kä/3CØ/....{1Wwäscht} sich>			1	

7. Sie sch.....t einen Brief	1	0(ND)	3			
8. Er t.....t Bier	1	0(ND)				
9. Der Junge l.....t schnell weg	2	1<Der Junge läuft {1Poder geht} schnell weg>		2		
10. Der Hubschrauber f.....t über den See	2	1<Der Hubschrauber /{1Wfehlt}/ über den See>		2		
11. Die Schülerin l.....t für das Abitur	2	1<Die Schülerin /{1Wliest}/ für das Abitur>		2		
12. Anna h.....t Radio	1	0(ND)	3			
13. Peter g.....t die Blumen	2	1<Peter /{1Wgibt}/ die Blumen>		2		
14. Der Mann l.....t Zeitung	1	0(ND)	3			
15. Anna n.....t Bonbons	2	1<Anna /{1Wnimmt}/ Bonbons>		2		
16. Der Mann k.....t Beifall	1	0(ND)	3			
17. Die Frau g.....t Einkaufen	1	0(ND)	3			
18. Robert f.....t	2	1<Robert /{1Wfehlt}/>		2		
19. Peter s.....t die Tür	2	1<Peter /{1Wsteht}/ die Tür>		2		
20. Jan b.....t eine Wurst	2	1<Jan /{1Wbrennt}/ eine Wurst>		2		
Sum of Trials, Errors & Evaluating Scale	33	13		47		

Commentary on the 2nd Hour

In the fourth exercise of table10 the articles and the first syllables of the Broca's Aphasic's responses show disturbances of the elision type. The articles are not completely omitted, but their vowels and consonants are inflicted on. There is an increasing vowel deletion in the articles of the compound words. It must be also noted that the first part of the compound words is disturbed. The form of the fifth exercise in table11 is not different from the fourth one of table10. The words of the two tables are bi-syllabic and compound. The only thing to which attention must be drawn is the fact that the patient - through a controlled therapeutic training - has developed the capacity of repeating both the articles and the lexical words that are pronounced by the therapist. Astonishingly, omissions, substitutions and additions, which occurred in the compound words, display a similar distribution in the compounded morphemes of these types of words (Tab.11, Exer.5). The sixth exercise in table 12 encompasses sentences which have an S-V and S-V-O structure. The disturbance occurs mainly in complex S-V-O sentences from which grammatical words and certain suffixes are omitted. However, S-V sentences are repeated without any difficulties.

To put it in a nutshell, in the first week of therapy training, the more the number of the constituents increases in a stimulus, the more the latter tends to show signs of disorders. The results of the evaluating scale of the three exercises are far above the average (Tab.10, 11 & 12, Exer.4, 5 & 6) despite the articulatory and the morphophonemic disorders.

In the fourth, fifth and sixth exercise of table13, 14 and 15 there are many elisions, substitutions, permutations and additions at the level of phonemes and morphemes. It must be noted, but it is not always the case, that at the beginning of a therapy session the Wernicke's aphasic made almost no errors in a particular group of words that are bi-syllabic. At this stage one might have a feeling and a conviction that the language of this patient has no disorders at all. But the more the course of training intensifies, the more the patient tends to deviate from

the target words and sentences, which are presented in the form of stimuli, hence the source of the morpho-phonemic disturbances that reflect the Wernicke's articulatory disorders.

In details, the moment the phonemic and morphemic combination of the lexical words become complex, vowels, consonants as well as morphemes unfold disorders of the deletion and substitution type (Tab.13 & 14); almost the same thing is to be deduced from the sentences of the sixth exercise in table15. As the patient completes them, many phonemes are omitted and whole morphemes and constituents are added, substituted or thoroughly deleted (Tab.15, Exer.6). Thus, the sum of trials and errors increased in the three exercises and the score of the evaluating scale sank (Tab.13, 14 & 15).

The anomic aphasic, Mrs Heinrich has neither the disturbances of the Broca's nor those of the Wernicke's aphasics. She recognizes and understands what the images - presented to her by LingWare as tasks to be solved – mean, but to many tasks she could not provide the correct and appropriate words and sentences. The reason why she goes ahead and starts to paraphrase the word forms and the sentential contexts. This led her to make mistakes of word finding. But one of the aims of therapy is to stimulate the patients to make trials and errors so as to develop a feeling of self-confidence as far as language is concerned. As far as the case of the anomic aphasic is concerned, the patient produced responses that have shared features and shared situations with the target words and sentences. These features show that the patient's efforts tend to move on the threshold of correctness. These whole aspects can be inferred from the errors that occurred in the exercises of table16, 17 and 18.

* In the **third hour** of the second week the three patients will receive a therapeutic re-training of the tasks that have been dealt with in the first and second setting. It is a session of naming. Exercise7 consists of mono- and bi-syllabic words, exercise8 of compound words, phrases and simple sentences and exercise9 of bi-syllabic and compound words. Even though the program requires from the patient in the (a) window-form "*Bitte schreiben Sie jetzt!*" the writing modality is to be skipped. The therapist, who controls the procedures of therapy, asks the patient to name the images with words and sentences.

Broca's Aphasic

Therapy on Mo.09, February 2004

An image or a situation is presented to Mrs Müller and asked to name it without any textual help. In this therapy session, certain chunks of the texts are presented in the (b) window-form

of the tasks. The (a), (c) and (d) windows are not involved in the administration of therapy because the text stimuli of the seventh, eight and ninth exercise have been trained in the first and second hour of the first week. In exercise7 of table19 therapy will be carried out only through the use of pictorial stimuli without any spoken assistance.



Weißte Taste für die richtige Lösung!

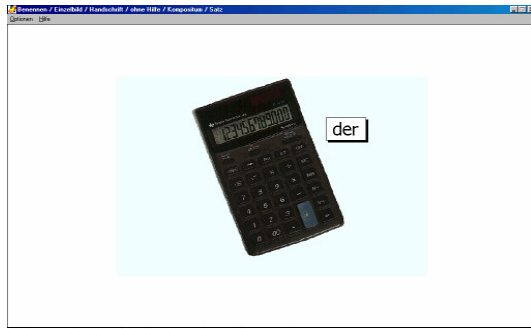
[2]

b

Table 19: Broca's Aphasic's Naming of mono-syllabic words

Exercise 7 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Uhr)	1	0(ND)	3			
3.(Tee)	1	0(ND)	3			
4.(Kuh)	1	0(ND)	3			
5.(Bier)	1	0(ND)	3			
6.(Bett)	1	0(ND)	3			
7.(Buch)	1	0(ND)	3			
8.(Mehl)	1	0(ND)	3			
9.(Fisch)	1	0(ND)	3			
10.....(Topf)	3	2< To/1CØ/f, T/1Vu/pf>			1	
11.....(Wirt)	2	1</{1WHerr}/>		2		
12.(Schirm)	2	1< Sch/1Ve/rm>		2		
13.(Brot)	1	0(ND)	3			
14.(Stuhl)	1	0(ND)	3			
15.(Fleisch)	1	0(ND)	3			
16.(Schränk)	2	1< Sch/1CØ/ank>		2		
17.(Zelt)	2	1< /1CS/elt>		2		
18.(Pferd)	2	1</1CØ/ferd>		2		
19.(Strumpf)	2	1<Str/1Ve/mpf>		2		
20.(Obst)	2	1<Ob[+1Cf]st>		2		
Sum of Trials, Errors & Evaluating Scale	29	9	51			

The therapeutic procedures of the above exercise will be continued in exercise8. The patient should name compound words, phrases and sentences. As the table below shows, the blank of the text must be completed by the patient. The therapist assists her as he reads the constituents that appear on the images near the objects that must be named. As is the case in the above exercise the words that are put between the brackets in table20 are not displayed in the (b) window-forms of LingWare.



Weißer Taste für die richtige Lösung!

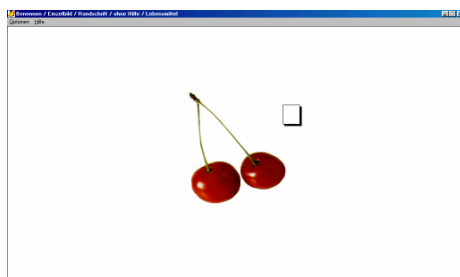
[2]

b

Table 20: Broca's Aphasic's Naming of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images , "Text" & "Tone")	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Aktenordner)	2	1<A/1CØ/tenordner>		2		
2. der(Taschenrechner)	4	3<de/1CØ/ Tasche/!CØ/rech/1CØ/er				0
3. die(Bohrmaschine)	3	2<die Boh/1C/machin/1VØ/>			1	
4. der(Rasierapparat)	4	3<de/1CØ/ Ras/1VØ/e/1CØ/apparat>				0
5. die(Kaffeemaschine)	2	1<die Kaffeemaschin/1VØ/		2		
6. der(Tischtennisschläger)	3	2<der {1MØ}Tennisschl/1Ca/ger>			1	
7. ein Kreis (weißer)	1	0(ND)	3			
8. ein Viereck (grünes)	2	1<ein grüne/1Cr/ Viereck		2		
9. ein rotes (Dreieck)	2	1<ein rote/1Cr/ Viereck, [+nein]>		2		
10. ein Kreis (blauer)	2	1<ein blaue/1Cs/ [+ ja ach] blauer Kreis		2		
11. ein gelbes (Viereck)	1	0(ND)	3			
12. ein Kreis (schwarzer)	2	1<ein schwarze/1Cs/ Kreis, oder>		2		
13. Der Mann (läuft)	3	2<der Mann l/1Va/ uf[+1Ve]t>			1	
14. Der fliegt (Hubschrauber)	3	2< Der Hu/1Cp/sch/1CØ/auber fliegt>			1	
15. Die Frau (telefoniert)	3	2<die Frau Telefone[1Vi]/1CØ/t>			1	
16. Der Junge ein Buch (liest)	2	1<Der Junge l/1VØ/est ein Buch>		2		
17. Die Oma einen (schreibt / Brief)	3	2<Die Oma schrei/1CØ/t, (Pause)....einen B/1CØ/ief			1	
18. Der Mann ein (trinkt / Bier)	2	1<Der Mann trink[+1Ve]t ein Bier		2		
19. Das Mädchenzu seiner..... (läuft / Mutter)	3	2<Das Mädchen l/1Va/uft zu seiner Mutte /1CØ/>			1	
20. Der Junge s.....t Trompete (spielt)	2	1<Der Junge sp/1VØ/elt Trompete>		2		
Sum of Trials, Errors & Evaluating Scale	49	29				31

The mono-syllabic words in which the patient was trained in exercise 7 of table 19 are to be re-trained together with the bi-syllabic words in exercise 9 of table 21. The administration of therapy will follow the same steps used in table 19. The patient is asked to name the words of the images without any text stimuli. The tone, which the therapist submitted during the rehearsal of the tasks in the second hour of the first week, will not be involved in the following session of therapy.



Weißer Taste für die richtige Lösung!

[14]

b

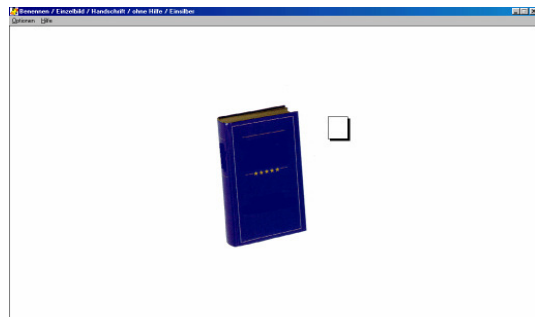
Table 21: Broca’s Aphasic’s Naming of mono- and bi-syllabic words

Exercise 9 of LW Stimuli (Images)	Trials	Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Mehl)	1	0(ND)	3			
3.....(Reis)	1	0(ND)	3			
4.(Nudeln)	2	1<Nudel/1CØ/>		2		
5.(Fisch)	1	0(ND)	3			
6.(Fleisch)	2	1<F/1CØ/eisch >		2		
7.(Brot)	1	0(ND)	3			
8.(Butter)	2	1<B/1Ve/tter>		2		
9.(Käse)	2	1<Kä/1Cs/e>		2		
10.(Kuchen)	2	1<Ku/1Cck/en Ku..[+nein], Kuchen>		2		
11.(Obst)	1	0(ND)	3			
12.(Apfel)	1	0(ND)	3			
13.(Birne)	2	1<Bi/1CØ/ne >		2		
14.(Kirschen)	3	2<Ki/1CØ/sche/1CØ/>			1	
15.(Trauben)	2	1<Tau/ 1Cp/en>		2		
16.(Zucker)	2	1</1CT/ucker>		2		
17.(Kekse)	2	1<Ke/1ØC/se		2		
18.(Brötchen)	2	1<{/1WBrot}/>	3			
19.(Brezel)	2	1<Bre/1Cs/el>		2		
20.(Bohnen)	2	1<Boh/1CØ/en>		2		
Sum of Trials, Errors & Evaluating Scale	34	14	46			

Wernicke’s Aphasic

Therapy on Mo.09, Febraury 2004

In exercise7 of table22 the patient, Mr Fimm is required to name the images of 20 tasks, which are listed in the table below. He gets no tone or text assistance as it was the case in the sessions of the first and second hour of therapy. Therapy administration of this patient does not differ from that of the Broca’s aphasic; he will be confronted with the same tasks and method of training with which the previous patient dealt.



Weiße Taste für die richtige Lösung!

[7]
b

Table 22: Wernicke’s Aphasic’s Naming of mono-syllabic words

Exercise 7 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Uhr)	1	0(ND)	3			
3.(Tee)	1	0(ND)	3			
4.(Kuh)	2	1<[+Scha..nein] ein Kuh/1Ve/>		2		

5.(Bier)	2	1<ein {+1Mglas}bier >(ND)	3			
6.(Bett)	2	1<[M/e/traze(SS)], aber mit B.(Pause) ein Bett>		2		
7.(Buch)	3	2<[Heft(SS)], [Kalender(D)] >			1	
8.(Mehl)	3	2<[Zuck—er(SS), [Pulver(SS)] , Mehl>			1	
9.(Fisch)	1	0(ND)	3			
10.....(Topf)	3	2< [Vase(SS)],[Ei—mer(SS)] oder nein Topf>			1	
11.....(Wirt)	3	2<[+Mann an der Theke], zapfen Bier (SS) >			1	
12.(Schirm)	2	1< [{+MRegen}schirm (SF)]>		2		
13.(Brot)	3	2< [Buten(D)],[Brötchen(SF)] ein Brot>			1	
14.(Stuhl)	3	2<[Ti—schler(SS), Tisch(SF) neben, Stuhl>			1	
15.(Fleisch)	3	2<[Fis/1CØ//k/ (SS)], [Schwein(SS)], Fleisch>			1	
16.(Schrack)	2	1<[Regal (SF)],(Pause) ...[SchSchr/e/nkchen(SF)] >		2		
17.(Zelt)	3	2<[Schirm(SS)], (Pause) Ha—[weiß ich nicht(D)]>			1	
18.(Pferd)	3	2<[+von der letz—enWoche], [Haustier (SS)]....>			1	
19.(Strumpf)	2	1<[+Weiß ich, aber ja], [Sock—en(SF)]>		2		
20.(Obst)	2	1 <ja , verschieden....ok.ja weiß..[Frechten (SS)]		2		
Sum of Trials, Errors & Evaluating Scale	45	25			35	

The tasks of the following exercise in table23 show images and their texts that have blanks of the lexical type. The therapist’s demand on the patient is to name the images without filling any text in the blanks. A complete spoken assistance is not provided as the patient was already trained in these tasks in the previous sessions. The therapist reads only the texts - that are shown in the tables below - and displayed together with the images of the window-forms.



Weiße Taste für die richtige Lösung!

[2]
b

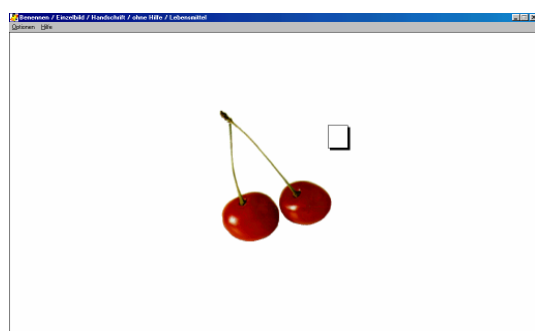
Table 23: Wernicke’s Aphasic’s Naming of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images, ‘Text’ & ‘Tone’)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Aktenordner)	1	0(ND)	3			
2. der(Taschenrechner)	1	0(ND)	3			
3. die(Bohrmaschine)	1	0(ND)	3			
4. der(Rasierapparat)	3	2<[Hören(D)],[Hörappa(D)]—[+nein] [zum Rasieren(SF)]>			1	
5. die(Kaffeemaschine)	3	2<[Maschine(SS)], [zum Kaffeetrinken (SF)] >			1	
6. der(Tischtennisschläger)	3	2<[Tennisbäll(er)(SS)],[Schlag(SS)], [Tennisschlä—ger(ND)]>			1	
7. ein Kreis (weißer)	3	2<[Farben wieder(D)], [kein- Ecken(SS), [Kreisen weiß(SF)]>			1	
8. ein Viereck (grünes)	3	2<[Das ist ein grün nit weiß(SS)...], [...aber Viereck(SF)]>			1	
9. ein rotes (Dreieck)	2	1<[rote Dreiecken,(D) [+nein], rotes Viereck >			1	

10. ein Kreis (blauer)	3	2<[nit grün(D)] [noch rot(D)], ein blau—er.... Kreis>			1	
11. ein gelbes (Viereck)	3	2<[eine Farbe(SS)], [ein bunt(D)gelbes Viereck>			1	
12. ein Kreis (schwarzer)	3	2<[Farben(SS), [+ja immer noch...], [dunkel nit(D)] ...schwarzer Kreis>			1	
13. Der Mann (läuft)	2	1<[Der Mann geht(SS)], [+nein] [er läuft (SF)]>	2			
14. Der fliegt (Hubschrauber)	3	2<[Hubschrauber fliehen(SS), [+oder] [...fliegten(SF)]>			1	
15. Die Frau (telefoniert)	3	2<... [die ruft...(SS)] [telelf(D)...], [die ruft an(SF)]>			1	
16. Der Junge ein Buch (liest)	3	2<[Der Schüler hat...(D)] [+oder] [liest das...(SS)] ein Buch>			1	
17. Die Oma einen(schreibt / Brief)	3	2<[die alte Frau schreibt was(SS)], [ja etwas(D)]>			1	
18. Der Mann ein (trinkt / Bier)	2	1<[... Mann trinkt.. Pils(SF)] (Pause).. ein Bier>	2			
19. Das Mädchenzu seiner (läuft / Mutter)	3	2<[das da läuft...(SS)] [+oder...][zu der Frau(SF)]>			1	
20. Der Junge s.....t Trompete (spielt)	3	2<[ein Junge ja mit Geige(SS)], [+nein], [Flöte...(SS)]>			1	
Sum of Trials, Errors & Evaluating Scale	51	31			29	

The following exercise of table24 is to be used to re-train mono- and bi-syllabic words. The stimuli in this case consist of images. The therapist presents an image without its text and tone and the patient should attempt to name it.

The insertion of simple tasks that were seen in the other session of training is very helpful to any aphasic patients, especially at the end of a training unit. In this way the patient experiences moments and feelings of success. He/she leaves a therapy session with a positive learning experience that creates in him/her the motivation and readiness to continue his/her aphasia therapy.



[14]
b

Table 24: Wernicke's Aphasic's Naming of bi-syllabic words

Exercise 9 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Mehl)	2	1[Zucke--- (SF)]		2		
3..... (Reis)	1	0(ND)	3			
4.(Nudeln)	2	1<[Reis(SS), [+oder nein], Nudeln>		2		
5.(Fisch)	1	0(ND)	3			
6.(Fleisch)	2	1<[Fisch(SS)], [+ein beson—dere] [+Sch--], Fleisch>		2		
7.(Brot)	3	2<[+ja klar], Breütchen[(SS)] <Br/IVu/t>			1	

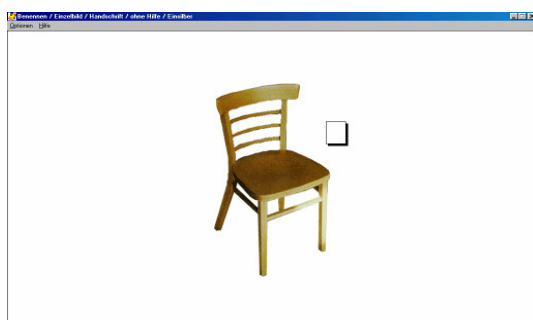
8.(Butter)	3	2<[Käse(SF), [+aber-...] [Au--Strich(SS)] auch.. Butter—>			1	
9.(Käse)	3	2<[das gleiche(SS)], [nit oder <K/1V/se (SF)>—en>			1	
10.(Kuchen)	3	2< [Kaffee(SS), [+noch was...] [Kekse (SS)]			1	
11.(Obst)	3	2<[Apfel(SS) [+oder] [Birne(SS)] >			1	
12.(Apfel)	1	0(ND)	3			
13.(Birne)	1	0(ND)	3			
14.(Kirschen)	3	2<... [+sind da..] [Würfelchen(D)] (Pause) [Trau---en(SS)] Kirsch---en>			1	
15.(Trauben)	1	0(ND)	3			
16.(Zucker)	3	2<[Kaffe(SS)] (Pause)..noch etwa [Z[+1Vw] ucker (ND) >			1	
17.(Kekse)	3	2<[+schwer] , [+nein] [+weiß ich], [Bikse—sel(D)], k/1Vä/kse>			1	
18.(Brötchen)	3	2<[Brot(SF)] [+aber was]..Bröt—[+1Cs]chen>			1	
19.(Brezel)	2	1<B/1CØ/ezel [+auch], [+ weiß nit], [+Rot--]>		2		
20.(Bohnen)	3	2<[+Rosen..Blu..], /1CR/o/1CØ/nen >			1	
Sum of Trials,Errors & Evaluating Scale	44	24			36	

Anomic Aphasic

Therapy on Tu. 10, February 2004

The therapist presents pictures to the patient. The latter has to find mono-, bi-syllabic and compound words as well as simple sentences that correspond to the forwarded pictorial situation. The whole material will be dealt with in this session of therapy.

In exercise 7 of table 25 the patient should attempt to find the names of the images, whose words are mono-syllabic. The patient gets no text and tone assistance from the therapist or the therapy program due to her unimpaired reading and hearing ability.



Weiße Taste für die richtige Lösung!

[14]

b

Table 25: Anomic Aphasic's Naming of mono-syllabic words

Exercise 7 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Uhr)	1	0(ND)	3			
3.(Tee)	1	0(ND)	3			
4.(Kuh)	1	0(ND)	3			
5.(Bier)	1	0(ND)	3			
6.(Bett)	1	0(ND)	3			

7.(Buch)	1	0(ND)	3			
8.(Mehl)	1	0(ND)	3			
9.(Fisch)	1	0(ND)	3			
10.....(Topf)	1	0(ND)	3			
11.....(Wirt)	2	1<[ein Mann, er zapft Bier(SS)] >		2		
12.(Schirm)	1	0(ND)	3			
13.(Brot)	1	0(ND)	3			
14.(Stuhl)	1	0(ND)	3			
15.(Fleisch)	1	0(ND)	3			
16.(Schrank)	3	2<[Möbel(SS)], [+es kann überall sein],[in der Küche...(SS)]>			1	
17.(Zelt)	3	2<[zum Kampen(SS)], [gegen die Sonne (SS)]>			1	
18.(Pferd)	1	0	3			
19.(Strumpf)	2	1<[Socken(SF)]>		2		
20.(Obst)	1	0(ND)	3			
Sum of Trials, Errors & Evaluating Scale	26	6			54	

In exercise 8 of table 26 the anomic aphasic has to label the images with compound words, phrases and sentences. Using LingWare the therapist presents the images and provides the texts that have lexical blanks. Both the therapist and LingWare submit no tone assistance.



Weißte Taste für die richtige Lösung!

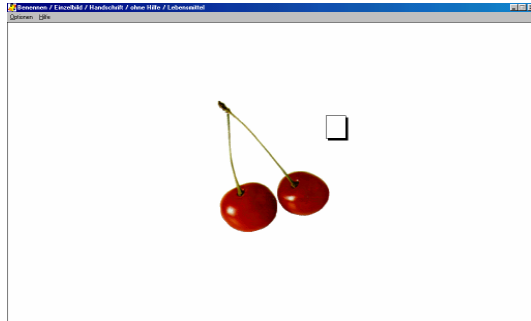
[2]

b

Table 26: Anomic Aphasic's Naming of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images & 'Text')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Aktendordner)	1	0(ND)	3			
2. der(Taschenrechner)	1	0(ND)	3			
3. die(Bohrmaschine)	1	0(ND)	3			
4. der(Rasierapparat)	1	0(ND)	3			
5. die(Kaffeemaschine)	1	0(ND)	3			
6. der(Tischtennisschläger)	2	1<der {1MØ}tennisschläger>		2		
7. ein Kreis (weißer)	1	0(ND)	3			
8. ein Viereck (grünes)	1	0<ein grünes... (pause)... Viereck>	3			
9. ein rotes (Dreieck)	1	0(ND)	3			
10. ein Kreis (blauer)	1	0(ND)	3			
11. ein gelbes (Viereck)	1	0(ND)	3			
12. ein Kreis (schwarzer)	2	1<ein schwarzer Viereck(D), [+nein] Kreis>		2		
13. Der Mann (läuft)	1	0(ND)	3			
14. Der fliegt (Hubschrauber)	2	1<[ein Flieger(SF)] fliegt [+über den See]>		2		
15. Die Frau (telefoniert)	1	0(ND)	3			
16. Der Junge ein Buch (liest)	2	1<[Er(SF)] liest ein Buch>		2		
17. Die Oma einen (schreibt / Brief)	3	2<[Die Frau(SF)] schreibt etwas...Brief ..oder>		2		
18. Der Mann ein (trinkt / Bier)	1	0(ND)	3			
19. Das Mädchen zu seiner..... (läuft / Mutter)	2	1<Das Mädchen läuft zu einer [Frau(SS)]>	3			
20. Der Junge s.....t Trompete (spielt)	3	2<Der Junge [singt(SS)] {+IMmit} [einem Instrumente (SS)] ja Trompete >			1	
Sum of Trials, Errors & Evaluating Scale	29	9			51	

Exercise 9 in table 27 consists of mono- and bi-syllabic words. During the administration of the following therapeutic training the tasks must be labelled by the patient without the therapist's submission of any text or tone assistance



Weißte Taste für die richtige Lösung!

[14]

b

Table 27: Anomic Aphasic's Naming of bi-syllabic words

Exercise 9 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Mehl)	1	0(ND)	3			
3. (Reis)	1	0(ND)	3			
4.(Nudeln)	1	0(ND)	3			
5.(Fisch)	1	0(ND)	3			
6.(Fleisch)	1	0(ND)	3			
7.(Brot)	1	0(ND)	3			
8.(Butter)	2	1<[+Hm], [Käse(SF)], [+nein], [Butter(ND)]>		2		
9.(Käse)	1	0(ND)	3			
10.(Kuchen)	2	1<[Torte(SF)] [+oder] [(KuchenND)]>		2		
11.(Obst)	2	1<[Früchte(SF)] [+oder.....]>		2		
12.(Apfel)	1	0(ND)	3			
13.(Birne)	2	1<[Apfel(SF)]... (Pause)...>		2		
14.(Kirsche)	3	2<[ich finde es nicht(D),...[kanm man essen(SS)]>			1	
15.(Trauben)	1	0(ND)	3			
16.(Zucker)	1	0(ND)	3			
17.(Kekse)	1	0(ND)	3			
18.(Brötchen)	2	1<[Brot(SF)] [+nein sicher nicht] >		2		
19.(Brezel)	2	1<[Kekse(SS)]>		2		
20.(Bohnen)	2	1<[+Hm] [+ so etwas] [+aber] [Würfeln (D)]...Bohnen]		2		
Sum of Trials, Errors & Evaluating Scale	29	9	51			

Commentary on the 3rd Hour

The naming of the tasks in the above exercises could have been facilitated by the training of these tasks in the previous sessions of treatment. Exercise 7, 8 and 9 in table 19, 20 and 21 are a re-training through naming of the tasks in which Mrs Müller was trained in the first and second hour of the first week. It can be inferred from these tables that the number of trials and errors in mono- and bi-syllabic words as well as in compound words has drastically decreased. Most of the articles are not affected by the disturbances. This rendered a high evaluating scale of correct points which can be drawn from table 19, 20 and 21. This confirms

also the effectiveness of this computer supported aphasia therapy, in which LingWare has been involved up to now.

The patient, Mr Fimm who was asked to name the images does not show the best and healthy ability. This is a fact that can be inferred from his performance during this therapy session. The increase in the number of trials and errors resulted from a change in the administration of therapy. This should not be considered as a setback in the process of therapy but rather a sign that the patient is in a position to make attempts to communicate correctly. This stimulus/response procedures will lead to the amelioration of his linguistic ability. The general results of the three exercises in table 22, 23 and 24 are cases that substantiate the above observation made on the performance of the Wernicke's aphasic. The correct points obtained, which are all above the average confirm that trials and errors to some extent support the process of recovery from language impairment. They encourage the patient to speak and feel free from any psychic hindrances.

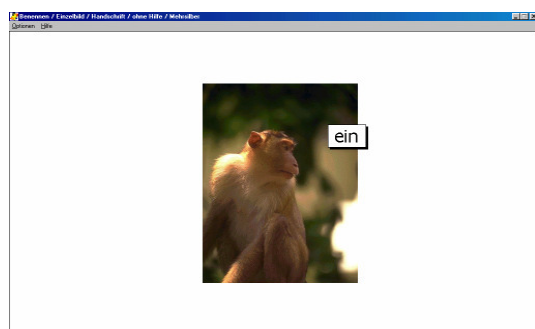
The excellent results of table 25, 26 and 27 obtained from exercise 7, 8 and 9 delineate that Mrs Heinrich has perfectly profited from the therapeutic training of the first week. Most of the tasks, that were given to her as a stimulation so as to elicit from her the correct responses, were answered correctly. The general sum of the correct points is too high and the number of trials and errors is too low. There are very few words and sentences she could not name. This can be simply referred to the effects of the anomic aphasia that can't be eradicated in a very short time.

* In the **fourth hour** the patients are to be trained in exercise 10 in bi-syllabic and compound words. The tasks are presented in pictures together with an article without any content words. Exercise 11 consists of simple sentences in the present tense; the lexical words - presented in the form of images - are omitted from the sentences. Exercise 12 is similar to the first one of this setting. It is made of the articles and the bi-syllabic and compound lexical words. It can be deduced from the whole exercises below that the (a), (c) and (d) window-forms of the images - run on the PC's screen - are skipped to avoid the writing modality and train only the naming ability of the patients

Broca's Aphasic

Therapy on Wed. 11, February 2004

In exercise10 of table28 the patient is provided with images and their function words during the administration of therapy. The therapist reads only the articles. In this session the task of the patient is to name the presented images of the bi-syllabic and compound words and couple them with the pronounced grammatical words.



Weißer Taste für die richtige Lösung!

[2]

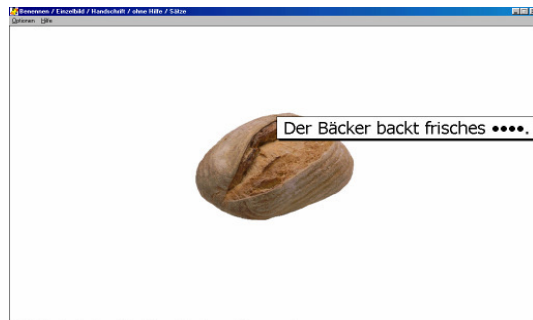
b

Table 28: Broca's Aphasic's Naming of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein..... (Auto)	1	0(ND)	3			
2. ein.....(Affe)	1	0(ND)	3			
3. eine.....(Ente)	1	0(ND)	3			
4. eine(Hose)	1	0(ND)	3			
5. ein Stück(Seife)	2	1 <ein Stück /ICT/eife>		2		
6. ein(Apfel)	1	0(ND)	3			
7. ein(Mantel)	1	0(ND)	3			
8. ein(Gürtel)	1	0(ND)	3			
9. eine.....(Schnalle)	2	1<eine Sch/1CØ/alle>		2		
10. eine..... (Krone)	2	1<eine / 2CT /one>		2		
11. eine.....(Bluse)	2	1<eine Blu [+1Cd] se>		2		
12. ein(Brötchen)	2	1<ein Brot/ 1Cs /en		2		
13. ein..... (Traktor)	3	2<ein T/ 1CØ/ a/ 1CØ /kor			1	
14. ein..... (Stempel)	2	1<ein / 1CØ /tempel		2		
15. ein..... (Flieger)	2	1<ein F/ 2CØ /eger>		2		
16. ein.....(Bleistift)	2	1<ein { 1MØ }stift>		2		
17. ein.....(Kühlschrank)	3	2<ein Küh/1CØ /sch/ 1CØ /ank>			1	
18. ein.....(Hubschrauber)	2	1<ein[/{1W Flieger}/ (SF)]>		2		
19. ein.....(Blumenkohl)	3	2<ein B/ 1CØ /umenkoh/ 1CØ /			1	
20. ein.....(Aktendordner)	3	2<ein A/ 1CØ /tenord/ 1CØ /er>			1	
Sum of Trials, Errors & Evaluating Scale	37	17	43			

Various sentences of exercise11 of table29 and the objects they refer to, from which lexical words are omitted, are presented to the patient. The latter hears the sentences and completes

them by naming the content words which are neither presented nor pronounced. The words to be named must fit in with the blank of each sentence.



Weißte Taste für die richtige Lösung!

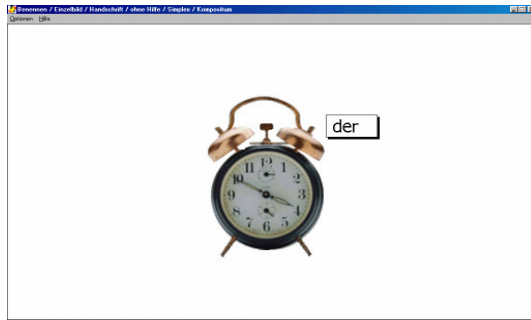
[3]

b

Table 29: Broca's Aphasic's Naming of content words in sentences

Exercise11 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Wirt zapft (Bier)	1	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	2	1<Ich esse Kassler mit dicken Bohn {1MØ}>		2		
3. Der Bäcker backt frisches (Brot)	1	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	2	1<Eier esse ich mit Pfeffer und Sa/1CØ/z>		2		
5. Im Sommer schleckte ich gerne (Eis)	2	1<Im Sommer schleckte ich gerne E/ 1VØ /s>		2		
6. Der Angler fängt einen (Fisch)	2	1<Der Angler fängt eine [+1CP]fisch>		2		
7. Das Baby trinkt aus der (Flasche)	2	1<Das Baby trinkt aus der F/ 1CØ /asche>		2		
8. Ich trinke Saft aus dem (Glas)	2	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	2	1<Ich trinke lieber Tee als K/ 1Ve /ffee>		2		
10. Nachmittag gibt es Kaffee und (Kuchen)	3	2<Nachmittag gibt es Kaffee und K/ 1Vü / 1Csch /en>			1	
11. Suppe esse ich mit dem (Löffel)	2	1<Suppe esse ich mit dem /1CW/öffel		2		
12. Ich schneide das Brot mit dem (Messer)	2	1<Ich schneide das Brot mit dem Messe /1CØ/>		2		
13. Kaffee schmeckt mit Zucker und (Milch)	2	1<Kaffee schmeckt mit Zucker und Mi/1CØ/ch		2		
14. Aus Apfelsinen presse ich frischen (Saft)	2	1<Aus Apfelsinen presse ich frischen /1C T/aft		2		
15. Im Glas perlt der (Wein)	1	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	1	0(ND)	3			
17. Ich trinke Kaffee aus der (Tasse)	2	1<Ich trinke Kaffee aus der / 1CV /asse		2		
18. Anna trinkt schwarzen (Tee)	1	0(ND)	3			
19. Ich esse Suppe vom (Teller)	2	1<Ich esse Suppe vom Telle/ 1C Ø/		2		
20. Die Suppe kocht im (Topf)	2	1<Die Suppe kocht im To/ 1CØ /f>		2		
Sum of Trials, Errors & Evaluating Scale	35	15	45			

The training of content words continues as well in exercise12 of table30. The patient gets the images and the articles of the lexical words. She is then required to name the objects with bi-syllabic and compound words that suit the articles that are pronounced by the therapist.



Weißer Taste für die richtige Lösung!

[11]

b

Table 30: Broca's Aphasic's Naming of bi-syllabic and compounds words

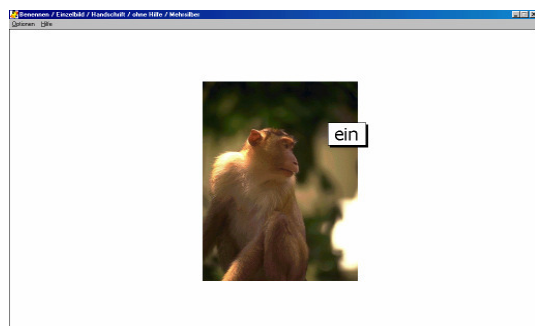
Exercise12 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der(Teller)	1	0(ND)	3			
2. der(Eimer)	2	1<der Eime/ 1Cl />		2		
3. der(Koffer)	1	0(ND)	3			
4. der (Gürtel)	1	0(ND)	3			
5. eine(Pfeife)	2	1<eine / 2Ct /eife>		2		
6. die(Leiter)	2	1<der Le/1VØ/ter>			1	
7. der(Hammer)	2	1<der H/1VU/mmer>			1	
8. der(Hobel)	1	0(ND)	3			
9. der.....(Stecker)	1	0(ND)	3			
10. der.....(Toaster)	2	1<der T/ 1VØ / aster>		2		
11. der(Wecker)	2	1<der W/1VØi/cker>		2		
12. der(Schalter)	2	1<der Scha/ 1CØ /ter		2		
13. der.....(Bagger)	2	1<der Ba/ 2Ck /er>		2		
14. der.....(Schrubber)	2	1<der Sch/ 1CØ /ubber>		2		
15. die(Singerin)	2	1<der Singer/1MØ/>		2		
16. der(Schreibtisch)	2	1<der Schreib/ 1CØ /isch>		2		
17. der (Drehstuhl)	3	2<der Dreh/1CØ/t/1Va/hl>		2		
18. der (Kühlschrank)	3	2<der Küh/1CØ/sch/ 1CØ/ank			1	
19. der(Hubschrauber)	3	2<der H/1Ve/bsch/1CØ/au—ber			1	
20. die(Wasserwaage)	3	2<der /1Vb/asserw/1Ve/ge>			1	
Sum of Trials, Errors & Evaluating Scale	39	19				41

Wernicke's Aphasic

Therapy on Wed.11, February 2004

The therapist provides to the patient the articles and the pictures of the tasks. The images of LingWare are made to run on the screen of a PC as it was the case in the above exercises. The patient has to respond to them with bi-syllabic and compound words relying simply on the images of the tasks of exercise10 of table31 and the articles that accompanied them. Exercise12 will be dealt with in the same way as exercise10 due to their similar form and content. The simple sentences of exercise11 of table32, which are read by the therapist, are presented to him with blanks which must be filled with meaningful lexical words. The aim of these exercises is to make the patient understand the meaning of the items and name each of them in a sentence.

The Wernicke's aphasic in exercise10 of table31 has to understand the images of the content words and name them, of course, together with the articles. The therapist presents, controls the flow of the images on the PC's screen and reads the articles.



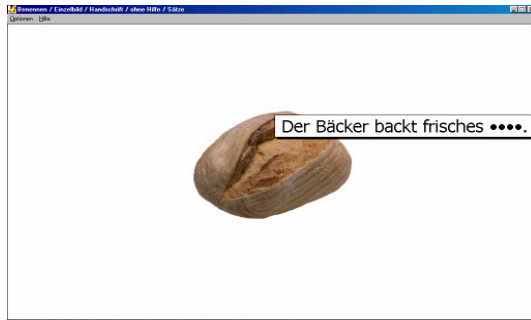
Weißte Taste für die richtige Lösung!

[2]
b

Table 31: Wernicke's Aphasic's Naming of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein(Auto)	2	1<ein [Wagen (SF)]>		2		
2.ein(Affe)	2	1<ein Katze(SF)]>		2		
3.eine(Ente)	2	1<ein / 1Cti /nte>		2		
4.eine(Hose)	2	1<ein [+1C B]hose>		2		
5.ein(Stück Seife)	2	1<ein [+1MØ] Seife>		2		
6.ein(Apfel)	2	1<ein [+1CT]apfel		2		
7.ein(Mantel)	2	1<ein [+ja] [lange Jacke(SF)]>		2		
8.ein(Gürtel)	1	0(ND)	3			
9.eine(Schnalle)	1	0(ND)	3			
10.eine(Krone)	1	0(ND)	3			
11.eine(Bluse)	2	1<eine ...(Pause) ..[Hemd(SF)]>		2		
12.ein(Brötchen)	2	1<ein [Brot(SF)]>		2		
13.ein(Traktor)	1	0(ND)	3			
14.ein(Stempel)	1	0(ND)	3			
15.ein(Flieger)	4	3<ein [Flug(SF)], [Fliegen(SF)], Flieger>				1
16.ein(Bleistift)	2	1<ein {1MØ}stift>				1
17.ein(Kühlschrank)	3	2<ein [Kuhli(D)], [+nein] [Kühlen(SS)], Kühlschrank>				1
18.ein(Hubschrauber)	2	1<ein, [zum fliegen(SS)] , Hub[+1Cn] schrauber>		2		
19.ein(Blumenkohl)	2	1<ein,[+ ja] Kohl{1MØ}, [+was] Blum- enkohl>		2		
20.ein(ein Aktenordner)	4	3<ein [+ist schwer],.... [order(SS)] [Blätter(SS)]..[Schrift(SS)]....>				0
Sum of Trials, Errors & Evaluating Scale	40	20		40		

In exercise11 of table32 the patient will be confronted with images from whose sentences certain content words are deleted. The therapist reads the sentence but the omitted CWs are not pronounced. The demand made on the patient is to name the blanks inherent in the sentences, of course, relying on the images of the objects that are displayed in the window-forms of LingWare.



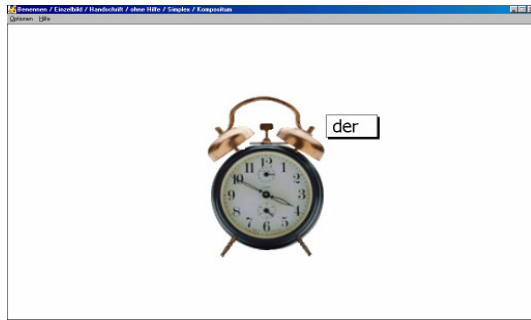
Weiße Taste für die richtige Lösung!

[3]
b

Table 32: Wernicke's Aphasic's Naming of content words in sentences

Exercise11 of LW Stimuli (Images, `Text` & `Tone`)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Wirt zapft (Bier)	1	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	2	1<Ich esse Kassler mit dicken Boh/ 1Ct /en>		2		
3. Der Bäcker backt frisches (Brot)	1	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	2	1<Eier esse ich mit Pfeffer und [+noch etwas] {1M Ø}>		2		
5. Im Sommer schleckte ich gerne(Eis)	1	0(ND)	3			
6. Der Angler fängt einen(Fisch)	1	0(ND)	3			
7. Das Baby trinkt aus der(Flasche)	1	0(ND)	3			
8. Ich trinke Saft aus dem(Glas)	3	2<Ich trinke Saft aus dem G[1Ca] ls[+2C as]			1	
9. Ich trinke lieber Tee als(Kaffee)	1	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	2	1<Nachmittag gibt es Kaffee und Kuch[+1Cn] en	3			
11. Suppe esse ich mit dem (Löffel)	1	0<Suppe esse ich mit dem (pause)Löffel>	3			
12. Ich schneide das Brot mit dem(Messe)	3	2<Ich schneide das Brot mit dem, [Kein Löffel(SS)], [+was], ...		2		
13. Kaffee schmeckt mit Zucker und(Milch)	1	0(ND)	3			
14. Aus Apfelsinen presse ich frischen (Saft)	2	1<Aus Apfelsinen presse ich frischen Sa[+1Cn]ft,[+ nie....ja] ...>		2		
15. Im Glas perlt der (Wein)	2	1<Im Glas perlt der [/{1W Flasche}/ (SS)]>		2		
16. Ich esse eine Wurst mit (Senf)	1	0(ND)	3			
17. Ich trinke Kaffee aus der(Tasse)	2	1<Ich trinke Kaffee aus [+nun klar], [Glas (SF)], [+auch nit], Tasse, ja>		2		
18. Anna trinkt schwarzen(Tee)	2	<Anna trinkt schwarzen a[1C k]ffee---(pause)		2		
19. Ich esse Suppe vom (Teller)	1	1<Ich esse die Suppe vom [Tasse(SS)]...>		2		
20. Die Suppe kocht im(Topf)	2	1<Die Suppe kocht im To[1Cp]...>		2		
Sum of Trials, Errors & Evaluating Scale	31	11		51		

The following exercise in which the Wernicke's aphasic is to be trained is similar to exercise10. Each image is presented together with an article. The latter is pronounced by the therapist. The task of the patient is to name each object presented by LingWare with bi-syllabic and compound words. The following window illustrates the form and the content of each task of training.



Weißer Taste für die richtige Lösung!

[11]

b

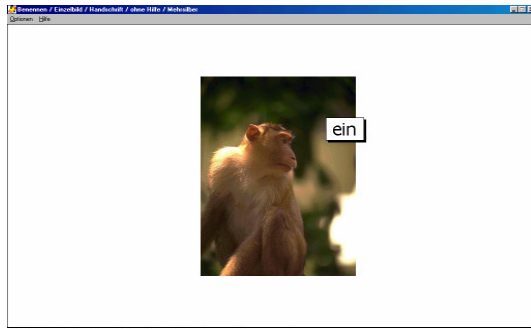
Table 33: Wernicke's Aphasic's Naming of bi-syllabic and compound words

Exercise12 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der(Teller)	1	0(ND)	3			
2. der(Eimer)	1	0(ND)	3			
3. der(Koffer)	1	0(ND)	3			
4. der(Gürtel)	1	0(ND)	3			
5. eine(Pfeife)	2	1<[Zigare(SF)] >		2		
6. die(Leiter)	1	0(ND)	3			
7. ein(Hammer)	1	0(ND)	3			
8. der(Hobel)	3	2<der...[Gerät(SS)], [+was noch], [schnei-den (SS)]...>			1	
9. der(Stecker)	3	2<der...[Kabel(SS)], [Strom(SS)]...>			1	
10. der(Toaster)	1	0(ND)	3			
11. der(Wecker)	1	0(ND)	3			
12. ein(Schalter)	3	2<der...[Stecker(SS)] [+auch für Strom] [+aber][zum Schalten](SF)..>			1	
13. der(Bagger)	1	0(ND)	3			
14. der(Schrubber)	2	1<...[zum Schrubben(SF)]>		2		
15. die(Singerin)	2	1<Die [singt(SF)]>		2		
16. der(Schreibtisch)	2	1<ein [{IMØ} tisch(SF)]>		2		
17. der(Drehstuhl)	2	1<der [{IMØ} Stuhl(SF)]>		2		
18. der(Kühlschrank)	2	1<der [Kühl--{IMØ}en(SS)]>		2		
19. der(Hubschrauber)	3	2<der[zum Fliegen(SS)], [Maschine(SS)] >			1	
20. die(Wasserwaage)	3	2<die Wergzeu—(SS), oder Wasser... (Pause) wiegen(SF)]>			1	
Sum of Trials, Errors & Evaluating Scale	34	14	44			

Anomic Aphasic

Therapy on Thu.12, February 2004

The therapist does not deal otherwise with Mrs Heinrich during the administration of therapy in the fourth hour. He pursued steps of training that are similar to those of the previous session of therapy. Mrs Heinrich is confronted with images and their articles. During the naming of the objects, she gets certain text assistance from LingWare. The therapist's pronunciation of the articles is optional because the patient's reading ability is not impaired.



Weißer Taste für die richtige Lösung!

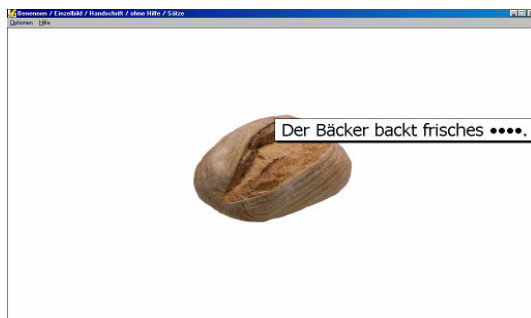
[2]

b

Table 34: Anomic Aphasic's Naming of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein(Auto)	1	0(ND)	3			
2.ein(Affe)	1	0(ND)	3			
3.eine(Ente)	1	0(ND)	3			
4.eine(Hose)	1	0(ND)	3			
5.ein(Stück Seife)	2	1< ein {1MØ} Seife>		2		
6.ein(Apfel)	1	0(ND)	3			
7.ein(Mantel)	1	0(ND)	3			
8.ein(Gürtel)	2	1<[eine Schnalle(SF)]>		2		
9.eine(Schnalle)	1	0<[+Ah ja] [+das ist] eine Schnalle>	3			
10.eine(Krone)	3	2<[Ein König...(SS)] [+oder] [Königin trägt es(SS)]>			1	
11.eine(Bluse)	1	0(ND)	3			
12.ein(Brötchen)	1	0(ND)	3			
13.ein(Traktor)	1	0(ND)	3			
14.ein(Stempel)	3	2<[Für das Büro(SS)], [zum Stempeln (SF)]...>			1	
15.ein(Flieger)	2	1<[ein Flugez—eug--(SS)]>		2		
16.ein(Bleistift)	2	1<[{1MØ}Stift(SF)]>		2		
17.ein(Kühlschrank)	1	0(ND)	3			
18.ein(Hubschrauber)	1	0(ND)	3			
19.ein(Blumenkohl)	2	1<[ein /{1M Weis}/kohl(SF)]>		2		
20.ein(ein Aktenordner)	2	1<[ein {1MØ}Tennisschläger(SF)]>		2		
Sum of Trials, Errors & Evaluating Scale	30	10	50			

In the therapy session of exercise11 of table35 the patient, Mrs Heinrich has to name the deleted content words of the sentences. The objects are presented together with their sentences that are read by the therapist, but without pronouncing the blanks.



Weißer Taste für die richtige Lösung!

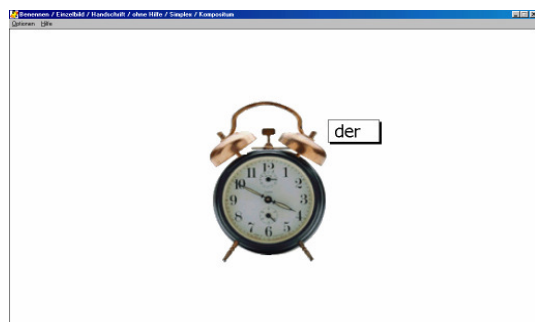
[3]

b

Table 35: Anomic Aphasic's Naming of content words in sentences

Exercise11 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Wirt zapft (Bier)	1	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	1	0(ND)	3			
3. Der Bäcker backt frisches (Brot)	2	1<Der Bäcker backt frische [Brötchen (SF)] [+nein] frisches Brot>		2		
4. Eier esse ich mit Pfeffer und (Salz)	1	0(ND)	3			
5. Im Sommer schlecke ich gerne(Eis)	2	1<Im Sommer schlecke ich gerne {+2M das da}....Ah Eis>		2		
6. Der Angler fängt einen(Fisch)	1	0(ND)	3			
7. Das Baby trinkt aus der(Flasche)	2	1<Das Baby trinkt[+1M Milch] aus der [/{1M Tasse}/(SF)]>		2		
8. Ich trinke Saft aus dem(Glas)	1	0(ND)	3			
9. Ich trinke lieber Tee als(Kaffee)	1	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	2	1<Nachmittags gibt es Kaffee und [/{1M Kekse}/(SS)]>		2		
11. Suppe esse ich mit dem (Löffel)	1	0(ND)	3			
12. Ich schneide das Brot mit dem(Messer)	1	0(ND)	3			
13. Kaffee schmeckt mit Zucker und(Milch)	2	1<Kaffee schmeckt mit Zucker und [/{1MSahne}/ (SF)] >		2		
14. Aus Apfelsinen presse ich frischen (Saft)	3	2<Aus Apfelsinen presse ich frisches {+1W flüssiges}...[/{1M etwas}/(D)]>			1	
15. Im Glas perlt der (Wein)	1	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	1	0(ND)	3			
17. Ich trinke Kaffee aus der(Tasse)	2	1<Ich trinke Kaffee aus der [/{1MKanne} / (SF)]>			1	
18. Anna trinkt schwarzen(Tee)	1	0(ND)	3			
19. Ich esse Suppe vom (Teller)	2	1<Ich esse die Suppe vom [/{1MTopf}/(SF)] >	3			
20. Die Suppe kocht im(Topf)	3	2<Die Suppe kocht im {+3M das Ding da} [/{1M Teller}/ (SS)]>			1	
Sum of Trials, Errors & Evaluating Scale	31	11	49			

The following exercise of table12 is similar in form and content to the tenth exercise. The way the therapist carries out its administration will not be different from the previous exercise of table34. In this context the therapist assumes the reading of the articles and the program, LingWare the presentation of the articles and the images of the different objects. The latter should be named by the patient with bi-syllabic and compound words.



Weiße Taste für die richtige Lösung!

[11]

b

Table 36: Anomic Aphasic's Naming of bi-syllabic and compound words

Exercise12 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der(Teller)	1	0(ND)	3			
2. der(Eimer)	2	1<[die Vase(SF)] >		2		
3. der(Koffer)	2	1<[die Tasche(SF)]>		2		
4. der(Gürtel)	1	0(ND)	3			
5. eine(Pfeife)	2	1<[Zigare(SF)]>		2		
6. die(Leiter)	1	0(ND)	3			

7. ein(Hammer)	2	1<[um Nageln zu hammern(SS)]>		2		
8. der(Hubel)	2	1<[Werkzeug, für das Holz ... (SS)] [+oder?]>		2		
9. der(Stecker)	1	0(ND)	3			
10. der(Toaster)	1	0(ND)	3			
11. der(Wecker)	1	0(ND)	3			
12. ein(Schalter)	2	1<[damit macht man Licht an(SF)]>		2		
13. der(Bagger)	3	2< [Fahrzeug(SS)] [wichtig für den Ackerbau (SS)]>			1	
14. der(Schrubber)	4	3<[Besen(SS)], [Bürste (SS)], [Pinsel (SS)]>				0
15. die(Singerin)	3	2<[Die Frau singt(SF)], [Sie ist am Singen(SF)]>			1	
16. der(Schreibtisch)	3	2<[runde Scheibe(SS)], [/{IMØ} Tisch]/>			1	
17. der(Drehstuhl)	2	1<[/{IMØ}Stuhl(SF)]>		2		
18. der(Kühlschrank)	1	0(ND)	3			
19. der(Hubschrauber)	2	1<[ein Flieger(SF)] [+oder] [Hubschrauber(ND)]>		2		
20. die(Wasserwaage)	2	1<[Gerät zum messe(SS)], [IMØ Waage (SF)]>		2		
Sum of Trials, Errors & Evaluating Scale	38	18		42		

Commentary on the 4th Hour

In the fourth hour of therapy Mrs Müller appears to have memorized the way the process of training has been administered. She became enthusiastic in her performance that can be confirmed by the number of her trials, in which she mobilized all her efforts to submit correct responses. In exercise10 of table28 morpho-phonemic deletions and substitutions occurred both in bi-syllabic and compound words; in 38 trials of table28 she made only 18 errors and obtained an evaluating scale of 42/60 correct points. In exercise11 of table29 even though the inserted grammatical words in the sentences contain articulatory disturbances, she was in a position to name all the objects she was confronted with. Articulatory disorders had a negative effect on the whole evaluating scale of this table. Exercise12 in table30 is similar in form to exercise11. It introduced tasks, which were not seen in the previous hours, such as “Schnalle”, “Krone” etc. Notwithstanding the insertion of these new items, the rate of the errors, trials, and evaluating scale remained constant. Despite these disturbances, there are signs of recovery in Mrs Müller’s language.

It can be deduced from the three exercises - that can be seen in table31, 32 and 33 - that the Wernicke’s aphasic, Mr Fimm has encountered certain difficulties in trying to name the objects using lexical words. In these exercises there are disturbances of semantic paraphrases, additions and substitution at the phoneme, morpheme and word levels. In the compound words as is the case in exercise10 of table31 and in exercise12 of table33 there are more disturbances in the tasks that lie between tasks 16 to 20. In exercise11 of table32, which consists of sentences, the patient has answered half of the tasks correctly. He approached many tasks with answers that were close to the target words. This made the results of the evaluating scale attain a satisfactory level. All in all, the general score of the correct point of the three exercises has gone beyond the expected results.

The anomic aphasic, Mrs Heinrich as it can be drawn from table 34, 35 and 36 has obtained the following results: 50/60, 49/60 and 43/60 in three exercises. They show an oscillating variation in their scores. This can be referred to her attempt to explain the name of the objects and not to name them with the appropriate lexical words. Semantic paraphrases, additions and substitutions are the disturbances that can be found in her responses.

* In the **fifth hour** of the third week of therapy the patients will be again trained in naming and partly in repetition. First of all, in exercise 13 they are required to name the verbs and slot them in the sentences. In exercise 14 they have to name the images with mono-syllabic words whose articles and first phonemes are presented in the window-forms of the images. Exercise 13 will be trained with the (b) window-forms of LingWare. In exercise 15 the patients will be introduced to a training of naming images with individual compound words and lexical words in phrases and sentences, whose structures differ completely from one another. In exercise 14 and 15 the training will be carried out through the use of (a) window-forms of LingWare.

Broca's Aphasic

Therapy on Mo.16, February 2004

In the thirteenth exercise of table 37 the therapist reads the sentences without conjugating the verbs. The patient has to repeat them and at the same time name and conjugate the verbs between the brackets.



Weiße Taste für die richtige Lösung!

[16]

b

Table 37: Broca's Aphasic's Naming of the verbs and Repetition of the sentences

Exercise 13 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna(lacht)	2	I<Anna lach/{ *IM e }/>		2		
2. Jürgen(raucht)	1	0(ND)	3			

3.Vater(kocht)	1	0(ND)	3			
4.Er(schläft)	2	1<Er schlaf /{*1M en}/ [+oder] schla—äft>		2		
5.Vater und Sohn(baden)	2	1<Vater und Sohn bad /{*1M et}/ (pause) [+oder] baden, [+ja] baden>		2		
6.Eva(kämmt) sich	3	2<Eva /[{1M kommt}]/(D)] [+nein], [+aber sich] ,k/1V a/mmt sich>			1	
7.Sie(schreibt) einen Brief	2	1<Sie schreib/{*1M en}/..., [+oder] schreibt einen Brief>		2		
8.Er(trinkt) ein Bier	1	0(ND)	3			
9.Der Junge.....(läuft) schnell weg	3	2<Der Junge l/1V a/uft schnell {1MØ}>			1	
10.Der Hubschrauber.....(fliegt) über den See	3	2<Der Hubschrauber fl/2Vo/gt über {1MØ} See>			1	
11.Die Schülerin.....(lernt) für das Abitur	2	1<Die Schülerin lernt für {1MØ} Abitur>		2		
12.Der Hund(bellt)	2	1<Der Hund bell/{*1M tet}/ ,[+ nein] bellt>		2		
13.Tim(spielt) Fußball	1	0(ND)	3			
14.Laura(singt) ein Lied	3	2(ND)<Laura sin/1CØ/t {1MØ} Lied			1	
15.Die Frau(putzt) das Fenster	3	2<Die Frau putz/{*1M en}/.../{1M ein}/ Frau putz >			1	
16.Der Junge(springt) ins Wasser	3	2<Der Junge spring{1MØ} in/1Ct/ Wasser>			1	
17.Er(zeigt) auf die Karte	4	3<Er zeig/{*1M en}/auf /{1M diese}/ Kart/1VØ/>				0
18.Hannibal(öffnet) die Tür	3	2<1CK/annibal öffn/{*1Me}/ die Tür>			1	
19.Klaus(liest) ein Buch	2	1<Klaus l/1VØ/est ein Buch>		2		
20.Der Vater(arbeitet) im Garten	2	1<Vater arbeit---et [+ja] in {1MØ} Garden>		2		
Sum of Trials, Errors & Evaluating Scale	44	24			36	

As it was mentioned above in the introductory note of the fifth hour of therapy, the therapist presents the images and reads the first consonants of the words of exercise 14 of table 38. The patient names the object and then repeats its lexical word together with the appropriate article that was already read by the therapist.



Bitte die richtigen Buchstaben eintippen

[17]

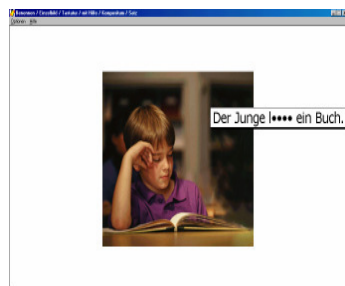
a

Table 38: Broca's Aphasic's Naming and Repetition of mono-syllabic words

Exercise 14 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein E.... (Eis)	1	0(ND)	3			
2.eine U....(Uhr)	2	1<ein/1VØ/ Uhr>		2		
3.ein T....(Tee)	1	0(ND)	3			
4.eine K..... (Kuh)	2	1<eine K/1Ve/h>		2		
5.ein B.....(Bier)	1	0(ND)	3			
6.ein B..... (Bett)	1	0(ND)	3			
7.ein B..... (Buch)	2	1<ein Bu/1Cck/>		2		
8.ein T..... (Tisch)	2	1<ein Ti/1C ch/>		2		
9.ein F.....(Fisch)	1	0(ND)	3			
10.ein T..... (Topf)	1	0(ND)	3			
11.ein W.....(Wirt)	2	1<ein W/1Ve/rt>		2		
12.ein Sch.....(Schirm)	2	1<ein Schi/1CØ/m>		2		
13.ein B.....(Brot)	1	0(ND)	3			
14.ein S..... (Stuhl)	2	1<ein St/1Ve/hl>		2		
15. F.....(Fleisch)	1	0(ND)	3			

16.ein Sch.....(Schrank)	3	2<ein Sch/1CØ//1Ve/nk>			1	
17.ein Z..... (Zelt)	2	1</1VØ/in Zelt>		2		
18.ein Pf.....(Pferd)	2	1<ein Pfer/1Ct/>		2		
19.ein St.....(Strumpf)	3	2<ein St/1CØ/umpf, Stru/1CØ/pf>			1	
20.ein W..... (Wein)	2	1<ein Wi[1Ve]n>		2		
Sum of Trials, Errors & Evaluating Scale	34	14			46	

In exercise 15 the patient will be trained in compound words, phrases and verbs. The therapist reads the text and presents the images of the program, LingWare. The patient has to name the blank and repeat the text of the object that the therapist pronounced.



Bitte die richtigen Buchstaben eintippen

[16]

a

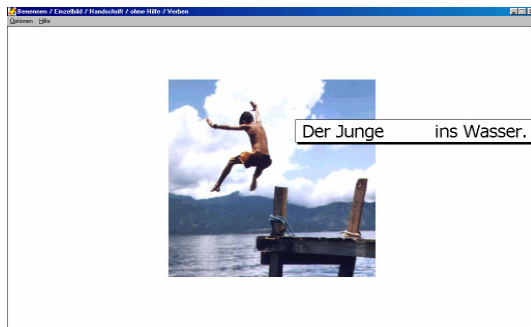
Table 39: Broca's Aphasic's Naming and Repetition of compound words, phrases and sentences

Exercise 15 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. A.....(Aktendner)	3	2< At[1Ck]enord/1CØ/er>			1	
2.ein T..... (Taschenrechner)	3	2<ein Tasche/1CØ/rechne/1Cn/>			1	
3.die B..... (Bohrmaschine)	3	2<die Boh/1CØ/maschin/1VØ/>			1	
4.der R.....(Rasierapparat)	3	2<de/1CØ/ Rasie/1CØ/apparat>			1	
5.der R.....(Rasenmäher)	3	2<der Rasenm/1Ve//1CØ/er>			1	
6.der T.....(Tischtennisschläger)	3	2<der {1MØ}tennisschl/1Ve/ ger>			1	
7.ein w.....Kreis (weißer)	2	1<ein weiß{1MØ} Kreis, ...weißer>		2		
8.ein g.....Vier..... (grünes / Viereck)	2	1<ein grüne/1CØ/ Viereck>		2		
9.ein r.....D..... (rotes / Dreieck)	3	2<.ein rote/1CØ/ D/1CØ/eieck>			1	
10.ein b.....K..... (blauer / Kreis)	1	0(ND)	3			
11.ein g.....V..... (gelbes / Viereck)	2	1<[+diesmal] ein gelbes {1MØ}eck>		2		
12.ein sch.....K..... (schwarzer / Kreis)	2	1<ein schwarze/1CØ/ Kreis>		2		
13.Der Mann l..... (läuft)	1	0(ND)	3			
14.Der Hub.....f..... (Hubschrauber / fliegen)	3	2<Der Hubschr/1Vo/uber, hm f---egt, f[1Ve]ligt>			1	
15.Die Frau t..... (telefonieren)	1	0(ND)	3			
16.Der Junge l..... ein Buch (lesen)	2	1<Der Junge l/1VØ/est ein Buch>		2		
17.Die Oma sch.....einen B..... (schreiben / Brief)	2	1<Die Oma schreibt.....(pause).....einen B[+1V]erief>		2		
18.Der Mann t.....ein B..... (trinken / Bier)	1	0(ND)		2		
19.Der Mann k.....eine Suppe (kochen)	2	1<Der Mann koch/{*e}/ eine Suppe>		2		
20.Das Mädchen l.....zu seiner M..... (laufen)	3	2<Das Mädchen l/1Va/uft zu {1MØ} Mutter>			1	
Sum of Trials, Errors & Evaluating Scale	45	15			45	

Wernicke's Aphasic

Therapy on Mo.16, February 2004

In exercise 13 of table 40 the therapist reads the beginning of the sentence and the Wernicke's aphasic, Mr Fimm has to name the verbs and repeat the sentences. Image, text and tone stimuli are partly supplied to the patient.



Weißer Taste für die richtige Lösung!

[16]

b

Table 40: Wernicke's Aphasic's Naming of verbs and Repetition of sentences

Exercise 13 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna(lacht)	1	0(ND)	3			
2. Jürgen(raucht)	1	0(ND)	3			
3. Vater(kocht)	2	1<Vater hm was,[+steht][+in die Küche] kochen(+1Met)>		2		
4. Er(schläft)	1	0(ND)	3			
5. Vater und Sohn(baden)	3	2<Vater und Sohn [+im Bad-et--zimmer],Sie [/{1M duschen}/{(SF)}>			1	
6. Eva(kämmt) sich	2	1<Eva [+schneidet], [+auch ja] [+putzen], kämmt(+1Cn) sich>		2		
7. Sie(schreibt) einen Brief	3	2<Sie sch/1Cn/eibt...../{1Wschneit}/.... einen Brief>			1	
8. Er(trinkt) ein Bier	1	0(ND)	3			
9. Der Junge.....(läuft) schnell weg	3	2<Der Junge [+rennet] [+flucht—tet] lauf[+1Ve]t schnell {1MØ}>			1	
10. Der Hubschrauber.....(fliegt) über den See	3	2<Der Hubschrauber [+gehen],[+nein] [fähr— auch nicht]/1CØ/liegt über den/{1Mdas}/>			1	
11. Die Schülerin.....(lernt) für das Abitur	2	1<Die Schülerin lern[+1Me]t [+ach nein] lernt für das Abitur>		2		
12. Der Hund(bellt)	1	0(ND)	3			
13. Tim(spielt) Fußball	3	2<Tim spielt{+1M et} Fuß/1Ct/all			1	
14. Laura(singt) ein Lied	2	1<Laura sing/{*1M en}/ [+mit Mikro—und] ein Lied>		2		
15. Die Frau(putzt) das Fenster	3	2<Die Frau putz[+1V2Ce r n] das/1CM/enster>			1	
16. Der Junge(springt) ins Wasser	3	2<Der Junge s/1Cw/ringt in/1CØ/ Wasser>			1	
17. Er(zeigt) auf die Karte	3	2<Er /1Csch/eigt auf die /1CØ/arte>			1	
18. Hannibal(öffnet) die Tür	2	1<Hannibal öffne[+1Cr]t die Tür [+und...]>		2		
19. Klaus(liest) ein Buch	2	1<Klaus lies[+1Ve]t ein Buch [+ja...]>		2		
20. Der Vater(arbeitet) im Garten	2	1<Der Vater [+ist un-]arbeitet[+1Cn] im Garten [+ja allein und...]>		2		
Sum of Trials, Errors & Evaluating Scale	43	23	37			

In exercise 14 of table 41, after having listened to the pronounced article and the consonants, the patient names the deleted consonants and vowels of mono-syllabic words and repeats both the name of the object and its article.



Bitte die richtigen Buchstaben eintippen

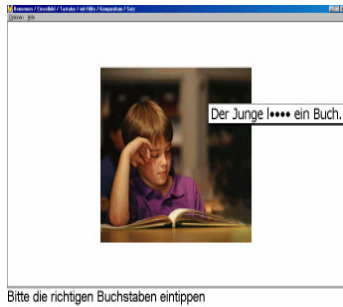
[17]

a

Table 41: Wernicke's Aphasic's Naming and Repetition of mono-syllabic words

Exercise 14 of LW Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein E.....(Eis)	1	0(ND)	3			
2.eine U.....(Uhr)	1	0(ND)	3			
3.ein T.....(Tee)	2	1< ein Tee[+2C1Vler] >		2		
4.eine K.....(Kuh)	2	1<ein [/{1M kalb}/(SF)] [+oder] [Kuh (ND)]>		2		
5.ein B.....(Bier)	1	0(ND)	3			
6.ein B.....(Bett)	2	1< ein Bett[+1Ve]>		2		
7.ein B.....(Buch)	1	0(ND)	3			
8.ein T.....(Tisch)	2	1<ein[+Ta—das da] ein Ti/1Cp/—(pause) Tisch>		2		
9.ein F.....(Fisch)	2	1<ein Fis/1Ck/>		2		
10.ein T.....(Topf)	2	1<ein Topf[+2C1Vsse] >		2		
11.ein W.....(Wirt)	2	1<ein Wi/1CØ/t —[ein..trin.. Bier]>		2		
12.ein Sch.....(Schirm)	1	0<ein schro—[+nein] (pause) Schirm>	3			
13.ein B.....(Brot)	1	0(ND)	3			
14.ein S.....(Stuhl)	1	0(ND)	3			
15. F.....(Fleisch)	4	3<ein [He—ld(D)] [Hacken(D)] [Kab(D)] >				0
16.ein Sch(Schrank)	2	1<ein Schrank[+1M chen]>		2		
17.ein Z.....(Zelt)	3	2<ein [Zimmer(D)], [+falsch, schwer] ein Ze/1Cn/t>			1	
18.ein Pf..... (Pferd)	2	1<ein Pf/1Va/rd>		2		
19.ein St.....(Strumpf)	3	2<ein St/1CØ/umpf[+1Ct] >			1	
20.ein W.....(Wein)	3	2<ein W—Wei[+1V e]n>		2		
Sum of Trials, Errors & Evaluating Scale	38	18	42			

The following exercise contains tasks that are similar to those of exercise 13 and 14. The patient follows the same processes of therapy that were used in the previous exercises; he has to name the blank of the compound words, the phrases and the verbs of the sentences and then repeat them. The therapist assists him by reading the texts that are presented in the windows of LingWare.



[16]

a

Table 42: Wernicke's Aphasic's Naming and Repetition of compound words, phrases and sentences

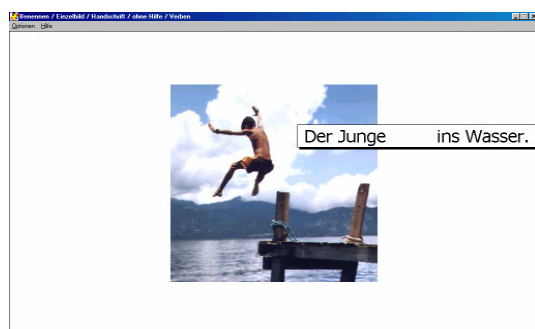
Exercise 15 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein A..... (Aktendner)	2	1<ein Akten[/{ IM koffer}]/(SS)] (Pause)... ein Ordner>		2		
2.der T.....(Taschenrechner)	2	1<ein Taschen—[/{ IM lampe}]/(SS)] rech---n—er>		2		
3.die B..... (Bohrmaschine)	2	1<ein B- die B- hm Bohrer{ IM Ø}>		2		
4.der R..... (Rasierapparat)	2	1<ein Rasierer{ IM Ø} (Pause)Rasier [/{ IM gerät}]/(SS)>			1	
5.der R..... (Rasenmäher)	4	3<ein Rasen{ IM Ø} [+ab][--er schneiden(D)], [+und noch] [Maschin... (D)].>				0
6.der T..... (Tischtennisschläger)	3	2<der Tennis{ IM Ø} [...Bälle(SS)] { IM Ø}Tennisschläger>			1	
7.ein w..... Kreis (weißer)	1	0(ND)	3			
8.ein g..... Viereck (grünes Viereck)	1	0(ND)	3			
9.ein r.....D..... (rotes Dreieck)	3	2<ein rotes Drei{+ IM er}{ 2M Ø}>			1	
10.ein b..... K..... (blauer Kreis)	2	1<ein blau---er / ICT /reis>		2		
11.ein g..... V..... (gelbes Viereck)	2	1<ein [+g---] vier{ IM Ø}, {+ IM das} gelbe Vier—eck>		2		
12.ein Sch..... K..... (schwarzer Kreis)	3	2<ein schwarzer[/{ IM Kreitz}]/(D) [+nein], [+Vierk..] Kreis>			1	
13.Der Mann l..... (laufen)	1	0(ND)	3			
14.Der Hub.....f..... (Hubschrauber fliegen)	3	2<der Hub—{*sch-berfer} fieg[1C l]t — (pause) Hubschrau—ber fliegt>			1	
15.Die Frau t..... (telefonieren)	2	1<Die Frau tel---[ruft an(SF)], telefon—niert>		2		
16.Der Junge l..... ein Buch (lesen)	2	1<Der Junge lie[+ 1C r]st ein [+das] Buch>		2		
17.Die Oma sch.....einen B.....(schreiben / Brief)	3	2<Die Oma sch/ 1C /eibt, [+was] einen [/{ IM blatt}]/(SS)] ,Brief[+ 1C t] ...>			1	
18.Der Mann t.....ein B..... (trinken)	2	1<Der Mann trink[+ 1V e] ein Bier		2		
19.Der Mann k..... eine Suppe (kochen)	2	1<Der Mann k/ 1V ü/cht eine Suppe>		2		
20.Das Mädchen l.....zu seiner M.....(laufen / Mutter)	2	1<Das Mädchen [+ lacht], [+aber auch] lä-läuft zu seiner [/{ IM Mutti}]/(SF)>		2		
Sum of Trials, Errors & Evaluating Scale	44	24	36			

Anomic Aphasic

Therapy on Tu. 17, February 2004

During the administration of training in the thirteenth exercise of table43 the patient, Mrs Heinrich is forwarded with images and texts whose verbs she has to name and then repeat them in the whole sentences. In the fourteenth exercise of table44 she has to name monosyllabic words and repeat them together with the articles. In the fifteenth exercise of table45 she has to name the images with individual compound words, with lexical words of phrases and sentences, then repeat some as single words and others in a context. The therapist assists

her with the presentation of an image to each task and the repetition of the texts that are displayed by the (b)window-forms of LingWare.



Weißer Taste für die richtige Lösung!

[16]

b

Table 43: Anomic Aphasic's Naming of verbs and Repetition of sentences

Exercise 13 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna(lacht)	1	0(ND)	3			
2. Jürgen(raucht)	1	0(ND)	3			
3. Vater(kocht)	1	0(ND)	3			
4. Er(schläft)	2	1<Vater [/{1M liegt}/(SS)], [+oder] er schläft>		2		
5. Vater und Sohn(baden)	2	1<Vater und Sohn [/{1Mduschen}/ (SF)]>		2		
6. Eva(kämmt) sich	3	2<Eva [/{1Mwäscht}/(SS)] {1MØ} [+die Haare]>			1	
7. Sie(schreibt) einen Brief	1	0(ND)	3			
8. Er(trinkt) ein Bier	1	0(ND)	3			
9. Der Junge.....(läuft) schnell weg	2	1<Der Junge [/{1W rennt}/ (SS)] schnell weg>		2		
10. Der Hubschrauber.....(fliegt) über den See	2	1<Der Hubschrauber fliegt [+aber wo] über [/{2M ein Meer}/(SF)]>		2		
11. Die Schülerin.....(lernt) für das Abitur	2	1<Die Schülerin [/{1M liest}/(SS)] für das Abitur>		2		
12. Der Hund(bellt)	1	0(ND)	3			
13. Tim(spielt) Fußball	1	0(ND)	3			
14. Laura(singt) ein Lied	3	2<Laura [/{spricht}/(SS)] (pause) Sie singt [/{2M etwas}/(D)] ein Lied>			1	
15. Die Frau(putzt) das Fenster	1	0(ND)	3			
16. Der Junge(springt) ins Wasser	1	0(ND)	3			
17. Er(zeigt) auf die Karte	2	1<Er zeigt auf [/{2M das Ding da}/(D)] eine Karte>		2		
18. Hannibal(öffnet) die Tür	1	0(ND)	3			
19. Klaus(liest) ein Buch	1	0(ND)	3			
20. Der Vater(arbeitet) im Garten	2	1<Der Vater arbeitet [/{2M draußen}/ (D)] wo war das im Garten>		2		
Sum of Trials, Errors & Evaluating Scale	31	11	49			

The patient, the anomic aphasic in exercise 14 of table 44 will be required to name the content words and combine them with the correct function words and repeat both of them as a whole unit. The therapist forwards her with the selected images of LingWare and the reading of the texts that are shown by the images.



Bitte die richtigen Buchstaben eintippen

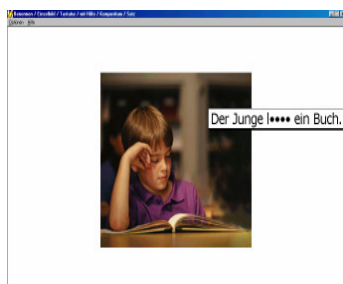
[17]

a

Table 44: Anomic Aphasic's Naming and Repetition of mono-syllabic words

Exercise 14 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein E.....(Eis)	1	0(ND)	3			
2.eine U.....(Uhr)	1	0(ND)	3			
3.ein T.....(Tee)	2	1<ein [/{1MTasse}]/(SS)]		2		
4.eine K.....(Kuh)	1	0(ND)	3			
5.ein B.....(Bier)	2	1<ein B--- [+Das trinkt man gern in Köln],[/{1M kölsch}]/(SF)], Bier >		2		
6.ein B.....(Bett)	1	0<ein.....zum Schlafen und ausruhen ein Bett>	3			
7.ein B.....(Buch)	1	0(ND)	3			
8.ein T.....(Tisch)	1	0(ND)	3			
9.ein F.....(Fisch)	1	0(ND)	3			
10.ein T.....(Topf)	3	2<ein Ta---[/{2M eine Vase}]/(SF)], ..[/{1M ein Glas}]/(SS)] [+etwas ähnliches]>			1	
11.ein W.....(Wirt)	1	0< ein ...[+S Er zapft Bier(SS)], ein Wirt>	3			
12.ein Sch.....(Schirm)	3	0(ND)			1	
13.ein B.....(Brot)	1	0(ND)	3			
14.ein S.....(Stuhl)	3	2<Ein Se...[/{1M Sessel}]/(SF)], ein [/{+1M Dreh-} stuhl(SF)]...>			1	
15. F.....(Fleisch)	1	0(ND)	3			
16.ein Sch(Schrank)	2	1<ein Sch....[/{+1M Küchen}schrank(SF)], [+oder nur] Schrank>		2		
17.ein Z.....(Zelt)	1	0(ND)	3			
18.ein Pf..... (Pferd)	1	0(ND)	3			
19.ein St.....(Strumpf)	2	1<ein Sto---[/{1M Socken}]/(SF)] [+nein das sehr lang]>		2		
20.ein W.....(Wein)	1	0(ND)	3			
Sum of Trials, Errors & Evaluating Scale	28	8				52

In the following exercise of table45 the form of the images and the text they present will not be altered. The patient has to name the deleted items and repeat them with the text that is read by the therapist.



Bitte die richtigen Buchstaben eintippen

[16]

a

Table 45: Anomic Aphasic's Naming and Repetition of compound words, phrases and sentences

Exercise 15 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. A..... (Aktendordner)	1	0(ND)	3			
2.der T.....(Taschenrechner)	1	0(ND)	3			
3.die B..... (Bohrmaschine)	2	1<die Bohrer{1MØ}>		2		
4.der R..... (Rasierapparat)	3	2<der Rasierer{1MØ} [+oder]—/{1Wmaschine}/>			1	
5.der R..... (Rasenmäler)	3	2< der ...[Um Rasen zu schneiden (SF)], [+auch] /{1M Gerät}/ (SS)>			1	
6.der T..... (Tischtennisschläger)	2	1< der {1MØ}Tennisschläger (SS) ,----[+Sehr gut...]>		2		
7.ein w..... Kreis (weißer)	2	1< ein weißer /{1M Farbe} ---- weißer Kreis>		2		
8.ein g..... Viereck (grünes /Viereck)	1	0<ein ---- grünes Viereck(ND)>	3			
9.ein r.....D..... (rotes /Dreieck)	1	0(ND)	3			
10.ein b..... K..... (blauer /Kreis)	1	0<Ein Kreis --- blauer>	3			
11.ein g..... V..... (gelbes/ Viereck)	2	1<ein /{1Wgrünes}/ Viereck>		2		
12.ein Sch..... K..... (schwarzer/ Kreis)	2	1<[schwarzer aber rund(SF)], [+ja] ein {1MØ}Kreis schwarzer >		2		
13.Der Mann l..... (laufen)	1	0(ND)	3			
14.Der Hub.....f..... (Hubschrauber fliegen)	1	0(ND)	3			
15.Die Frau t..... (telefonieren)	1	0(ND)	3			
16.Der Junge l..... ein Buch (lesen)	1	0(ND)	3			
17.Die Oma sch.....einen B.....(schreiben / Brief)	2	1<Die Oma schreibt einen B----/{2M etwas }/ (SF)>		2		
18.Der Mann t.....ein B..... (trinken)	1	0((ND)	3			
19.Der Mann k..... eine Suppe (kochen)	2	1<[{+1S Er steht in die Küche}(SS),Der Mann kocht eine Suppe>		2		
20.Das Mädchen l.....zu seiner M.....(laufen / Mutter)	3	2<Das Mädchen läuft zu seiner M----/{1M Frau}/(SF)>		2		
Sum of Trials, Errors & Evaluating Scale	33	13	47			

Commentary on the 5th Hour

Mrs Müller found the tasks of the three exercises in table 37, 38 and 39 very difficult due to the new procedures that are introduced in the administration of therapy. For instance, in the thirteenth exercise of table 37 she not only repeats the verbs but she has to conjugate them as well. From here entailed her mistakes at the level of the flexion of the grammatical morphemes. In her answers there were many breaks and pauses, repetitions and hesitations. The increase in the number of trials and errors can be clarified by the introduction of a new method of training in which both naming and repetition are combined. This can be deduced from the fourteenth and fifteenth exercise in which elisions, substitutions and additions have not only augmented in mono-syllabic but also in compound words, phrases and sentences.

Even the Wernicke's aphasic, Mr Fimm encountered certain difficulties during the administration of this new therapy method though the therapist supplied him with pictorial and textual assistance. In table 40 most of the sentences display disturbances at the verb level and substitutions, additions or elisions of new constituents at the sentence level. In table 41 and 42 one can observe the inability of the patient to fill in the blanks the correct lexical words and the appropriate verbs. The increase of the number of trials and errors made the sum of the evaluating scale decline in the three exercises (Tab. 40, 41 & 42 / Exer. 13, 14 & 15).

This new method, which was applied in the fifth hour of therapy, had no negative effect on the anomic aphasic, Mrs Heinrich. Despite the rise of trials and errors in table 43, 44 and 45 of

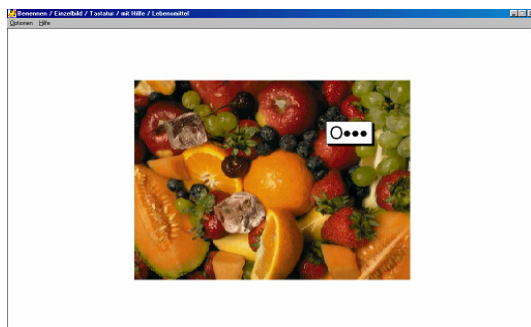
exercise 13, 14 and 15 and the paraphrases of many words in table 44 and 45, her submitted general score of the correct points is higher than that of Broca's and Wernicke's aphasics.

* The **sixth hour** of the third week of therapy encompasses three exercises. They stand at this stage of therapy as a re-training of the previous exercises. They contain tasks that have been trained in the first and second week of therapy. The form and the administration of the tasks are almost similar to what has been dealt with in the last two settings; it is a combined session of training that will consist of repetition and naming. This type of re-training in tasks of the previous weeks is primordial at this stage. It renders a global view to the therapist about the effectiveness and the intensity of training; and the manner how to reshuffle and restructure the items so as to sketch other plans that can be employed in the next sessions of therapy. Exercise 16, 17 and 18 contain mono-syllabic and compound words. Their forms can be now and then changed as the training takes place in order to direct the effect of their re-training process to the areas and the modalities where the impairments tend to occur in the language of the individual patients.

Broca's Aphasic

Therapy on Wed. 18, February 2004

The therapist presents to Mrs Müller a picture on which one or two phonemes of a word as well as an infinite article are written. He reads the articles and the presented phonemes of the lexical words. The demand made on the patient is to name the objects by completing the omitted consonants and vowels and then repeating them as a whole constituent. The words, that will be re-trained, are either mono- or bi-syllabic.



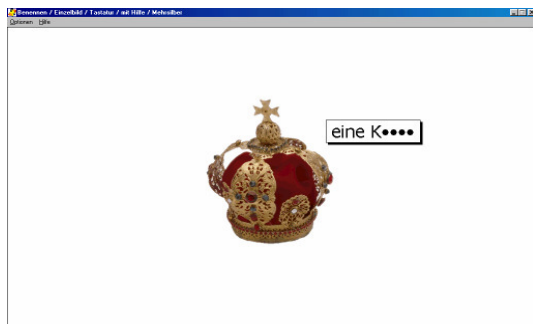
[11]

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Table 46: Broca's Aphasic's Naming and Repetition of mono- and bi-syllabic words

Exercise16 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Ei..... (Eis)	1	0(ND)	3			
2. M.....(Mehl)	1	0(ND)	3			
3. R.....(Reis)	2	1<[/1Wessen]/(SF)] ...Reis [+oder] >		2		
4. N.....(Nudeln)	1	0(ND)	3			
5. ein F.....(Fisch)	2	1<ein Fi/1Cch/, [+nein]>		2		
6. F.....(Fleisch)	2	1<Fle/1VØ/sch>		2		
7. B.....(Brot)	1	0(ND)	3			
8. B.....(Butter)	2	1<Butte/1CØ/>		2		
9. K.....(Käse)	1	0(ND)	3			
10. K.....(Kuchen)	2	1<Ku/1C K/en>		2		
11. O.....(Obst)	1	0(ND)	3			
12. ein A.....(Apfel)	2	1<ein /1VE/pfel>		2		
13. eine B.....(Birne)	2	1<eine Bi/1CØ/ne>		2		
14. K.....(Kirschen)	3	2<Ki/1CØ/sche[+1Vi]n [Kirschen(ND)]>			1	
15. T.....(Trauben)	2	1<Trau/1C f/en>		2		
16. Z.....(Zucker)	2	1<Zuck/1VCa/>		2		
17. eine K.....(Kekse)	2	1<eine Ke/1CØ/se>		2		
18. B.....(Brötchen)	2	1<Bröt/2C Ø/en>		2		
19. B.....(Brezel)	3	2<B/1CØ/e[+1Ct]zel>			1	
20. B.....(Bohnen)	2	1<Boh/1C t/en>		2		
Sum of Trials, Errors & Evaluating Scale	36	16	46			

In exercise17 of table47 the therapist reads the article and the presented phoneme of the lexical word. The patient has to name the omitted sound units that suit to the image, and then repeat the complete word together with its infinite article. Each content word of the table below refers to an image, the latter assists the patient as she attempts to name and repeat the tasks.



Bitte die richtigen Buchstaben eintippen

[10]

a

Table47: Broca's Aphasic's Naming and Repetition of bi-syllabic and compound words

Exercise 17 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Au..... (Auto)	1	0(ND)	3			
2. ein A.....(Affe)	1	0(ND)	3			
3. eine E..... (Ente)	1	0(ND)	3			
4. eine H.....(Hose)	1	0(ND)	3			
5. ein Stück.....(Seife)	2	1<ein Stück Se/1CØ/ fe>		2		
6. ein A.....(Apfel)	1	0(ND)	3			
7. ein M.....(Mantel)	1	0(ND)	3			
8. ein G.....(Gürtel)	2	1<ein Gü/1CØ/tel>		2		
9. eine Schn.....(Schnalle)	3	2<ein/1VØ/ Schn/1Ce/alle>			1	
10. eine K.....(Krone)	2	1<ein/1VØ/ Krone>	3			
11. eine B.....(Bluse)	3	2<ein/1V Bu[1C]se>			1	
12. B.....(Brötchen)	2	1<Br/1Vu/tchen, [+viele....]>		2		
13. ein Tr.....(Traktor)	2	1<ein T/1CØ/aktor>		2		
14. ein St.....(Stempel)	3	2<[+ja.] ein St/1Vi/mp[+1Cf]el>			1	

15. ein F.....(Flieger)	2	1<ein F/ICØ/ieger>		2		
16. ein B.....(Bleistift)	3	2<ein B/ICØ/ei/ICØ/tift>			1	
17. ein K.....(Kühlschrank)	3	2<ein K/IVu/hl/ICt/rank>			1	
18. ein Hub(Hubschrauber)	3	2<ein Hubsch/IC k/aube/ICØ/>			1	
19. ein Bl.....(Blumenkohl)	3	2< ein Blume/ICØ/koh/ICØ/>			1	
20. Ak.....(Aktenordner)	3	2<Akte/ICØ/ord/ICØ/er>			1	
Sum of Trials, Errors & Evaluating Scale	42	22			38	

The exercise below in table48 is somehow different from those that were trained in the first and second hour of therapy. Each bi-syllabic and compound word must be coupled with a definite article. The therapist reads an article and its presented phoneme. The patient, on his part, has to name the object with the word form that should fit in the blank and then repeat both the article and the content word.



Bitte die richtigen Buchstaben eintippen

[12]

a

Table 48: Broca's Aphasic's Naming and Repetition of bi-syllabic and compound words

Exercise 18 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der T.....(Teller)	1	0(ND)	3			
2. der K.....(Koffer)	1	0(ND)	3			
3. der G.....(Gürtel)	1	0(ND)	3			
4. die L.....(Leiter)	2	1</{IM der}/ Leiter>		2		
5. der H.....(Hammer)	3	2</{IMdie}/ Hamme/ICØ/>			1	
6. der H.....(Hobel)	1	0(ND)	3			
7. der St.....(Stecker)	2	1</{IMdie}/ Stecker >		2		
8. der T.....(Toaster)	3	2<der Toa/ICØ/te/ICØ/>			1	
9. der W.....(Wecker)	2	1<der /ICT/ecker>		2		
10. der Sch.....(Schalter)	2	1<der Scha/ICØ/ ter>		2		
11. der B.....(Bagger)	2	1<der Ba/ICck/er		2		
12. der Sch.....(Schreibtisch)	3	2<der Sch/ICØ/eib/ICØ/isch			1	
13. der Dreh.....(Drehstuhl)	2	1<der /ICT/rehstuhl>		2		
14. der K.....(Kühlschrank)	3	2<de/ICØ/ Kühlschra/ICØ/k>			1	
15. der Hub.....(Hubschrauber)	2	1<der Hubsch/ICØ/auber>		2		
16. die W.....(Wasserwaage)	3	2<Der Wasse/ICØ/w/IVe/ge			1	
17. der K.....(Küchentisch)	2	1<der Küchen/ICØ/isch		2		
18. der B.....(Backofen)	2	1<de/ICØ/ Back/IVØ/fen			1	
19. der F.....(Farbfernseher)	2	1<der {IMØ}fernseher>		2		
20. die S.....(Schallplatte)	2	1<die Schall/ICØ/latten,[+nie]... platten>		2		
Sum of Trials, Errors & Evaluating Scale	41	21			39	

Wernicke's Aphasic

Therapy on Wed.18, February 2004

Mr Fimm will be also trained in the above three exercises with which the Broca's aphasic has been confronted so as to reinforce his ability of naming the phonemes of the lexical words and their repetition together with the infinite or finite articles. In exercise16 of table49 the therapist reads the presented text of the image to excite the patient's neural and auditory ability. The sound effects may trigger the already stored phonemes of the first and second session of training. The phonemes to be combined refer to an object illustrated in the window-form below.



[13]

Table 49: Wernicke's Aphasic's Naming and Repetition of mono- and bi-syllabic words

Exercise16 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Ei..... (Eis)	1	0(ND)	3			
2. M.....(Mehl)	1	0(ND)	3			
3. R.....(Reis)	2	1 <Rei/1Cz/>		2		
4. N.....(Nudeln)	2	1 <Nude/1Cd/ ln>		2		
5. ein F.....(Fisch)	2	1 <Fis/1Ck/>		2		
6. F.....(Fleisch)	3	2 <F[+1Ca]/2VØ/sch>			1	
7. B.....(Brot)	1	0(ND)	3			
8. B.....(Butter)	3	2 <B[+1Cp]utte/1Cn/>			1	
9. K.....(Käse)	3	2 <Kä/1Cz/e[+1C r]>			1	
10. K.....(Kuchen)	2	1 <Ku/1C fk/en>		2		
11. O.....(Obst)	2	1 <O/1CØ/st>		2		
12. ein A.....(Apfel)	2	1 <ein Apf/1VCst/>		2		
13. eine B.....(Birne)	2	1 <Bir [+1Cf]ne>		2		
14. K.....(Kirschen)	3	2 <Kr[1Ci]schen[+1V1Cen]>			1	
15. T.....(Trauben)	2	1 <T/1CØ/auben>		2		
16. Z.....(Zucker)	2	1 <Zuck[+1Cp]er>		2		
17. K.....(Kekse)	3	2 <[+Ke----s[1Ck]e], /{1M Käse}/nie...>			1	
18. B.....(Brötchen)	3	2 < Br-- [+Klein] Br/1Vo/[1Cch]t—en>			1	
19. eine B.....(Brezel)	2	1 <eine Bre/1Cst/el>		2		
20. B.....(Bohnen)	3	2 <Boh/1Cm/e—[+1C]n, [+Ah ja]>			1	
Sum of Trials, Errors & Evaluating Scale	44	24	36			

The naming of the images of two syllabic and compound words and their repetition with infinite articles is the setting of training in which the Wernicke's aphasic will be involved in exercise17 of table50. In this context the task of the therapist is to read only the initial

phoneme and in some tasks the first two phonemes of a word. The patient has to name the rest and repeat the infinite article and its lexical word.



[7]

Table 50: Wernicke’s Aphasic’s Naming and Repetition of bi-syllabic and compound words

Exercise 17 of LW Stimuli (Images, ‘Text’ & ‘Tone’)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Au..... (Auto)	1	0(ND)	3			
2. ein A.....(Affe)	1	0(ND)	3			
3. eine E..... (Ente)	2	1<eine [+E..n.] [+1CT]ente		2		
4. eine H.....(Hose)	2	1<eine H/1Va/se>		2		
5. ein Stück.....(Seife)	2	1<ein Stück Seif[+1Ct]e		2		
6. ein A.....(Apfel)	2	1<ein Apfel[+1Cn]		2		
7. ein M.....(Mantel)	2	1<ein Man/1CØ/el>			1	
8. ein G.....(Gürtel)	3	2<ein G/1Vu/r/1Cd/el>			1	
9. eine Schn.....(Schnalle)	3	2<ein Sch[1Va]n[+1Ve]lle>		2		
10. eine K.....(Krone)	2	1<eine Kro/1Cm/e>		2		
11. eine B.....(Bluse)	2	1<eine Buse[1Cl]		2		
12. B.....(Brötchen)	2	1< Brö[1Cn]tchen		2		
13. ein Tr.....(Traktor)	2	1<ein Tr/1Ve/k---tor>		2		
14. ein St.....(Stempel)	3	2<ein Ste/1C ck/peI, Stemp[+1Cf]el>			1	
15. ein F.....(Flieger)	3	2<ein F/1C1VØ/eger>			1	
16. ein B.....(Bleistift)	2	1<ein Bleis/1Ch/ift>			1	
17. ein K.....(Kühlschrank)	3	2<ein K/1Vu/h/1CØ/schrank>			1	
18. ein Hub.....(Hubschrauber)	4	3<ein Hu/1Cf/schrau/1Ck/e/1Cl/>				0
19. ein Bl.....(Blumenkohl)	3	2<ein Bum[1Cl]en/{1Mtor}/ >			1	
20. Ak.....(Aktendordner)	4	3<Ak/1Cs/ten/1CØ/d[1Vo]ner>				0
Sum of Trials, Errors & Evaluating Scale	48	28	32			

Therapy in table51 will be continued with tasks that are similar to those of exercise18 of table48. The administration of therapy has almost the same procedures. It is must be taken for granted that the patient’s responses will be otherwise due to the type of aphasia he suffers from. After having heard the pronounced phonemes and observed their images the patient attempts to name their deleted phonemes and repeat them with a finite article.



[5]

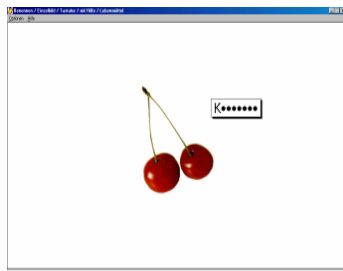
Table 51: Wernicke's Aphasic's Naming and Repetition of bi-syllabic and compound words

Exercise 18 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der T.....(Teller)	1	0(ND)	3			
2. der K.....(Koffer)	2	1<der K/IVu/ffer>		2		
3. der G.....(Gürtel)	3	2<der Gü[+ICIVmi]rtel>			1	
4. die L.....(Leiter)	2	1<die Lei/ICs/er		2		
5. der H.....(Hammer)	1	0(ND)	3			
6. der H.....(Hobel)	2	1<der Hu/ICf/el		2		
7. der St.....(Stecker)	3	2<der St/IVi/[+ICn]cker>			1	
8. der T.....(Toaster)	2	1<der Toast{1MØ}>		2		
9. der W.....(Wecker)	2	1<der Weck[+ICt]er		2		
10. der Sch.....(Schalter)	3	2<der Scha[+ICf]lt[+ICn]er>			1	
11. der B.....(Bagger)	2	1<der Ba/ICk/er>		2		
12. der Sch.....(Schreibtisch)	3	2<der Schrei /ICØ/Ti[+IC e]sch			1	
13. der Dreh.....(Drehstuhl)	2	1<der {1MØ}Stuhl>		2		
14. der K.....(Kühlschrank)	2	1<der Kühl/ICt/rank		2		
15. der Hub.....(Hubschrauber)	3	2<der Hubschra/ICn//ICk/er			1	
16. die W.....(Wasserwaage)	3	2<die Wa/ICtt/erwaa[+ICr]ge>			1	
17. der K.....(Küchentisch)	3	2<der Kü[+ICt]chen/ICf/isch>			1	
18. der B.....(Backofen)	2	1<der Back[+ICt]ofen>		2		
19. der F.....(Farbfernseher)	3	2<der {1MØ}Fern[+ICb]seher>			1	
20. die S.....(Schallplatte)	3	2<die Scha/ICft/p/ICr/atten>			1	
Sum of Trials, Errors & Evaluating Scale	47	27	33			

Anomic Aphasic

Therapy on Thu.19, February 2004

The therapy session of the anomic aphasic, Mrs Heinrich will be somehow different from that of the Broca's and Wernicke's aphasics. First of all the therapist reads neither the whole word referring to the object nor its first or second phoneme. He simply controls the running of the images and their presented texts. The task of the patient, in this case, is similar to that of the other two patients. She has to name the deleted phonemes of the lexical words and repeat them as whole units (see Exer.16, Tab.52).



[14]

Table 52: Anomic Aphasic's Naming and Repetition of mono- and bi-syllabic words

Exercise 16 of LW Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Ei..... (Eis)	1	0(ND)	3			
2. M.....(Mehl)	1	0(ND)	3			
3. R.....(Reis)	1	0(ND)	3			
4. N.....(Nudeln)	1	0(ND)	3			
5. ein F.....(Fisch)	1	0(ND)	3			
6. F.....(Fleisch)	2	1< Fi...[+hm] ..{+1MSchwein}fleisch...>		2		
7. B.....(Brot)	2	1<B...[+Ach ja] [/{1Mtorte}/(SF)]...>		2		

8. B.....(Butter)	3	2<B.../{ 1M käse}/{ SF } ...>		2		
9. K.....(Käse)	1	0(ND)	3			
10. K.....(Kuchen)	2	1</{ 1M Kekse }/{ SF }...>		2		
11. O.....(Obst)	2	1</{ 1M Trauben }/{ SF }...>		2		
12. ein A.....(Apfel)	1	0(ND)	3			
13. eine B.....(Birne)	1	0(ND)	3			
14. K.....(Kirschen)	2	1</{ 2M keine Trauben }/{ SF } ...>		2		
15. T.....(Trauben)	1	0(ND)	3			
16. Z.....(Zucker)	2	1</{ 1S Tut man im Kaffee(SS)}...>		2		
17. K.....(Kekse)	1	0(ND)	3			
18. B.....(Brötchen)	1	0(ND)	3			
19. eine B.....(Brezel)	2	1</{ 1M Brot }/ (SF)...>		2		
20. B.....(Bohnen)	2	1<{+ 1P Günes Zeug}....>		2		
Sum of Trials, Errors & Evaluating Scale	30	10		50		

The administration of therapy in exercise17 of table53 is similar to the procedures that were used to administer training in exercise16 of table52. The therapist presents the image of an object and its text. The latter will not be read. The patient is then expected to name the rest of the word and repeat it with an infinite article.

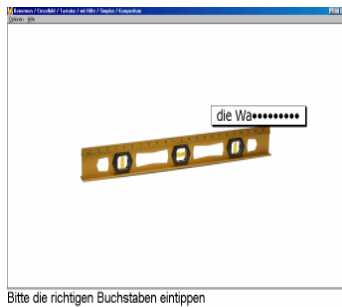


[9]

Table 53: Anomic Aphasic's Naming and Repetition of bi-syllabic and compound words

Exercise 17 L/W Stimuli (Images , 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. ein Au..... (Auto)	1	0(ND)	3			
2. ein A.....(Affe)	1	0(ND)	3			
3. eine E..... (Ente)	1	0(ND)	3			
4. eine H.....(Hose)	1	0(ND)	3			
5. ein Stück.....(Seife)	2	1<ein Stück.....[zum waschen...(SS)][riecht gut....(SS)]>		2		
6. ein A.....(Apfel)	1	0(ND)	3			
7. ein M.....(Mantel)	2	<ein M----[pause] [/{ 1M Jacke }/{ SF }]		2		
8. ein G.....(Gürtel)	2	1<ein G----[Trägt man mit einer Hose(SS)]>		2		
9. eine Schn.....(Schnalle)	2	1<eine Schn.....[Nicht für die Hose, für die Uhr(SF)]>		2		
10. eine K(Krone)	2	1<eine K----[/{ 1M Hut }(SS)] (pause) eine Krone>		2		
11. eine B.....(Bluse)	3	2<eine B----[/{ 1M Hemd }/{ SF }], [/{ 1M Pulli }/{ SF }]....>			1	
12. B.....(Brötchen)	2	1< [/{ 1M Brot }/ (SF)] [+oder]---->		2		
13. ein Tr.....(Traktor)	3	2<ein Tr----[/{ 1W Landmaschine }(SS)], [/{ 1M Schlepper }/ (SF)]>			1	
14. ein St.....(Stempel)	1	0(ND)	3			
15. ein F.....(Flieger)	1	0(ND)	3			
16. ein B.....(Bleistift)	1	0(ND)	3			
17. ein K.....(Kühlschrank)	2	1<ein Kühler(1MØ)....>		2		
18. ein Hub(Hubschrauber)	2	1<ein Hub----[/{ 1M Flieger }/{ SF }...>		2		
19. ein Bl.....(Blumenkohl)	2	1<ein Bl----Blumen{ 1MØ }—ja kohl>		2		
20. Ak.....(Aktenordner)	2	1<Ak----{ 1MØ }ordner....>		2		
Sum of Trials, Errors & Evaluating Scale	33	13		47		

The following exercise in table54 is a combination of the tasks that can be found in table52 and 53. It is a continuation of training in bi-syllabic and compound words. The patient gets no pronounced text. In this context, the aphasic visualizes its partly presented phonemes and its image. The demand - she is confronted with - is to name its deleted phonemes and finally repeat the word with the finite article.



[16]

Table 54: Anomic Aphasic's Naming and Repetition of bi-syllabic and compound words

Exercise 18 L/W Stimuli (Images, 'Text' & 'Tone')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der T.....(Teller)	1	0(ND)	3			
2. der K.....(Koffer)	3	2<der K----[/{ 1M Tasche}/(SF)], [/{ 1P große Tasche}/ (SF)]...>			1	
3. der G.....(Gürtel)	2	1<der G----[/{ 1M Schnalle}/(SF)]...>		2		
4. die L.....(Leiter)	3	2<die L----[/{ 1S ..benutzt von Malern, Dachdeckern.}/(SS)]...>			1	
5. der H.....(Hammer)	2	1<der H----[/{ 1M Werkzeug}/(SS)]..(pause)..>		2		
6. der H.....(Hobel)	1	0(ND)	3			
7. der St.....(Stecker)	1	0(ND)	3			
8. der T.....(Toaster)	1	0(ND)	3			
9. der W.....(Wecker)	1	0(ND)	3			
10. der Sch.....(Schalter)	1	0(ND)	3			
11. der B.....(Bagger)	1	0(ND)	3			
12. der Sch.....(Schreibtisch)	2	1< der { 1M Ø}Tisch.....>		2		
13. der Dreh.....(Drehstuhl)	2	1<der /{ 1M büro}/stuhl....>		2		
14. der K.....(Kühlschrank)	1	0(ND)	3			
15. der Hub.....(Hubschrauber)	1	0(ND)	3			
16. die W.....(Wasserwaage)	3	2<die W----[/{ 1M Instrument}/(SS)], [/{ 1M Werkzeug}/ (SS)]>			1	
17. der K.....(Küchentisch)	2	1<der K----{ 1M Ø}Tisch....>		2		
18. der B.....(Backofen)	1	0(ND)	3			
19. der F.....(Farbfernseher)	2	1<der F----{ 1M Ø}Fernseher....>		2		
20. die S.....(Schallplatte)	3	2< die S----{+ 1P Rolling für Musik(SF)}, CD(SF)....>			1	
Sum of Trials, Errors & Evaluating Scale	34	14	46			

Commentary on the 6th Hour

Skipping through the exercises of table46, 47 and 48 may lead one to draw a conclusion that the Broca's aphasic, Mrs Müller has managed to retain and memorize the greatest number of mono- and bi-syllabic as well as compound words even though the latter delineate certain disturbances. This has had an effect on the scores of the evaluating scale, that were achieved in the exercises (Tab.46, 47 & 48/ Exer.16, 17 & 18), and the number of trials and errors that were submitted during the administration of therapy.

The Wernicke's aphasic, Mr Fimm got an acceptable score in the three exercises of table 49, 50 and 51 because of the occurrence of phonemic and morphemic omissions and substitutions in certain tasks of the exercises, he was trained in. It is no surprise that the results of the three exercises, as far as the correct points of the evaluating scale are concerned, are just above the average. This low score of the evaluating scale and the rise of trials and errors is to be referred to the newly introduced procedure of training in which both the naming of the deleted phonemes and the repetition of the words are combined.

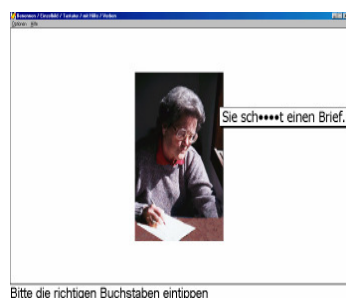
Mrs Heinrich, the anomic aphasic submitted an exceptional performance in this setting of therapy. She secured excellent results that were unfolded in table 52, 53 and 54. At this stage this can make us draw the following conclusion: the therapist's efforts and use of a computer supported aphasia therapy has in one way or another approached its target. It has managed to make the patients learn new tasks and be active in their trials so as to submit intelligible responses even though, now and then, they relapse in certain morpho-phonemic and lexical errors.

* The **seventh hour** of the fourth week of therapy should not be seen as a repetition of the tasks that were trained in the previous weeks but rather as a combination of the materials of three weeks. Although the following lexical and grammatical words, phrases, simple and complex sentences were already trained in the previous settings, the form and the method of therapy administration will be different. This restructured composition will be presented in three exercises. Exercise 19 consists of sentences that have the following syntactic structure: NP+VP/ NP+VP+NP/ NP+VP+PP/ NP+VP+Adj; exercise 20 is made up of content words with definite and indefinite articles as well as mono- and bi-syllabic words; finally, exercise 21 encompasses compound words with indefinite and definite articles and sentences which have NP+VP/ NP+VP+NP/ NP+VP+PP structures. It must be noted that training will take place without the assistance of the therapist. This time the computer will be involved in the control of the text and the tone. The three patients are involved only in the task of naming. The therapist can type in the blank, after that a whole word or sentence will be pronounced by a voice stored in LingWare. Even if the program requires from the patients "Bitte die richtigen Buchstaben eintippen", the writing modality will not be involved in this session of therapy. It will be treated in the next one. Images of this unit illustrate the form of the exercises and the way of their administration.

Broca's Aphasic

Therapy on Mo.23, February 2004

The therapist increases the difficulty of therapy administration in its form and content. The patient's speech and language areas will be stimulated by the presented visual stimuli. She receives no acoustic assistance from the therapist as it was the case in the previous therapy settings. It is a check so as to find out whether Mrs Müller has, at least, stored a particular amount of the material she has been trained in the last sessions of therapy. Some text will be submitted with the image to facilitate the access to the responses for which the patient will be looking for. In this context she has to understand the text and its image and then name the blanks that were inserted in the sentences, phrases and words. In the following exercise of table55 the patient attempts to name the verbs.



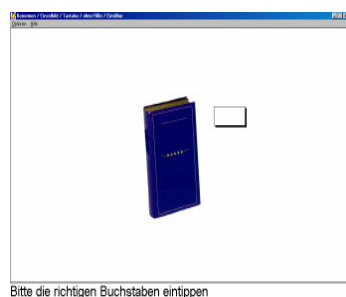
[7]

Table 55: Broca's Aphasic's Naming of verbs in sentences

Exercise 19 of LW Stimuli (Images & 'Text')	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna l.....t (lacht)	1	0<Frau.... ja Anna ----(ND)>	3			
2. Jürgen r.....t (rauchet)	1	0<Ein Mann..... ja doch Jürgen----(ND)>	3			
3. Vater k.....t (kocht)	1	0<Auch MannVater--.(ND)>	3			
4. Er sch.....t (schläft)	2	1<Ja, --Mann ...sch/ICØ/äft >		2		
5. Vater und Sohn b..... (baden)	3	2<... /{IP Mann und Kind}/ bad/{IM et}/>			1	
6. Eva k.....t sich (kämmen)	2	1<Frau...Eva kämmt {IMØ}>		2		
7. Sie sch.....t einen Brief (schreibt)	3	2<Sie schreib/{IM en}/ {IMØ} Brief >			1	
8. Er t.....t ein Bier (trinkt)	3	2<ein Bier..., {IMØ} trinkt {IMØ} Bier			1	
9. Der Junge l.....t schnell weg (läuft)	3	2<[/{IP ein Kind}/ (SF)] läuft {IMØ} weg>			1	
10. Der Hubschrauber f.....t über den See (fliegt)	3	2<.../{IMda}/ Hubschrauber....fliegt über {IMØ} See>			1	
11. Die Schülerin l.....t für das Abitur (lernt)	4	3< {IMØ} Schülerin... /{IW lernt}/ für {IMØ} Abitur>				0
12. Anna h.....t Radio (hört)	2	1<[/{IP Frau}/ (SF)] hört Radio>		2		
13. Petra g.....t die Blumen (gießt)	3	2<[/{IP Frau}/ gießt[+IVe]....Blumen, Frau gießt die...>			1	
14. Der Mann l.....t Zeitung (liest)	1	0(ND)	3			
15. Anna n.....t Bonbons (nascht)	3	2<Anna /{IWnimmt}/ /{IWSüß}/---- >		2		
16. Der Mann k.....t Beifall (klatscht)	4	3<[/{IP ein Mann, zwei}/ (SF)] klatsch /{IM en}/ {IMØ}>				0
17. Die Frau g.....t einkaufen (geht)	3	2<[/{IP ein Frau}/ (SF)] geht....geht {IWØ} [+ei..Tasche]>			1	
18. Robert f.....t (friert)	2	1<[/{IP Mann}/ (SF)]... [+steht].... friert [+da]. ..>		2		

19. Peter s.....t die Tür (schließt)	3	2<[/({ IP Junge})/({ SF)...] sch/1 CØ /ießt Tür, d—die Tür>			1	
20. Jan b.....t eine Wurst (brät)	3	2 {+ IS Mann mach...Feuer} brat/({ IM en)/eine Wurst >			1	
Sum of Trials, Errors & Evaluating Scale	50	30			30	

In exercise 20 of table 56 the patient will be confronted with images that must be responded to with mono-syllabic words. It is an exercise of naming single words. She can even submit the text of the words in individual phonemes. The patient is provided only with an image without any textual or acoustic assistance.

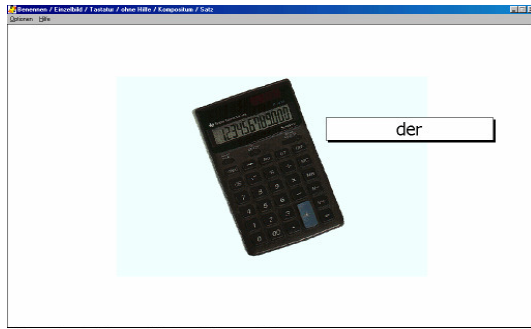


[7]

Table 56: Broca's Aphasic's Naming of mono- and bi-syllabic words

Exercise 20 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Uhr)	1	0(ND)	3			
3.(Tee)	3	2<[Tasse(SS), Kaffee(SS)>]			1	
4.(Kuh)	2	1<[Tier (SS)]	3			
5.(Bier)	1	0(ND)		2		
6.(Bett)	1	0(ND)	3			
7.(Buch)	1	0(ND)	3			
8.(Mehl)	2	1<Zucker(SS)>		2		
9.(Fisch)	2	1<Fis/1 Ck />		2		
10.(Topf)	3	2<[Teller(SS)], (pause)...[Glas (SS)>			1	
11.(Wirt)	3	2<[/({ IP ei..Mann})/ (SF)], /1 CV /irt>			1	
12.(Schirm)	2	1<Sch/1 Ve /rm>		2		
13.(Brot)	1	0(ND)	3			
14.(Stuhl)	1	0(ND)	3			
15.(Fleisch)	1	0(ND)	3			
16.(Schränk)	2	1<Sch---sch/1 CØ /ank, >		2		
17.(Zelt)	2	1<1 CS /elt>		2		
18.(Pferd)	2	1<1 CØ /ferd,>		2		
19.(Strumpf)	3	2<[/({ IMS ocken}) (SF)] [+auch]St/1 CØ /umpf >			1	
20.(Hose)	1	0(ND)	3			
Sum of Trials, Errors & Evaluating Scale	35	15			45	

In the following exercise of table 57 the patient will be trained in the naming of compound words, lexical words of the phrases, verbs and content words of the sentences. The tone assistance, which was assumed by the therapist in the first and second week of training, will not be provided.



Bitte die richtigen Buchstaben eintippen

[2]

Table 57: Broca's Aphasic's Naming of compound words, adjectives and verbs

Exercise 21 of LW Stimuli (Images & Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.....(Aktenordner)	2	1< {1MØ} ordner>		2		
2.der(Taschenrechner)	2	1< der Tasche/1CØ/rechner>		2		
3.die(Bohrmaschine)	2	1<die Bohrer {1MØ}>		2		
4.der(Rasierapparat)	2	1<der Rasier{1MØ}>		2		
5.die(Kaffeemaschine)	2	1<die Kaffee{1MØ}---(pause)trinken,.... maschin /1VØ/			1	
6.der(Tischtennisschläger)	3	2<der {1MØ}Schläger ,Tischtennis{1MØ}>			1	
7.ein Kreis (weißer)	2	1<ein {1MØ} Kreis>		2		
8.ein Viereck (grünes)	2	1<{1MØ} grünes Viereck>		2		
9.ein Viereck (rotes)	1	0(ND)	3			
10.ein Kreis (blauer)	2	1<ein blaue/1Cs/ [+nie] blauer Kreis>		2		
11.ein..... Viereck (gelbes)	1	0(ND)	3			
12.ein Kreis (schwarzer)	2	1<[+de...]Schwarze,{1MØ}schwarzer Kreis>		2		
13.Der Mann (läuft)	1	0(ND)	3			
14.Der..... fliegt (Hubschrauber)	2	1<{1MØ} Hubsch/1CØ/auber fliegt>			1	
15.Die Frau(telefoniert)	1	0(ND)	3			
16.Der Junge ein Buch (liest)	3	2<{1MØ}Junge liest /{1Mdas}/ Buch>			1	
17.Die Omaeinen (schreibt)/ (Brief)	2	1<Die [/{1P Frau}/ (SF)] schreibt ein{1MØ} Brief>			1	
18.Der Mann ein (trinkt) /(Bier)	3	2<der Mann trinkt{+1Met} {1MØ}Bier >			1	
19.Das Mädchen..... zu seiner(läuft) / (Mutter)	2	1<[{1P ein Kind}(SF)] läuft zur {1MØ} Mutter>		2		
20.Der Junge s.....t Trompete (spielt)	4	3<der Junge spiel{1MØ} T/1CØ/ompet /1VØ/>				0
Sum of Trials Errors & Evaluating Scale	41	21	39			

Wernicke's Aphasic

Therapy on Mo. 23, February 2004

As far as the sentences of exercise19 in table58 are concerned the Wernicke's aphasic is expected to name the verbs of the sentences that describe the images. In this exercise the patient gets no tone assistance. Images and their texts are presented by LingWare.



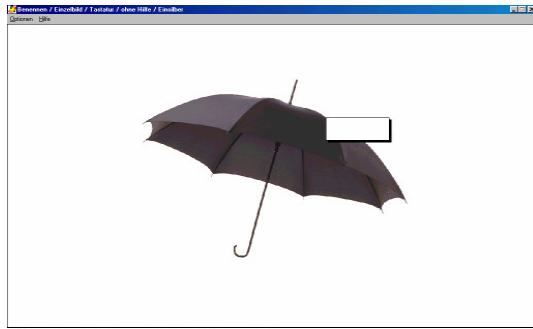
Bitte die richtigen Buchstaben eintippen

[20]

Table 58: Wernicke's Aphasic's Naming of verbs in sentences

Exercise 19 of LW Stimuli (Images & Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna l.....t (lacht)	1	0(ND)	3			
2. Jürgen r.....t (rauchet)	1	0(ND)	3			
3. Vater k.....t (kocht)	1	0(ND)	3			
4. Er sch.....t (schläft)	2	1<[+. Mann is.. müde],[im Bett(SF)],{1MØ} schläft>		2		
5. Vater und Sohn b.....t (baden)	2	1<[+Ein,zwei sind im Bad]/{1P Sie}/ baden>		2		
6. Eva k.....t sich (kämmen)	4	3<Wer? denn, /{1Mfrau}/ /{1Wwäscht}/ {1MØ} [+die Haare]>				0
7. Sie sch.....t einen Brief (schreibt)	2	1<[+Schreibt,ok] Sie schreibt {1Mden} Brief>		2		
8. Er t.....t ein Bier (trinkt)	3	2<[+ein Glasbier, ja wohl], {1MØ} trinkt /{1M das}/ Bier>			1	
9. Der Junge l.....t schnell weg (läuft)	3	2<{1MØ} Junge [+geht durch Wald]..läuft {1MØ} weg..>			1	
10. Der Hubschrauber f.....t über den See (fliegt)	2	1<[+schwer], Hub—schrauber, es /2CØ/tiegt {1PØ}>			1	
11. Die Schülerin l.....t für das Abitur (lernt)	3	2</{1M eine}/ Schülerin... [+hat Prüfung und] lernt{1PØ}>			1	
12. Anna h.....t Radio (hört)	2	1</{1Mdie}/[+ja], hört Radio, [+Musik]...>		2		
13. Petra g.....t die Blumen (gießt)	3	2<Blumen, /{1M eine Frau}/ {1M fegt} die Blu.....>			1	
14. Der Mann l.....t Zeitung (liest)	3	2<[+Zeitung, lesen..] {1MØ} Mann {1M blest} Zeit—ung>			1	
15. Anna n.....t Bonbons (nascht)	4	3<[+essen ja..] /{1Wfrau}/ nasch{*1Ment} diese {1MØ}>				0
16. Der Mann k.....t Beifall (klatscht)	3	2</{1M er}(SF)/ klatscht {1MØ}>			1	
17. Die Frau g.....t einkaufen (geht)	2	1<Die Frau [+kommt, ja], geh{1MØ} [+vom auch..] einkaufen>		2		
18. Robert f.....t (friert)	3	2</{1M er}/, [+da nicht im Haus], [ihm ist kalt(SF)]>			1	
19. Peter s.....t die Tür (schließt)	2	1</{1Mer}/ [+läuft zieht das...], [+schließt..] schließt dieTür>		2		
20. Jan b.....t eine Wurst (brät)	4	3</{1M Mann}/ [+und Feuer, brill...] /{1Wgrillt}/ {1MØ}Wurst>				0
Sum of Trials, Errors & Evaluating Scale	49	29	31			

In the exercise below of table59 the Wernicke's aphasic has to name the images with mono-bi-syllabic words. Tone and text assistance are not provided. In the previous sessions of therapy the patient was somehow acquainted with the form and the content of these tasks.



Bitte die richtigen Buchstaben eintippen

[12]

Table 59: Wernicke's Aphasic's naming of mono- and bi-syllabic words

Exercise 20 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Uhr)	1	0(ND)	3			
3.(Tee)	1	0(ND)	3			
4.(Kuh)	1	0(ND)	3			
5.(Bier)	2	1< [Glasbier(SF)]>		2		
6.(Bett)	1	0(ND)		2		
7.(Buch)	2	1<[+große] [Roman(SS)]>	3			
8.(Mehl)	2	1<[Pulver(SS)] >		2		
9.(Fisch)	1	0(ND)	3			
10.(Topf)	3	2<[töpfen(SS)], [Vase—n(SF)]>			1	
11.(Wirt)	3	2<[Mann am ThekeSS],.Kne..Wer[+ICf]t>			1	
12.(Schirm)	1	0(ND)	3			
13.(Brot)	1	0(ND)	3			
14.(Stuhl)	3	2<[.Sessel(SF)] St/IVü/hl			1	
15.(Fleisch)	2	1<FI/IVa/sch>		2		
16.(Schrank)	1	0(ND)	3			
17.(Zelt)	2	1<weiß ich, Ze/IVØ/t>		2		
18.(Pferd)	3	2<[Schönes Tier(SS)] [+im.....] (pause).. {*1M Pfen}>			1	
19.(Strumpf)	2	1< Str[+IVICer]umpf>		2		
20.(Hose)	2	1<[+kein Strumpf]...[+eine, zwei,--se], ... Hose{+1M n}>		2		
Sum of Trials, Errors & Evaluating Scale	35	15	45			

In exercise21 of table60, which is somehow similar to exercise19 of table58, the patient is required to name the images of the compound words, lexical words of the phrases, verbs and content words of the sentences



Bitte die richtigen Buchstaben eintippen

[13]

Table 60: Wernicke's Aphasic's Naming of compound words, adjectives and verbs

Exercise 21 of LW Stimuli (Images & Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.....(Aktendner)	1	0(ND)	3			
2.der(Taschenrechner)	2	1<[gut zum rechnen(SS), [+klein]{1MØ} Rechner>		2		
3.die(Bohrmaschine)	2	1[+das da...][{1MØ}maschine(SS)]		2		
4.der(Rasierapparat)	2	1[+auch gleich..] [+nein] [Rasierer {1MØ}(SF)]		2		
5.die(Kaffeemaschine)	3	2< [Kaffee {1MØ}(SS)]...., eine [{1MØ} Maschine(SS)]>			1	
6.der(Tischtennisschläger)	2	1<[für Tennis(SS)..,{1MØ}Tennisschläger>		2		
7.ein Kreis (weißer)	2	1<{1MØ}weißer Kreis>		2		
8.ein Viereck (grünes)	3	2<[+kein Kreis] {1MØ}{1MØ}Viereck			1	
9.ein Viereck (rotes)	2	1<ein rotes {1MØ}Eck>		2		
10.ein Kreis (blauer)	2	1<ein {1MØ}Kreis>		2		
11.ein..... Viereck (gelbes)	2	1<ein gelbes Vier/{1Mer}/>		2		
12.ein Kreis (schwarzer)	2	1<[+Wieder...]ein.....schwarzer...[+das...]/ICG/leis>		2		
13.Der Mann (läuft)	1	0(ND)	3			
14.Der..... fliegt (Hubschrauber)	3	2< Der Hub{1MØ}.../{1Mflieger}/ fliegt>			1	
15.Die Frau(telefoniert)	1	0(ND)	3			
16.Der Junge ein Buch (liest)	3	2<Der Junge—[+am besten] /{1M lernt}/ /{1M im}/ Buch>			1	
17.Die Omaeinen (schreibt)/ (Brief)	3	2<Oma schreibt /{1M etwas}/, einen {*1M Briecht}>			1	
18.Der Mann ein (trinkt) /(Bier)	3	2Der Mann trin/ICf/t ein /{1M Glass}/			1	
19.Das Mädchen..... zu seiner(läuft) / (Mutter)	3	2<Das Mädchen /ICw/äuft zu {1MØ} Mutter>			1	
20.Der Junge s.....t Trompete (spielt)	2	1<Der Junge [+hat.....] spie/ICØ/ t/ICØ/ ompete>			1	
Sum of Trials, Errors & Evaluating Scale	41	21				39

Anomic Aphasic

Therapy on Tu. 24, February 2004

During the administration of training in exercise 19 of table 61 Mrs Heinrich, who has been acquainted with these tasks in the previous exercises, will be assisted by the submission of the images and some parts of the texts. They are visual cues that can stimulate her linguistic capability. In this exercise her task is to name a verb in a sentence. The following window presents the form and the content of the tasks.



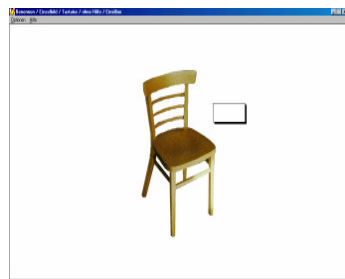
Bitte die richtigen Buchstaben eintippen

[18]

Table 61: Anomic Aphasic's Naming of verbs in sentences

Exercise 19 of LW Stimuli (Images & Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Anna l.....t (lacht)	1	0(ND)	3			
2. Jürgen r.....t (raucht)	1	0(ND)	3			
3. Vater k.....t (kocht)	1	0<Mann ...Vater kocht (ND)>	3			
4. Er sch.....t (schläft)	1	0<Er [+legt im Bett, und] schläft(ND)>	3			
5. Vater und Sohn b.....t (baden)	1	0<Die baden, Vater und Sohn(ND)>	3			
6. Eva k.....t sich (kämmen)	2	1<Eva k/IVo/mmt sich [+die Haare]>		2		
7. Sie sch.....t einen Brief (schreibt)	1	0(ND)	3			
8. Er t.....t ein Bier (trinkt)	2	1<Er t... (pause) /{1W nimmt ein}/ Bier>		2		
9. Der Junge l.....t schnell weg (läuft)	1	0(ND)	3			
10. Der Hubschrauber f.....t über den See (fliegt)	2	1<Der Hubschrauber /{1Wfliebt}/ nein...fliegt über den See		2		
11. Die Schülerin l.....t für das Abitur (lernt)	2	1<Die Schülerin /{1Wliest}/ für das Abitur>		2		
12. Anna h.....t Radio (hört)	2	1<Anna /{1W hat} / [+das] Radio		2		
13. Petra g.....t die Blumen (gießt)	2	1<Petra /{1W gibt}/ die Blumen>		2		
14. Der Mann l.....t Zeitung (liest)	1	0(ND)		2		
15. Anna n.....t Bonbons (nascht)	2	1<Anna /{1Wnimmt}/ Bonbons>		2		
16. Der Mann k.....t Beifall (klatscht)	2	1<Der Mann [+lacht], er klatscht Beifall(ND)>	3			
17. Die Frau g.....t einkaufen (geht)	1	0(ND)	3			
18. Robert f.....t (friert)	2	1<Robert /{1Wfeiert}/>		2		
19. Peter s.....t die Tür (schließt)	2	1<Peter /{1Wsteht}/ [+]ach ja schließt die Tür>		2		
20. Jan b.....ring...t eine Wurst (brät)	2	1<Jan /{1W bringt}/ eine Wurst>		2		
Sum of Trials, Errors & Evaluating Scale	31	11	49			

The anomic aphasic has also to name the mono-syllabic words, whose texts are not submitted with the images. In this therapy session the patient is controlled by the procedures that were programmed in LingWare and presented in exercise20 of table62. The therapist has only a guiding role in this session; he intervenes to slow or speed the therapy processes.



[14]

Table 62: Anomic Aphasic's Naming of mono- and bi-syllabic words

Exercise 20 of LW Stimuli (Images)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Eis)	1	0(ND)	3			
2.(Uhr)	1	0(ND)	3			
3.(Tee)	1	0(ND)	3			
4.(Kuh)	1	0(ND)	3			
5.(Bier)	1	0(ND)	3			
6.(Bett)	1	0(ND)	3			
7.(Buch)	1	0(ND)	3			
8.(Mehl)	2	1<[...um Kuchen zu backen...(SS)]>		2		
9.(Fisch)	1	0(ND)	3			
10.(Topf)	3	2<[eine Vase(SF)],[..gut zum kochen(SS)]>			1	
11.(Wirt)	1	0<das ist ein Wirt>	3			
12.(Schirm)	1	0(ND)	3			
13.(Brot)	1	0(ND)	3			
14.(Stuhl)	1	0(ND)	3			
15.(Fleisch)	2	1<[Das Stück kann man braten..(SS)] >		2		
16.(Schrank)	1	0(ND)	3			

17.(Zelt)	2	1<[...habe ein im Campingplatz(SS)...] >	2		
18.(Pferd)	2	1<[ein großes Tier...(SS)]>	2		
19.(Strumpf)	1	0(ND)	3		
20.(Hose)	1	0(ND)	3		
Sum of Trials, Errors & Evaluating Scale	26	6	54		

In exercise 21 of table 63 the anomic aphasic, Mrs Heinrich will be trained in the compound words, lexical words of the phrases, verbs and content words of the sentences. The therapist deals with her in the same he did with the Broca's and Wernicke's aphasic; she is required to name the verbs in the sentences and the lexical words in and without contexts.



Bitte die richtigen Buchstaben eintippen

[16]

Table 63: Anomic Aphasic's Naming of compound words, adjectives and verbs

Exercise 21 of LW Stimuli (Images & Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.(Aktendordner)	1	0(ND)	3			
2.der(Taschenrechner)	1	0<(pause),[+weiß ich]der Taschenrechner>	3			
3.die(Bohrmaschine)	2	1<die ... das Werkzeug zum Bohren(SF)]>		2		
4.der(Rasierapparat)	2	1<der Rasierer{1MØ}>		2		
5.die(Kaffeemaschine)	1	0(ND)	3			
6.der(Tischtennisschläger)	2	1<der [+ist schwer]..., Tischtennis{1MØ}>		2		
7.ein Kreis (weißer)	1	0<ein weißer,.....(pause)... Kreis(ND)>		2		
8.ein Viereck (grünes)	2	1<ein grüne/ICr/,...[+Vierer], Viereck>		2		
9.ein Viereck (rotes)	1	0(ND)	3			
10.ein Kreis (blauer)	1	0(ND)	3			
11.ein..... Viereck (gelbes)	1	0(ND)	3			
12.ein Kreis (schwarzer)	1	0(ND)	3			
13.Der Mann (läuft)	2	1<Der Mann /{1 P joggt}/>		2		
14.Der..... fliegt (Hubschrauber)	2	1<Der [+ hoch runter]... Flieger(SF) fliegt>		2		
15.Die Frau(telefoniert)	2	1<Die Frau /{1P ruft an}/>		2		
16.Der Junge ein Buch (liest)	1	0(ND)	3			
17.Die Omaeinen (schreibt)/ (Brief)	3	2<Die Oma /{1W liest}/ einen /{1W Text}/ [+vom Blatt]>			1	
18.Der Mann ein (trinkt) /(Bier)	2	1<Der Mann trinkt ein [Glasbier(SF)]>		2		
19.Das Mädchen..... zu seiner(läuft)/ (Mutter)	2	1<Das Mädchen /{1Wgeht}/ zu seiner Mutter>		2		
20.Der Junge s.....t Trompete (spielt)	1	0(ND)	3			
Sum of Trials, Errors & Evaluating Scale	31	11	49			

Commentary on the 7th Hour

From the sessions of the seventh hour, in which the method of naming was used to train the Broca's, Wernicke's and anomic aphasics without any tone assistance, important deductions can be drawn from their language and linguistic abilities.

From the responses of the Broca's aphasic we infer that elisions and substitutions occurred in the function words and the inflexions, as well as in the lexical words, that are presented as individual words or in sentences, from which whole morphemes or individual phonemes were left out or substituted. The evaluating scales of exercise19 of table55 and exercise21 of table57 have just gone beyond the average due to the complex structures and contents of the tasks.

In the responses of the Wernicke's aphasic we have more additions, semantic and neologistic paraphrases at the word and sentence levels as well as morphophonemic deletions and substitutions in the grammatical and, mainly, in the lexical category. The results of the Wernicke's aphasic's evaluating scale do not differ largely from those of the Broca's aphasic. This can be seen in table58 of exercise19 and table60 of exercise21.

The anomic aphasic's responses unfold the paraphrases of the lexical words and the substitution of an entire word or phrase. There are very few and in many tasks almost no morpho-phonemic elisions or substitutions. Consequently, her performance in these exercises of therapy made her evaluating scale higher than that of the Broca's and Wernicke's aphasics. Despite the fact that she obtained good general results her speech and language still carries traces of disturbances.

All in all, the therapeutic method of training, through which the patients' naming ability was treated, without any tone assistance, decreased somehow the evaluating scale, especially that of the Broca's and the Wernicke's aphasics, but it unfolded many aspects and characteristics about the three patients' language and linguistic capacities. This is an observation that should be taken into account and used as a basis that should serve in the structuring of training in the next sessions of therapy.

* In the **eighth hour** of the fourth week treatment will be oriented to the patients' typing ability through exercise22, 23 and 24. At this stage the patients are not required to write complete phrases and sentences. The demand made on them is to complete the omitted phonemes and morphemes of the content words. In exercise22 and 23 the patients have to complete the words by typing in mono-, bi-syllabic and compound words. In exercise24, which consists of sentences, they have to type lexical words in the blanks. The program, LingWare checks the input of the patients and provides positive or negative outputs to the responses.

Broca's Aphasic

Therapy on Wed. 25, February 2004

During the administration of the Broca's aphasic's treatment in exercise22 of table64 she is shown only one image each time. The text is neither submitted by the therapist nor by the therapy program, LingWare. The therapist dictates a word two times with almost a period of 10 seconds between each dictation. The dictation may be carried out by LingWare. The task of the patient is to type in the blank to formulate a lexical word. This procedure will be followed, to some extent, in exercise22, 23 and 24.



Bitte die richtigen Buchstaben eintippen

[7]

Table 64: Broca's Aphasic's Typing of mono- and bi-syllabic words

Exercise 22 of LW Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.....(Eis)	1	0(ND)	3			
2.....(Mehl)	1	1<Me/1CØ/l>		2		
3.....(Reis)	1	0(ND)	3			
4.....(Nudeln)	2	1<Nudel[+1V e]n>		2		
5.....(Fisch)	1	1<Fis/1CØ/h>		2		
6.....(Fleisch)	2	1<Fleis/1CØ/h>		2		
7.....(Brot)	1	0(ND)	3			
8.....(Butter)	2	1<Butt/1VØ/r>		2		
9.....(Käse)	1	1<Kä/1Cz/e>	3			
10.....(Kuchen)	3	2<Ku/1Ck//1VØ/n>			1	
11.....(Obst)	1	0(ND)	3			
12.....(Apfel)	2	1<Apf/1Va/l>		2		
13.....(Birne)	3	2<Bi/1CØ/n/1Va/>		2		
14.....(Kirschen)	3	2<Kirs/1CØ/h/1VØ/n>			1	
15.....(Trauben)	3	2<Tra/1VØ/b/1VØ/n>			1	
16.....(Zucker)	3	2/1CTs/u/1CØ/ker			1	
17.....(Kekse)	2	1<Ke/1CØ/se>		2		
18.....(Brötchen)	3	2<Bröts/1CØ/h/1VØ/n>			1	
19.....(Brezel)	3	2<Bre/ 1C ts//1VØ/l l>			1	
20.....(Bohnen)	2	1<Bo/1CØ/nen>		2		
Sum of Trials, Errors & Evaluating Scale	42	22	38			

In the next exercise of table65 the infinite articles and the images of the objects are provided. The patient has to type in the blanks the lexical words of the objects. The therapist dictates

each word two times. LingWare gives the patient a feed-back in which she is told whether her response is true or false.



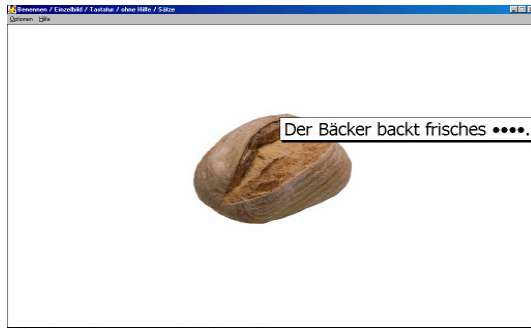
Bitte die richtigen Buchstaben eintippen

[10]

Table 65: Broca's Aphasic's Typing of bi-syllabic and compound words

Exercise 23 of LW Stimuli (Images & 'Text' and Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein.....(Auto)	1	0(ND)	3			
2.eine.....(Affe)	3	2<Af/1CØ//1Va/>			1	
3.eine.....(Ente)	2	1<Ent/1VØ/>		2		
4.eine.....(Hose)	3	2<Hos/1VØ/[+1Cr]>			1	
5.ein.....(Stück Seife)	3	2</1CSh/tück /1CZ/eife>			1	
6.ein.....(Apfel)	2	1<Apf/1VØ/l/>		2		
7.ein.....(Mantel)	1	0(ND)	3			
8.ein.....(Gürtel)	2	1<Gürt/1CØ/l/>		2		
9.eine.....(Schnalle)	3	2<Schnal/1CØ//1Va/>			1	
10.eine.....(Krone)	1	0(ND)	3			
11.eine.....(Bluse)	2	1<Blu/1Cz/e>		2		
12.ein.....(Brötchen)	2	1<Bröt/1Cs/hen>		2		
13.ein.....(Traktor)	1	0(ND)	3			
14.ein.....(Stempel)	3	2</1CSht/emp/1CØ/l/>			1	
15.ein.....(Flugzeug)	4	3<Flu/1Ckz/1VØ/lu/1Ck/>				0
16.ein.....(Bleistift)	3	2<Blei/1Csh/t/1Ce/ft>			1	
17.ein.....(Kühlschrank)	4	3<Kü/1CØ/lS//1CØhran/1Cg/>				0
18.ein.....(Hubschrauber)	3	2<Hubschra/1VØ/br[1Ve]>			1	
19.ein.....(Blumenkohl)	2	1<Blumenko/1CØ/l/>		2		
20.ein.....(Aktenordner)	3	2<Aktenorde[1Cn]r,...ordn/1VØ/r>			1	
Sum of Trials, Errors & Evaluating Scale	48	28	32			

In exercise24 of table66 the images and the sentences, in which the lexical word of the object must be inserted, are submitted by LingWare. The task of the patient in this hour of training is to type the deleted lexical word of the object in the sentence. The therapist dictates two times a whole sentence without leaving out the word to be typed.



Bitte die richtigen Buchstaben eintippen

[3]

Table 66: Broca's Aphasic's Typing of lexical words in the sentences

Exercise 24 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Wirt zapft ein (Bier)	1	0(ND)	3			
2. Ich esse Kassler mit dicken (Bohnen)	2	1<Ich esse Kassler mit dicken Bo/1CØ/nen>		2		
3. Der Bäcker backt frisches (Brot)	1	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	2	1<Eier esse ich mit Pfeffer und Sal[+1C t]z>		2		
5. Im Sommer schlecke ich gerne (Eis)	1	0(ND)	3			
6. Der Angler fängt einen (Fisch)	2	1<Der Angler fängt einen fis/1CØ/h>		2		
7. Das Baby trinkt aus der..... (Flasche)	3	2<Das Baby trinkt aus der Flas/1CØ/h/1Va/>			1	
8. Ich trinke Saft aus dem (Glas)	1	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	3	2<Ich trinke lieber Tee als Ka/1CØ/fe/1CØ/>			1	
10. Nachmittags gibt es Kaffee und (Kuchen)	2	1<Nachmittags gibt es Kaffee und Ku/1Cg/en>		2		
11. Suppe esse ich mit dem (Löffel)	3	2<Suppe esse ich mit dem L/1Vü//1CØ/fel>			1	
12. Ich schneide das Brot mit dem (Messer)	3	2<Ich schneide das Brot mit dem Mes/1VØ/e/1CØ/>			1	
13. Kaffee schmeckt mit Zucker und (Milch)	3	2<Kaffee schmeckt mit Zucker M/1Ve/l/1Cs/h >			1	
14. Aus Apfelsinen presse ich frischen (Saft)	1	0(ND)	3			
15. Im Glas perlt der (Wein)	2	1<Im Glas perlt der We/1VØ/n>		2		
16. Ich esse eine Wurst mit (Senf)	3	2<Ich esse eine Wurst mit /1CZ/en/1Cv/>			1	
17. Ich trinke Kaffee aus der..... (Tasse)	2	1<Ich trinke Kaffee aus der Tas/1CØ/e>		2		
18. Anna trinkt schwarz..... (Tee)	1	0(ND)	3			
19. Ich esse die Suppe vom (Teller)	3	2<Ich esse die Suppe vom Te/1CØ/le/1CØ/>			1	
20. Die Suppe kocht im (Topf)	2	1<Die Suppe kocht im Tof[1Cp]>		2		
Sum of Trials, Errors & Evaluating Scale	41	21	39			

Wernicke's Aphasic

Therapy on Wed. 25, February 2004

In this setting Mr Fimm's treatment will be carried out by the therapist with the same method with which Mrs Müller, the Broca's aphasic has been trained. The exercises of table 67, 68 and 69 will have the same form and content as the previous ones with which the previous patient has been confronted. The images of the tasks are presented, to some extent, without any text. The therapist dictates the text and the patient has to visualize the image and type the content word that refers to it.



Table 67: Wernicke's Aphasic's Typing of mono- and bi-syllabic words

Exercise 22 of LW Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.....(Eis)	1	0(ND)	3			
2.....(Mehl)	3	2<Mh[1Ve]]>			1	
3.....(Reis)	2	1<Re/1VØ/s>		2		
4.....(Nudeln)	2	1<[Nudel[+1Ce]n>		2		
5.....(Fisch)	3	2<Fis/1CØ/h[+1Ck]>			1	
6.....(Fleisch)	3	2<Fl/1VØ/is/1CØ/h>			1	
7.....(Brot)	1	0(ND)	3			
8.....(Butter)	3	2<But/1CØ//1VØ/r>			1	
9.....(Käse)	2	1<Kä/1Ctz/e>		2		
10.....(Kuchen)	3	2<Ku/1Ckh//1CØ/n>			1	
11.....(Obst)	3	1<Obst[+1Cn]>		2		
12.....(Apfel)	3	1<Apf[+1Cl]el		2		
13.....(Birne)	3	2<Bi[+1Cl]ne[1Cr]>			1	
14.....(Kirsche)	3	2<Kirs/1CØ/hen[+1Ce]>			1	
15.....(Trauben)	3	2<Trau/1Cm//1VØ/n>			1	
16.....(Zucker)	3	2<Zu/1CØ/k/1VØ/r			1	
17.....(Kekse)	2	1Kek/1Ctz/e		2		
18.....(Brötchen)	4	3<Bröt[+1Cs]/1CØ/[+1Ck]en>				0
19.....(Brezel)	3	2<Bre/1Cts//1VØ/l>			1	
20.....(Bohnen)	3	2<Bo/1CØ/n[+1Ct]en>			1	
Sum of Trials, Errors & Evaluating Scale	51	31	29			

The tasks of exercise23 of table68 are presented with images that are accompanied with an infinite article. Their lexical words are composed of bi-syllabic and compound words. The therapist dictates each word two times, thereupon the Wernicke's aphasic has to type it. LingWare provides him with a feed-back that confirms whether the response is true or false.



Table 68: Wernicke's Aphasic's Typing of bi-syllabic and compound words

Exercise 23 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.ein.....(Auto)	2	1<Aut/1Vu/>		2		
2.eine.....(Affe)	3	2<Af/1CØ/e[+1Cr]>			1	
3.eine.....(Ente)	2	1<Ente[+1Cn]		2		

4.eine.....(Hose)	3	2<Ho/1Cz//1Vv/>			1	
5.ein.....(Stück Seife)	4	3<{*1M shtik} /1CØ/[+2CKn]eife				0
6.ein.....(Apfel)	3	2<Ap[+1Cf]f[1Ce]>			1	
7.ein.....(Mantel)	2	1<Mant/1Va/l>		2		
8.ein.....(Gürtel)	4	3</1Ck/ürt/1VØ/l[+1Cr]>				0
9.eine.....(Schnalle)	3	2<S/1CØ/hnal/1CØ/e>			1	
10.eine.....(Krone)	3	2<Kro/1Cm/e[+1Cl]>			1	
11.eine.....(Bluse)	3	2<Blu/1Cz/e[+1Cr]			1	
12.ein.....(Brötchen)	3	2<Bröt/1Cs/en[+1V1Cen]>			1	
13.ein.....(Traktor)	3	2<Trak[+1Cd]t/1Vu/r			1	
14.ein.....(Stempel)	3	2<Stemp[+1Cf][1Ce]>			1	
15.ein.....(Flugzeug)	4	3<{*1Mdug}1M {*1M z/1VØ/ug}				0
16.ein.....(Bleistift)	3	2<Bleist/1Ve//1Cv/t>			1	
17.ein.....(Kühlschrank)	4	3<Ku/1CØ/l/1CØ/chran/1Cg/>				0
18.ein.....(Hubschrauber)	3	2<Hubschrau/1Cp/r[1Ve]>			1	
19.ein.....(Blumenkohl)	3	2<Blumenk/1Cu/l[+1Ve]>			1	
20.ein.....(Aktendordner)	3	2<Aktendorder[1Cn][+1V1Cer]>			1	
Sum of Trials, Errors & Evaluating Scale	61	41			19	

In the next exercise of table 69 the patient has to type the lexical words in the blanks of the sentences. The therapist dictates a complete sentence two times; even the word that must be filled in the blank is pronounced. In this context the patient responds with the typing of the content word in the sentence blank.



[6]

Table 69: Wernicke's Aphasic's Typing of content words in the sentences

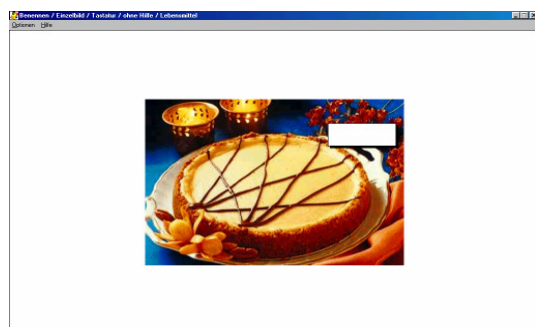
Exercise 24 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Wirt zapft ein (Bier)	2	1<Der Wirt zapft ein B/1CØ/er>		2		
2. Ich esse Kassler mit dicken (Bohnen)	3	2<Ich esse Kassler mit dicken Bo/1CØ/hen{+1M en}			1	
3. Der Bäcker backt frisches (Brot)	2	1<Der Bäcker backt frisches /1CV/rot>		2		
4.Eier esse ich mit Pfeffer und (Salz)	3	2< Eier essen ich mit Pfeffer und Sa/1Ct//1Cs/>			1	
5. Im Sommer schlecke ich gerne (Eis)	2	1<Im Sommer schlecke ich gerne /1VA/is>		2		
6. Der Angler fängt einen (Fisch)	3	2<Der Angler fängt einen Fis/1CØ/h>			1	
7. Das Baby trinkt aus der..... (Flasche)	3	2<Das Baby trinkt aus der Flac[1Cs]h /1VØ/>			1	
8. Ich trinke Saft aus dem (Glas)	2	1<Ich trinke Saft aus dem Gls[1Va]>		2		
9. Ich trinke lieber Tee als (Kaffee)	3	2<ich trinke lieber Tee als Kaf/1CØ/e/1VØ >			1	
10. Nachmittags gibt es Kaffee und (Kuchen)	3	2<Nachmittags gibt es Kaffee und Ku /1CØ/h[+1Cf]en>			1	
11. Suppe esse ich mit dem (Löffel)	3	2<Suppe esse ich mit dem Löff/1CØ/el [+1Cm]>			1	
12. Ich schneide das Brot mit dem (Messer)	3	2<Ich schneide das Brot mit Mes/1CØ/er [+1Ve]>			1	
13. Kaffee schmeckt mit Zucker und (Milch)	2	1<Kaffee schmeckt mit und Zucker und Mil/1Cs/>		2		
14. Aus Apfelsinen presse ich frischen (Saft)	3	2<Aus Apfelsinen presse frischen /1CTz/ a[+1Cn]ft>			1	
15. Im Glas perlt der (Wein)	2	1<Im Gals perlt der We/1VØ/n>		2		
16. Ich esse eine Wurst mit (Senf)	3	2<Ich esse eine Wurst mit S[+1Cz]enf[+1Ct]>			1	
17. Ich trinke Kaffee aus der..... (Tasse)	3	2<Ich trinke Kaffee aus der Ta/1C1Vxa/>			1	
18. Anna trinkt schwarz..... (Tee)	2	1<Anna trinkt schwarzen Tee[+1Cr]>		2		

19. Ich esse die Suppe vom (Teller)	3	2<ich esse die Suppe vom Tel/1CØ/r[1Ve]>			1	
20. Die Suppe kocht im (Topf)	3	2<Die Suppe kocht im To/2Cnv/>			1	
Sum of Trials, Errors & Evaluating Scale	53	33			27	

Anomic Aphasic

Therapy on Thu. 26, February 2004

The anomic aphasic is not to be trained otherwise in exercises of table 70, 71 and 72. She has to type individual words and lexical words that complete the sentences. The dictation to the anomic aphasic is also supported by the images. The therapist dictates a word or a sentence two times and after 10 seconds the patient should start typing the constituent that fits in the blank. The texts - as the image below of exercise 70 shows - are not displayed in the window-forms of the tasks.



Bitte die richtigen Buchstaben eintippen

[10]

Table 70: Anomic Aphasic's Typing of mono- and bi-syllabic words

Exercise 22 of LW Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.....(Eis)	1	0(ND)	3			
2.....(Mehl)	1	0(ND)	3			
3.....(Reis)	1	0(ND)	3			
4.....(Nudeln)	1	0(ND)	3			
5.....(Fisch)	1	0(ND)	3			
6.....(Fleisch)	1	0(ND)	3			
7.....(Brot)	1	0(ND)	3			
8.....(Butter)	1	0(ND)	3			
9.....(Käse)	2	1<K/1Ce/se		2		
10.....(Kuchen)	1	0(ND)	3			
11.....(Obst)	1	0(ND)				
12.....(Apfel)	1	0(ND)				
13.....(Birne)	1	1<B/1Ve/rne>		2		
14.....(Kirschen)	2	1<Ki[+1Ve]/rchen>		2		
15.....(Trauben)	1	0(ND)	3			
16.....(Zucker)	2	1<Zu/1CØ/ker>		2		
17.....(Kekse)	1	0(ND)	3			
18.....(Brötchen)	1	0(ND)	3			
19.....(Brezel)	2	1<Bre[+1Ct] zel>		2		
20.....(Bohnen)	2	1<Bo/1CØ/nen>		2		
Sum of Trials, Error & Evaluating Scale	26	6		54		

The same therapeutic training will be continued in the following table. The therapist dictates the word of a task two times with a period of 10 seconds between the dictations, after that the patient has to type it. As the image below shows the texts of the infinite articles are submitted with the images.

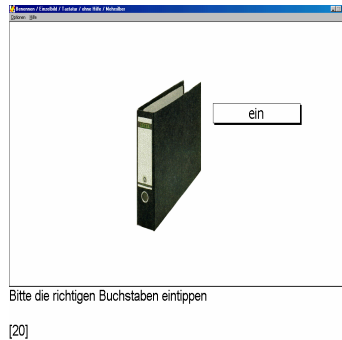


Table 71: Anomic Aphasic's Typing of bi-syllabic and compound words

Exercise 23 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Correct Tasks			
			3	2	1	0
1.ein.....(Auto)	1	0(ND)	3			
2.eine.....(Affe)	2	1<Af/1CØ/e>		2		
3.eine.....(Ente)	1	0(ND)	3			
4.eine.....(Hose)	1	0(ND)	3			
5.ein.....(Stück Seife)	1	1<Stück/*1Cs/eife		2		
6.ein.....(Apfel)	1	0(ND)	3			
7.ein.....(Mantel)	1	0(ND)		2		
8.ein.....(Gürtel)	2	1<G/1Vu//rtel>		2		
9.eine.....(Schnalle)	2	1<Schnal/1CØ/e>		2		
10.eine.....(Krone)	1	0(ND)	3			
11.eine.....(Bluse)	1	0(ND)	3			
12.ein.....(Brötchen)	2	1<Br/1Vo/tchen>		2		
13.ein.....(Traktor)	1	0(ND)	3			
14.ein.....(Stempel)	2	1<Stemp/1VØ/l>		2		
15.ein.....(Flugzeug)	2	1<Flugz/1VØ/ug>		2		
16.ein.....(Bleistift)	2	1<Blei/1Csh/tift>		2		
17.ein.....(Kühlschrank)	2	2<Kü/1CØ/l (pause).... s/1CØ/hrank>			1	
18.ein.....(Hubschrauber)	2	1<Hub.. (pause).. /1CØ/chrauber>		2		
19.ein.....(Blumenkohl)	2	1<Blumenko/1CØ/l		2		
20.ein.....(Aktendordner)	2	1<Aktendord/1CØ/er>		2		
Sum of Trials, Errors & Evaluating Scale	34	14	46			

In the sentences of table 72 the anomic aphasic, Mrs Heinrich is required to type content words in the sentences which are dictated to her by the therapist. She is assisted with the images and the sentences, from which the lexical words to be typed, are omitted. She hears a whole sentence being dictated two times with a period of 10 seconds between each dictation, and then proceeds with the typing of a lexical word that refers to the object of the image. The illustration is offered by the following window-form of LingWare.



Bitte die richtigen Buchstaben eintippen

[10]

Table 72: Anomic Aphasic's Typing of lexical words in the sentences

Exercise 24 of LW Stimuli (Images, 'Text' & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Wirt zapft ein (Bier)	1	0(ND)	3			
2. Ich esse Kassler mit dicken (Bohnen)	1	0(ND)	3			
3. Der Bäcker backt frisches (Brot)	1	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	2	1<Eier esse ich mit Brot und Sal[+1Ct]z>		2		
5. Im Sommer schlecke ich gerne (Eis)	1	0(ND)	3			
6. Der Angler fängt einen (Fisch)	2	1<Der Angler fängt einen Fis/1CØ/h>		2		
7. Das Baby trinkt aus der (Flasche)	1	0(ND)	3			
8. Ich trinke Saft aus dem (Glas)	1	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	2	1<Ich trinke lieber Tee als Kaffe/1VØ/>		2		
10. Nachmittags gibt es Kaffee und (Kuchen)	1	0(ND)	3			
11. Suppe esse ich mit dem (Löffel)	2	1<Suppe esse ich mit dem L/1V ü/ffel>		2		
12. Ich schneide das Brot mit dem (Messer)	2	1<Ich schneide das Brot mit dem Messe/1CØ/>		2		
13. Kaffee schmeckt mit Zucker und (Milch)	1	0(ND)	3			
14. Aus Apfelsinen presse ich frischen (Saft)	1	0(ND)	3			
15. Im Glas perlt der (Wein)	2	1<Im Glas perlt der W/1Va/in>		2		
16. Ich esse eine Wurst mit (Senf)	2	1<Ich esse eine Wurst mit Senf[+1Cf]>		2		
17. Ich trinke Kaffee aus der (Tasse)	1	0(ND)	3			
18. Anna trinkt schwarz (Tee)	1	0(ND)	3			
19. Ich esse die Suppe vom (Teller)	1	0(ND)	3			
20. Die Suppe kocht im (Topf)	2	1<Die Suppe kocht im /1CZ/opf>		2		
Sum of Trials, Errors & Evaluating Scale	28	8	52			

Commentary on the 8th Hour

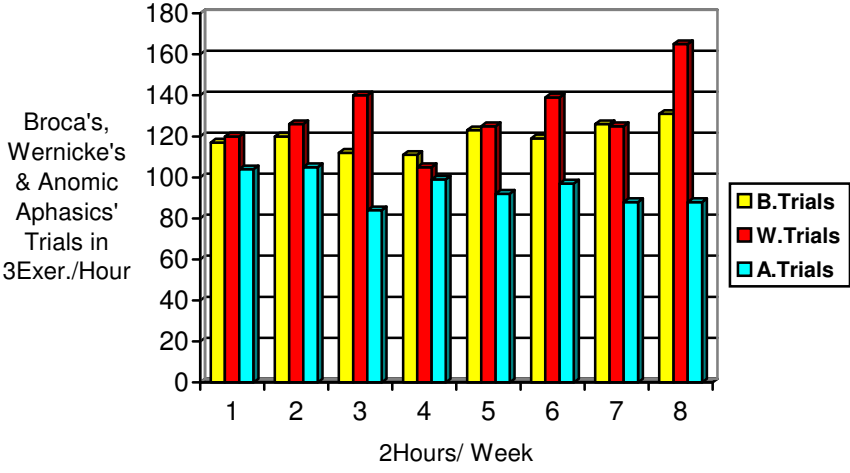
Important findings are unfolded about the writing modality in exercise 22, 23 & 24 as the typing method was introduced in this session of the eighth hour of the fourth week. The errors, which Mrs Müller made in exercise 22 of table 64 and exercise 23 of table 65 occurred mainly in positions which have a complex phonetic environment. They are specifically sounds which are written but not pronounced or have certain similar phonetic features with the other vowels or consonants. These disturbances are elisions, substitutions or additions that are not confined to a particular syllable; they occur at random. Despite the occurrence of these errors, the patient attained a reasonable score in exercises of table 64 and 65. To type a content word in a sentence is not so easy as it might be expected to be; in such a context the Broca's aphasic made many errors, exercise 24 is a case in point. Even though text and tone assistance were used, exercise 24 of table 66 depicts that there are many disturbances in the lexical words that were typed in the blanks. The errors have the same nature as those of exercise 22 and 23. What can be inferred from these observations is the fact that the writing modality of the

Broca's aphasic is still badly disturbed if we take into account that the patient was asked to try to type only words and no phrases or sentences.

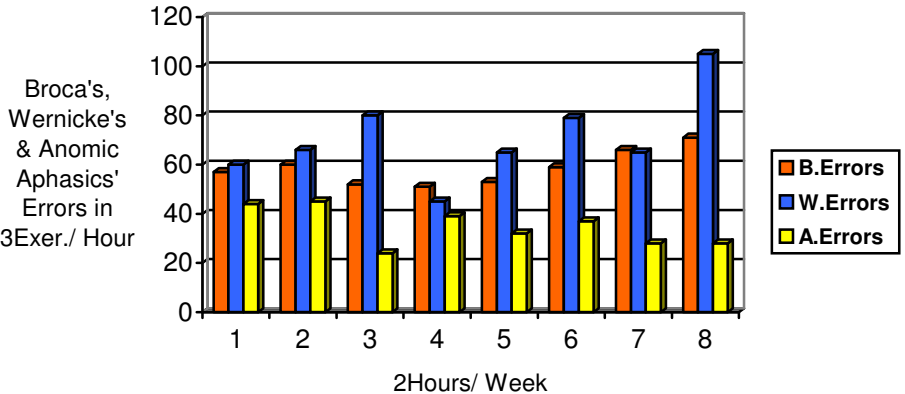
If we look at the written language of the Wernicke's aphasic, Mr Fimm, the errors he made increased constantly from one exercise to the other (Tab.67, 68 & 69). Writing mono- and bi-syllabic words as well as compound ones the patient made errors in the vowels and consonants of two-syllabic words and morphemes of the compound words. It must be noted that his responses show more additions rather than substitutions or elisions (Exer.e22 & 23/ Tab.67 & 68). In exercise24 of table 69, which consists of sentences from which only certain lexical words are deleted, the disturbances occurred both in consonants and vowels of the thoroughly typed words. Next to the additions and elisions there are neologistic paraphrases that can be seen in meaningless combinations. These disturbances made the errors increase and the results decrease dramatically. The three exercises, in which the Wernicke's aphasic has been trained, show that his writing modality needs more treatment because it is seriously disturbed.

The errors, which Mrs Heinrich, the anomic aphasic made, are of a phonemic nature because of the deletion of consonants and vowels (exercise22 & 23) from certain words. Her results in these two exercises are excellent. In exercise24 of table72, which consists of sentences, Mrs Heinrich has managed to deliver more meaningful and correct lexical words that fit in the blanks of the sentences. However, in certain words there are elisions, substitutions and additions, but of a very low limited number. This is the reason why the errors she made remained low, and the results she attained high; if we draw a comparison with the scores that were achieved by the Broca's and Wernicke's aphasics in the same exercises. The following diagrams represent how aphasia therapy has developed in a period of four weeks. The bar- and graph-diagrams complement each other in this task.

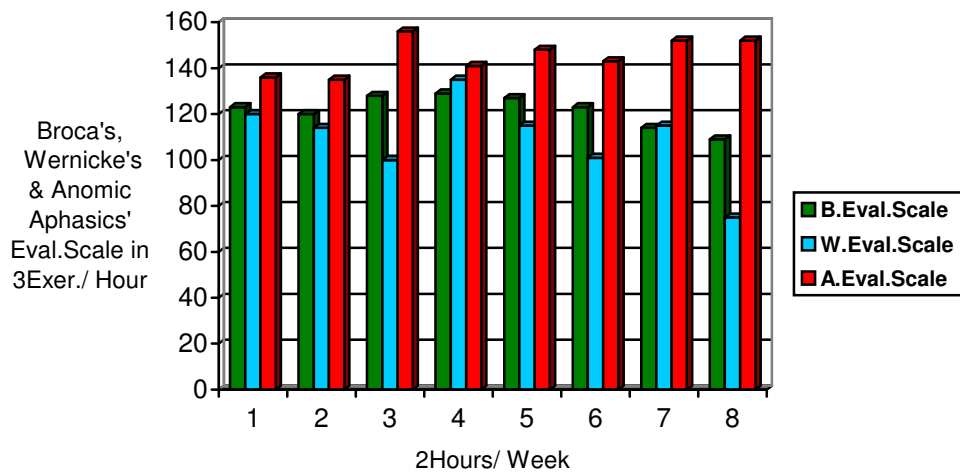
6.6.3.1.2 - Schematic Representation of the First Phase of Training with LingWare



(a)

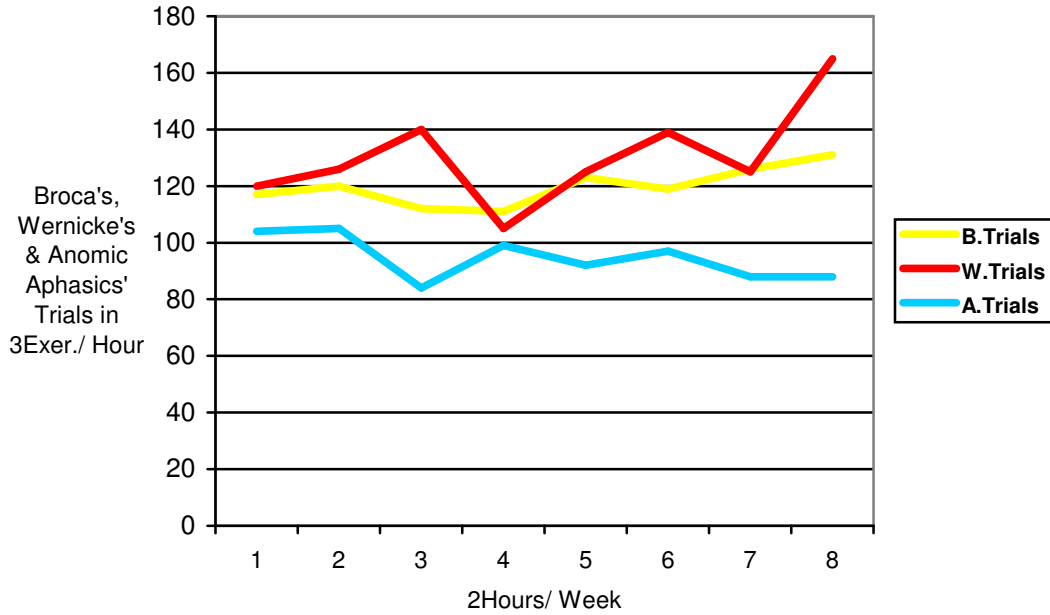


(b)

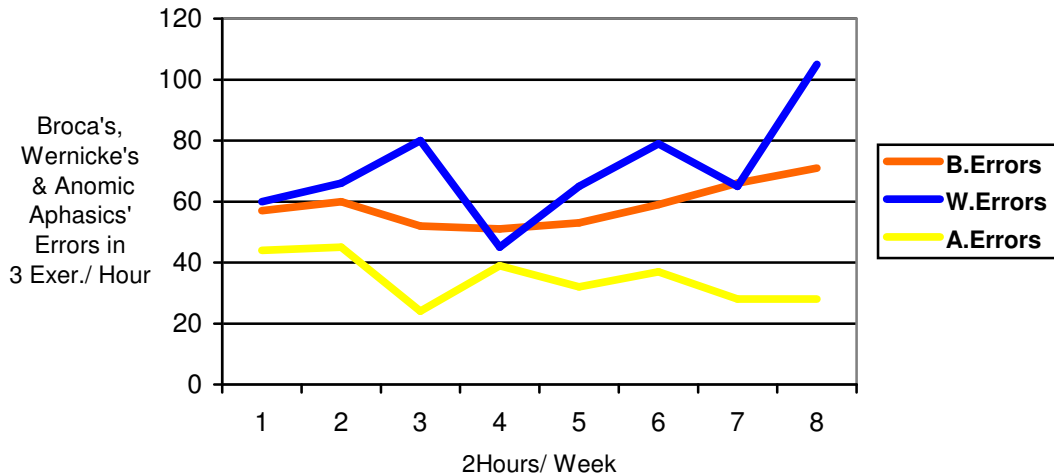


(c)

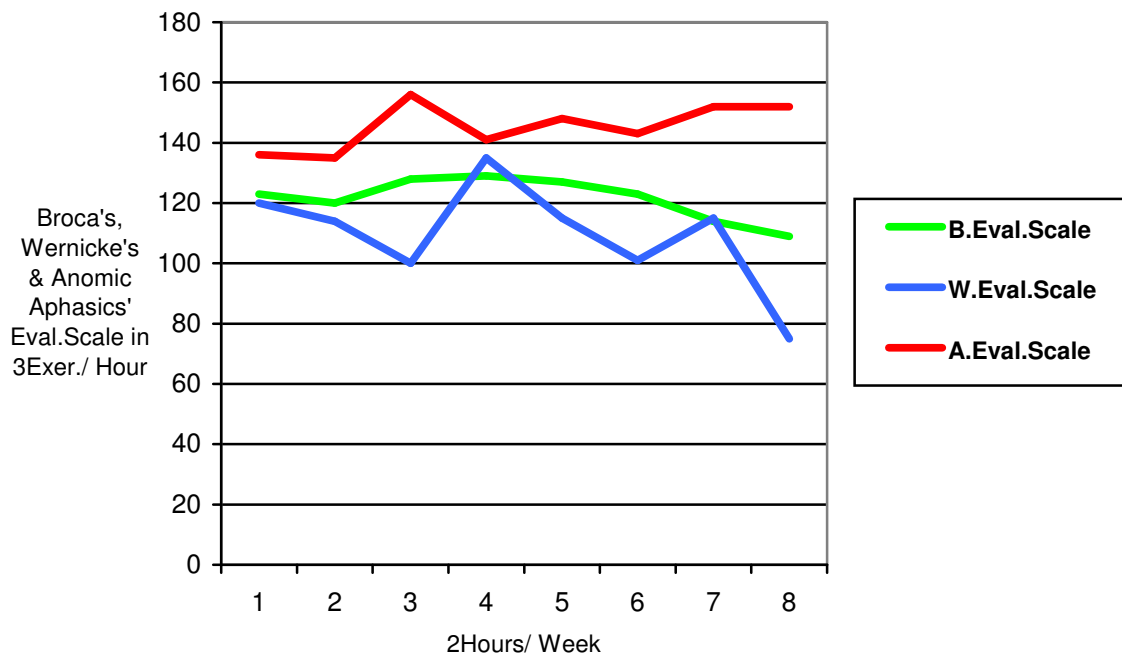
Fig.25. The (a), (b) and (c) bar-diagrams show the level of trials, errors and evaluating scale



(d)



(e)



(f)

Fig.26. The (d), (e) and (f) graph-diagrams show an intermittent rise and fall in the process of trials, errors and evaluating scale

To comment on the diagrams we can say that the graphs derived from the bar-diagrams delineate how the administration of aphasia therapy with LingWare and the control of its dosis progressed over a period of four weeks in the first phase of treatment. Each week is represented otherwise by the graphs due to the materials that were involved in the procedures of therapy and the strategy of re-training.

The graphs display the stimulus-response progress and the rate of stimulation to the modalities of speech and language. They provide us with a view about how the performing ability of the patients changed and appeared in the repetition and the naming of words and sentences as well as the typing of single words in the blanks (see the aphasics' responses in the tables of the 1st phase of aphasia therapy).

6.6.3.1.3 - Second Phase of Aphasia Therapy

Before involving the patients in the second phase of aphasia therapy, in which NeuroLing will be used, it was decided that the patients will have a break of one week to avoid putting them under strains. It is a period of rest that will give us an insight into the motivation, readiness and capacity of each of them as far as training is concerned. As re-training progresses during a session of therapy, valuable information will be gathered about how the patients will respond to NeuroLing.

This program, that supports the therapy of aphasia, is totally different from LingWare. The second phase of aphasia therapy will unfold that NeuroLing has its own unique form and content. As far as this research paper is concerned this program will be considered as a continuation of the therapy plan that was started five weeks ago despite the rest between the two phases. NeuroLing is to complement the therapy process and render an overview about the effects it has on the patients which LingWare could not achieve, but without foregrounding the importance of one program and undermining the other. Aphasia therapy will be carried out in a period of five weeks. Each patient will be involved in two sessions of therapy per a week, each session will consist of two exercises.

A general overview about the features of the exercises of NeuroLing, which will be used in these sessions of therapy, is necessary in this context. It reflects a general view about the structure of a therapy plan and a tangible idea about the content of training and its graduation.

The **first hour** of the second phase of therapy will be devoted to the exercises of *recognition* and *selection*. The **semantic ability** of the patients will be trained by attempting to make them recognize and differentiate the **pictorial meanings with and without visual similarity**. *Exercise1* has its own particular form and way of presentation; it has tasks in which the meaning of one image does not fit **semantically** in with the other three types of meanings, but in *exercise2* an image fits **visually** in with the other images but it differs semantically from them.

The **second hour** of therapy will be directed to the treatment of the patients' *Understanding* of the *Concreta* at the *Reception* level. The three patients will be trained in the following

tasks that have their own particular features. *Exercise3* and *4* are semantic exercises that can be used to train the **reception ability**, and the **audition-perception capacity** as well as the **reading sense** at the word level. They have a similar form but their contents differ. The third exercise has an **easy semantic content** as it has **two similar items**; however, the fourth one is **very difficult** because it comprises **three or four items** that are **semantically close** to one another. In the two exercises each patient is required to **understand** and **assign a concrete lexical word to an image** – which has a concrete referential aspect – at the reception level.

The **third hour** of the second week deals with a therapy that focuses on the *Understanding* of the *Abstracta* at the reception level. In *exercise5* the patients will be trained in **noun phrases** and **adjectives**; in *exercise6* they are asked to find the **semantic field** to which a **lexical word** belongs. All the terms and the images of exercise6 are embedded in semantic and associative relations. Generally, the patients receive a training in concepts which are semantically close to one another or opposite to each other but mainly abstract. To put it in a nutshell, each patient is required to understand an abstract lexical word and assign it to an image at the reception level.

The **fourth hour** will be dedicated to a therapeutic training in the *Understanding* of the *Concrete Sentences* at the reception level; it is a training in trying to understand concrete sentences. *Exercise7* introduces the patients to the use of “SPO” sentences that consist of two, almost similar, “Akkusativobjekte” and **descriptive situations**. In *exercise8* the patients are required to identify and recognize how the “Kasus-Markierung” is realized.

The **fifth hour** is oriented to a practical treatment in the *Understanding, Assigning* and *Formation* of the lexical words at the reception and production level. In *exercise9* the focus will be, mainly, on **understanding** and **assigning a substantive**, a **verb** and an **adjective** to an **abstract sentence**; it is a “relational language understanding” at the reception level. During training the patient selects them (N, V, Adj) from **terms** that are **semantically close** to one another. *Exercise10* introduces other aspects in training. It is an exercise of **production**. It consists of tasks whose aim is to stimulate both the **semantic** and the **phonological ability** of the patients. The latter are required to name an image using **mixed independent vowels and consonants**, that must be organized in a **correct word form**. The aim is to obtain a **meaningful lexical word** that fits in the blank, and achieves a correct grapheme-phoneme correspondence and a reference to the presented image.

The **sixth hour** of therapy tackles a therapeutic training that deals with the *Selection, Assignment* and *Typing* of the terms at the production level. The patients are still to be trained in exercises of production, which have another form and content thoroughly different from the

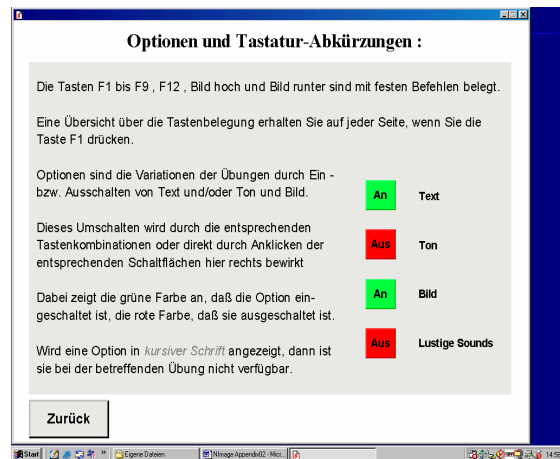
above ones of the fifth hour of training. In *exercise11* the patients will be trained to learn how to **cue** every day used **terms** that are **semantically close** to one another. It is a selection of the suitable semantic terms from a range of very frequently used cues, that should be assigned to an image. *Exercise12* offers the patients the possibility **to type** what they are required **to cue** and even correct it. The program asks them whether to submit a solution or the possibility to attempt again to solve the task if a mistake happens to occur in it. The two exercises instruct the patients how to **remember** and **associate different cues**.

In the **seventh hour** of aphasia therapy in the fourth week the patients are to be trained both in exercises of production and grammar. *Exercise13* is an exercise of production in which grammatical “**Kasus-Markierung**” will be assigned to a sentence. *Exercise14* is also an exercise of production in which a **correct conjugated verb** should be inserted in a sentence.

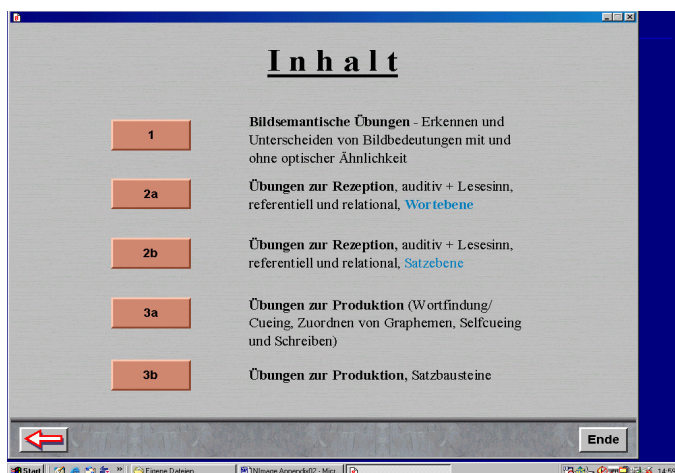
The **eighth hour** of treatment in the fourth week is a continuation of training of **adjectives** in *exercise15* and **prepositions** in *exercise16*. The patients are required to select one solution from **four** to **more solutions** that make the patient think about the **structure** of the **language**, **positions** of the **constituents**, **word order** and **gender** (masculine, feminine, and neuter gender), and insert it in a sentence. At this stage the patients receive no images that could assist them to find the correct tasks. It is an abstract level of therapy which is foregrounded by a focus on the grammatical features of the sentences and a consideration of their semantic aspects.

The **ninth hour** of therapy in the fifth week will consist of *exercise17* and *18* that have a **similar form**, which is made of “**S-P**” and “**S-P-O**” sentences. How to construct correct grammatical and meaningful sentences at the production level is the task in which the patients will be trained. Each patient, with the exception of Mrs Heinrich, is asked to construct a sentence using **mixed**, **scattered content** and **function words** that are presented on the screen together with an image.

The moment one runs NeuroLing, he/she is confronted with the following windows with which he/she can structure the way the procedures of therapy are to be administered to the individual patients.



As one logs in the program, he/she immediately gets to the targets which NeuroLing, as a PC program that supports aphasia therapy, aims to achieve. The following window summarizes the contents and the steps that the author of the program inserted in it so as to help the patients gain control over their impaired communicative ability.



The particularities of NeuroLing lie in the way its title entries are structured and sub-structured. The above window illustrates concretely these characteristics and particularities that can be summarized in the following general terms; mainly, recognition and differentiation as well as reception and production.

In this phase the patients, who have different forms of aphasia, will be involved in a therapeutic training that focuses on the meaningful aspect of language; that is, their semantic and communicative ability will be the focal point during the administration of training.

The three patients will be confronted with the tasks of NeuroLing. The start introduces the meaning of the simplest lexical words, but the program proceeds successively to the

submission of the most complex and abstract sentence constructions. It is a movement from word formations to sentence constructions and then to communicative contexts.

The titles and subtitles of the program, in which the exercises of training have been organized and categorized, reflect the characteristics of NeuroLing and what the author of the program intends to mediate and achieve. What the above titles and subtitles carry is to be delineated by the tasks of each exercise in a detailed way. Each exercise is preceded with an image that illustrates the form and the content of the tasks that are to be used to stimulate the language of the aphasic patients. The whole images, which will be used as stimuli - to which the patients must respond - are presented in the *Image Appendix*.

Tasks of NeuroLing

* In the **first hour** of therapy the semantic ability of the patients will be trained by attempting to make them recognize and differentiate the pictorial meanings that have either meaningful differences or visual similarities. The two exercises of this session have a particular form of presentation. In the first exercise we have the meaning of one image that does not fit semantically with the other three types of images, even though they share certain semantic features. In the second exercise there is an image that fits visually with the other images, but it differs semantically from them.

Broca's Aphasic

Therapy on Mo.01, March 2004

The patient, Mrs Müller hears the spoken words of the images and visualizes them. She is then required to recognize and select the right one that does not belong to the semantic field of the presented images. This means that she must recognize and select the image of a lexical word, which is semantically close to the others; that is, the one that shares semantic features with the others but differs visually from them. She is, thus, involved in an exercise of recognition and selection. In some cases if it is necessary, she can click on each image and hear it being pronounced again. It must be noted that in this training unit exercise1 and 2 consist only of 15 tasks.



Table 73: Broca's Aphasic's therapy in an exercise of Recognition and Selection

Exercise 1 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1) - Meerkarte - die Landkarte - der Globus - die Küstenstrasse	2	1<der Globus>		2		
2) - die Finger - die Nase - der Mund - das Auge	1	0	3			
3) - die Handschuhe - der Regenschirm - die Schuhe - der Hut	2	1<der Hut >		2		
4) - der Barsch - der Kolibri - die Doge - die Schildkröte	1	0	3			
5) - das Schloß - die Kirche - das Landhaus - das Fenster	2	1<das Landhaus>		2		
6) - der Hahn - das Pferd - die Schildkröte - die Katze	1	0	3			
7) - die Bluse - die Windjacke - die Wollsocken - das Kostüm	2	1<die Bluse>		2		
8) - die Kappe - die Brille - die Bekleidung - der Gürtel	2	1<die Kappe>		2		
9) - der Hirsch - das Huhn - das Schwein - die Kühe	2	1<das Huhn>		2		
10) - der Haarfön - der Lockenstab - der Rasier - das Handy	3	2<der Haarfön, der Rasier>			1	

11) - der Tisch - der Stuhl - der <i>Rollstuhl</i> - der Schrank	2	1<der Schrank>		2		
12) - der Bus - das <i>Fahrrad</i> - der Krankenwagen - die Lokomotive	2	1<der Krankenwagen>		2		
13) - der Kamm - die <i>Gemüsepresse</i> - die Zahnbürste - der Haarfön	2	1<die Zahnbürste>		2		
14) - die Winterstiefel - die Handschuhe - der <i>Regenschirm</i> - die Skier	3	2<die Skier, die Winterstiefel>			1	
15) - die Biene - der Käfer - die Spinne - die <i>Schlange</i>	1	0	3			
Sum of Trials, Errors & Evaluating Scale	28	13		32		

In exercise2 of table74 the demand made on the patient is to recognize and select the image of a lexical word, which is visually close to the others but semantically different from them. It is an image that shares no semantic features with the others but does not differ visually from them.



Table 74: Broca's Aphasic's therapy in an exercise of Recognition and Selection

Exercise 2 of NL Stimuli/Images & Tone	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1) - der Hut - der Zylinder - der Helm - die <i>Torte</i>	2	1<der Zylinder>		2		
2) - der Drachen - der Luftballon - der <i>Apfel</i> - die Puppe	3	2<der Drachen, die Puppe>			1	

3)	- die Zigarre - die Zigarette - der <i>Bleistift</i> - die Pfeife	2	1<die Pfeife>		2			
4)	- die Kartoffel - die Buchse - der <i>Becher</i> - das Kassler	2	1<das Kassler>		2			
5)	- das <i>Paket</i> - die Handtasche - der Schulranzen - der Aktenkoffer	3	2< der Aktenkoffer, die Handtasche >				1	
6)	- der Sessel - die <i>Toilette</i> - der Stuhl - der Hocker	2	1<der Hocker>		2			
7)	- der Deckenstrahler - die Tischlampe - der <i>Regenschirm</i> - die Hängelampe	2	1<der Deckenstrahler>		2			
8)	- der Walkman - das Kofferradio - der <i>Toaster</i> - der CD-Spieler	2	1<der Walkman>		2			
9)	- das <i>Mikrophon</i> - das Waffeleis - die Flasche Sekt - das Fastfood	2	1<das Fastfood>		2			
10)	- der Kuli - der Bleistift - der Füller - der <i>Pinsel</i>	2	1<der Bleistift>		2			
11)	- die Sonnenbrille - das <i>Fernglas</i> - die Brille - die Brille	1	0	3				
12)	- die Ananas - der Apfel - die Apfelsine - der <i>Wirsing</i>	2	1<die Ananas>		2			
13)	- die <i>Banane</i> - der Kopfsalat - die Olive - die Peperoni	3	2<die Olive, die Pepperoni>				1	
14)	- die <i>Torte</i> - die Brötchen - der Pizzaboden - das Brot	2	1<der Pizzaboden>		2			
15)	- der <i>Eimer</i> - die Karaffe - das Faß - die Tasse	3	2<die Karaffe, die Tasse>				1	
Sum of Trials, Errors & Evaluating Scale		33	18		27			

Wernicke's Aphasic

Therapy on Mo. 01, March 2004

Mr Fimm listens to the lexical words of the images being pronounced so as to have an idea about what each one of them means. In exercise 1 of table 75 he is confronted each time with four tasks from which he has to select an item which is semantically close to the others but visually different from them; that is, it is an object that shares semantic features with the others but it differs visually from them.

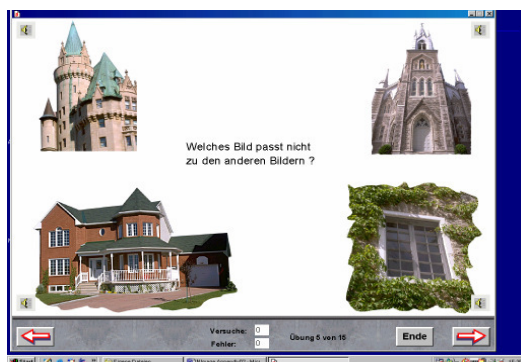


Table 75: Wernicke's Aphasic's therapy in an exercise of Recognition and Selection

Exercise 1 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1) - Meerkarte - die Landkarte - der Globus - die Küstenstrasse	2	1<der Globus>		2		
2) - die Finger - die Nase - der Mund - das Auge	2	1<der Mund>		2		
3) - die Handschuhe - der Regenschirm - die Schuhe - der Hut	3	2<die Schuhe, der Hut>			1	
4) - der Barsch - der Kolibri - die Doge - die Schildkröte	4	3<die Schildkröte, die Doge, der Kolibri>				0
5) - das Schloß - die Kirche - das Landhaus - das Fenster	2	1<das Landhaus>		2		
6) - der Hahn - das Pferd - die Schildkröte - die Katze	2	1<das Pferd>		2		

7)	<ul style="list-style-type: none"> - die Bluse - die Windjacke - die <i>Wollsocken</i> - das Kostum 	2	1<Kostum>		2		
8)	<ul style="list-style-type: none"> - die Kappe - die <i>Brille</i> - die Bekleidung - der Gürtel 	3	2<der Gürtel, die Bekleidung>			1	
9)	<ul style="list-style-type: none"> - der <i>Hirsch</i> - das Huhn - das Schwein - die Kühe 	2	1<das Huhn>		2		
10)	<ul style="list-style-type: none"> - der Haarfön - der Lockenstab - der Rasier - das <i>Handy</i> 	3	2<der Lockenstab, der Rasier>			1	
11)	<ul style="list-style-type: none"> - der Tisch - der Stuhl - der <i>Rollstuhl</i> - der Schrank 	2	1<der Stuhl>		2		
12)	<ul style="list-style-type: none"> - der Bus - das <i>Fahrrad</i> - der Krankenwagen - die Lokomotive 	2	1<der Krankenwagen>		2		
13)	<ul style="list-style-type: none"> - der Kamm - die <i>Gemüsepresse</i> - die Zahnbürste - der Haarfön 	3	2<der Haarfön, die Zahnbürste>			1	
14)	<ul style="list-style-type: none"> - die Winterstiefel - die Handschuhe - der <i>Regenschirm</i> - die Skier 	3	2<die Skier, die Winterstiefel>			1	
15)	<ul style="list-style-type: none"> - die Biene - der Käfer - die Spinne - die <i>Schlange</i> 	2	1<der Käfer>		2		
Sum of Trials, Errors & Evaluating Scale		37	22			23	

In exercise2 of table76 the Wernicke's aphasic has to select an item, which is visually similar to the others but semantically different from them. It is an object whose pictorial features share a similarity with another object of the images but its semantic aspect differs totally from them.



Table 76: Wernicke's Aphasic's therapy in exercise of Recognition and Selection

Exercise 2 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1) - der Hut - der Zylinder - der Helm - die <i>Torte</i>	2	1<der Zylinder>		2		
2) - der Drachen - der Luftballon - der <i>Apfel</i> - die Puppe	2	1<der Drachen>		2		
3) - die Zigarre - die Zigarette - der <i>Bleistift</i> - die Pfeife	2	1<der Pfeife>		2		
4) - die Kartoffel - die Buchse - der <i>Becher</i> - das Kassler	2	1<die Buchse>		2		
5) - das <i>Paket</i> - die Handtasche - der Schulranzen - der Aktenkoffer	2	1<der Schulranzen>		2		
6) - der Sessel - die <i>Toilette</i> - der Stuhl - der Hocker	3	2<der Sessel, der Hocker>			1	
7) - der Deckenstrahler - die Tischlampe - der <i>Regenschirm</i> - die Hängelampe	3	2<der Deckenstrahler, die Hängelampe>			1	
8) - der Walkman - das Kofferradio - der <i>Toaster</i> - der CD-Spieler	3	2<der Walkman, das Kofferradio>			1	
9) - das <i>Mikrophon</i> - das Waffeleis - die Flasche Sekt - das Fastfood	3	2<das Fastfood, die Flasche Sekt>			1	
10) - der Kuli - der Bleistift - der Füller - der <i>Pinsel</i>	2	1<der Bleistift>		2		
11) - die Sonnenbrille - das Fernglas - die Brille - die Brille	2	1<die Sonnenbrille>		2		
12) - die Ananas - der Apfel - die Apfelsine - der <i>Wirsing</i>	3	2<die Ananas, die Apfelsine>			1	
13) - die <i>Banane</i> - der Kopfsalat - die Olive - die Peperoni	3	2<der Kopfsalat, die Olive>			1	
14) - die <i>Torte</i> - die Brötchen - der Pizzaboden - das Brot	3	2<die Brötchen, der Pizzaboden>			1	

15) - der Eimer - die Karaffe - das Faß - die Tasse	3	2<das Faß, die Karaffe>				1	
Sum of Trials, Errors & Evaluating Scale	38	23					22

Anomic Aphasic

Therapy on Tu. 02, March 2004

Mrs Heinrich will be also involved in the same procedures of recognition, differentiation and selection. In exercise 1 of table 77 she must pick up the image of a lexical word which shares certain semantic features with the other images but which differs visually from them.



Table 77: Anomic Aphasic's therapy in an exercise of Recognition and Selection

Exercise 1 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1) - Meerkarte - die Landkarte - der Globus - die Küstenstrasse	1	0	3			
2) - die Finger - die Nase - der Mund - das Auge	1	0	3			
3) - die Handschuhe - der Regenschirm - die Schuhe - der Hut	1	0	3			
4) - der Barsch - der Kolibri - die Doge - die Schildkröte	2	1<der Kolibri>		2		
5) - das Schloß - die Kirche - das Landhaus - das Fenster	1	0	3			

6)	- der Hahn - das Pferd - <i>die Schildkröte</i> - die Katze	2	1<der Hahn>		2			
7)	- die Bluse - die Windjacke - die <i>Wollsocken</i> - das Kostüm	1	0		3			
8)	- die Kappe - die <i>Brille</i> - die Bekleidung - der Gürtel	1	0		3			
9)	- der <i>Hirsch</i> - das Huhn - das Schwein - die Kühe	1	0		3			
10)	- der Haarfön - der Lockenstab - der Rasier - das <i>Handy</i>	1	0		3			
11)	- der Tisch - der Stuhl - der <i>Rollstuhl</i> - der Schrank	2	1<der Schrank>		2			
12)	- der Bus - <i>das Fahrrad</i> - der Krankenwagen - die Lokomotive	1	0		3			
13)	- der Kamm - die <i>Gemüsepresse</i> - die Zahnbürste - der Haarfön	2	1<der Haarfön>		2			
14)	- die Winterstiefel - die Handschuhe - der <i>Regenschirm</i> - die Skier	2	1<die Skier>		2			
15)	- die Biene - der Käfer - die Spinne - die <i>Schlange</i>	1	0		3			
Sum of Trials, Errors & Evaluating Scale		20	5		40			

The images of the following window consist of objects which look alike due to the same form they have. But there is an object which is semantically different from the others even though they have a similar form. The task of the anomic aphasic, after having heard the words of the objects being spoken, is to recognize and select the right object as the Broca's and the Wernicke's aphasics did in table 74 and 76. She is involved in the recognition and selection of an object which is visually similar to the others, but semantically different from them.

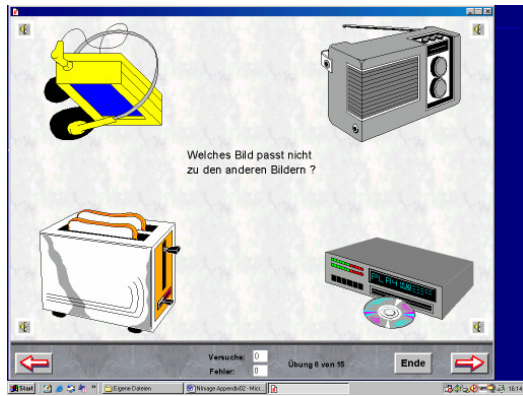


Table 78: Anomic Aphasic's therapy in exercise of Recognition and Selection

Exercise 2 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1) - der Hut - der Zylinder - der Helm - die Torte	1	0	3			
2) - der Drachen - der Luftballon - der Apfel - die Puppe	2	1< der Luftballon>		2		
3) - die Zigarre - die Zigarette - der Bleistift - die Pfeife	1	0	3			
4) - die Kartoffel - die Buchse - der Becher - das Kassler	2	1<die Kartoffel		2		
5) - das Paket - die Handtasche - der Schulranzen - der Aktenkoffer	1	0	3			
6) - der Sessel - die Toilette - der Stuhl - der Hocker	1	0	3			
7) - der Deckenstrahler - die Tischlampe - der Regenschirm - die Hängelampe	2	1<die Tischlampe>		2		
8) - der Walkman - das Kofferradio - der Toaster - der CD-Spieler	1	0	3			
9) - das Mikrophon - das Waffeleis - die Flasche Sekt - das Fastfood	1	0	3			
10) - der Kuli - der Bleistift - der Füller - der Pinsel	1	0	3			

11) - die Sonnenbrille - das <i>Fernglas</i> - die Brille - die Brille	1	0	3				
12) - die Ananas - der Apfel - die Apfelsine - der <i>Wirsing</i>	2	1<die Ananas>		2			
13) - die <i>Banane</i> - der Kopfsalat - die Olive - die Peperoni	1	0	3				
14) - die <i>Torte</i> - die Brötchen - der Pizzaboden - das Brot	2	1<der Pizzaboden>		2			
15) - der <i>Eimer</i> - die Karaffe - das Faß - die Tasse	3	2<das Faß, die Tasse>				1	
Sum of Trials, Errors & Evaluating Scale	22	7	38				

Commentary on the 1st Hour

At the beginning of the first week of therapy the patients are confronted with simple exercises. The aim of this simplicity is to avoid confusing them just in the first hour of the second period of training. The observations of some cases of aphasia have shown that the aphasic patients lose their motivation and interest in treatment if a therapeutic training starts with difficult tasks at the beginning of a therapy period.

One can infer from exercise 1 of table 73 that Mrs Müller, the Broca's aphasic was in a position to make a demarcation line between one term and a generic one under which three terms are subsumed. These terms are semantically close to one another; for instance, the terms "*der Tisch*", "*der Stuhl*" and "*der Schrank*" of task 11 in exercise 1 of table 73 can be included in a generic term "*das Möbel*" to which the term "*Rohlstuhl*" does not belong even though it shares certain semantic features with a "*Stuhl*".

The errors, she made in this exercise, are too low. This could be a reason why the correct points of her evaluating scale turned satisfactory. But the tasks in exercise 2 of table 74 are different from those of the first exercise (Tab. 73) a fact that made the results sink. In this exercise the form of one image might give an insight to the patient that the image belongs to the same generic term of the three terms, but it is only a visual deception, as the term that must be selected differs semantically from them. For example the term "*der Hut*", "*der Zylinder*" and "*der Helm*" can be included under the term "*die Kopfbedeckung*" to which the form of the image "*Torte*" is similar. It is a visual deception that made her pick the word "*der*"

Zylinder” as being different from the other words of the generic term. The ambiguity and complexity of the relationship between the generic term of three words and a term that might be a member of it made the trials and the errors increase and the result of the evaluating scale reach only an average score (Tab.74/Exer.2).

Mr Fimm was trained in the same exercises that were given to Mrs Müller. The administration of therapy followed also the same steps. In the first simplest exercise (Tab.75) Mr Fimm did not skip easily through the tasks. For many tasks he made the wrong decision. This increased the number of trials and errors and lessened the score of the evaluating scale which did not go beyond 23/45 points. In exercise2 of table76 the results of the selection of the right terms sunk because the Wernicke’s aphasic can not figure out the difference that exists between the generic term and the other concepts.

The anomic aphasic, Mrs Heinrich had very little difficulties in understanding the meaning of the four words and selecting the correct one which is different from a particular semantic category. The answers she delivered in exercise1 and 2 of table77 and 78 support this observation. She got excellent results in the exercises of the first hour of the second phase of therapy. But even in her responses there are traces of language impairment at different intervals, but these semantic disorders do not have the same nature as those that occurred in the responses of the Broca’s and Wernicke’s aphasics as far as the previous exercises are concerned.

* In the **second hour** of therapy of the first week the three patients will be trained in certain tasks whose features and form of presentations differ totally from those of exercise1 and 2 of the previous tables of the first hour, hence the increase in the difficulty of the tasks. Exercise3 and 4 will be used in the training of the patients’ understanding of concrete lexical words. These exercises have a similar form in NeuroLing and the following run: the moment the patient clicks on an object, if it is correct, the program will move to the other one; if not, the patient will be required to make another trial. But the content of one exercise differs from the other; the third exercise has an easy semantic content as it has two similar items; however, the fourth one is very difficult as it comprises three of four items that are semantically close to one another. As the administration of training goes on, each patient has to understand and select the correct word of an object, which has a concrete referential aspect.

Broca's Aphasic

Therapy on Wed. 03, March 2004

As far as Mrs Müller is concerned, she has first of all to visualize the four images presented to her and label the correct one. The text and the tone of the words that could give her assistance are submitted by the program. In the case of the third exercise of table 79 she is confronted with four terms; two of them are semantically close to one another. It is an easy exercise; the procedures of its training require that Mrs Müller has to hear and understand the lexical word, which appears in a window-form of NeuroLing, and assign it to the image it refers to.



Table 79: Broca's Aphasic's therapy in an exercise of *Understanding* a concrete lexical word sharing semantic features with another one at the *Reception Level*

Exercise 3 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. das Schloß	2	1 <das Haus>		2		
2. die Pfanne	1	0	3			
3. das Haus	1	0	3			
4. der Topf	1	0	3			
5. der Schreibtisch	1	0	3			
6. der Kuchen	2	1 <der Keks>		2		
7. der Keks	1	0	3			
8. der Bürostuhl	2	1 <der Schreibtisch>		2		
9. der Schrank	1	0	3			
10. der Fernseher	1	0	3			
11. die Brille	1	0	3			
12. der Tisch	1	0	3			
13. das Fahrrad	1	0	3			
14. das Auto	1	0	3			
15. der Traktor	1	0	3			
16. der Rasenmäher	2	1 <der Traktor>		2		
17. der Besen	1	0	3			
18. der Fotoapparat	2	1 <das Telefon>		2		
19. der Schwamm	1	0	3			
20. das Telefon	1	0	3			
Sum of Trials, Errors & Evaluating Scale	25	5	55			

The fourth exercise of table80 is very difficult due to the semantic and situational features that are shared by three or four terms from which the Broca's aphasic has to pick up the right one. She has to deal with it in the same way she did with the third exercise; she has to click on an object which she considers to be the right one, and wait for a response, if the latter is not correct she has to try it again. In the window-form appears also the text of the object that must be selected.



Table 80: Broca's Aphasic's therapy in an exercise of *Understanding* a concrete lexical word sharing semantic features with more than one word at the *Reception Level*

Exercise 4 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.das Messer	1	0	3			
2.die Kelle	2	1<der Löffel>		2		
3.die Gabel	1	0	3			
4.der Löffel	1	0	3			
5.die Glühbirne	1	0	3			
6..die Laterne	3	2<die Kerze, die Lampe>			1	
7.die Kerze	1	0	3			
8.die Lampe	2	1<die Laterne>		2		
9.der Schrank	1	0	3			
10.der Stuhl	2	1<die Bank>		2		
11.die Bank	1	0	3			
12.der Tisch	1	0	3			
13.das Fahrrad	1	0	3			
14.der Bus	2	1<der Zug>		2		
15.das Auto	2	1<der Bus>		2		
16.der Zug	1	0	3			
17.der Schwamm	1	0	3			
18.die Bürste	3	2<der Schwamm, der Besen>			1	
19.der Eimer	1	0	3			
20.der Besen	2	1<die Bürste>		2		
Sum of Trials, Errors and Evaluating Scale	30	10	50			

Wernicke's Aphasic

Therapy on Wed. 03, March 2004

The way of therapy administration to the Wernicke's aphasic should not be different from that of the Broca's aphasic due to the aphasic syndrome he suffers from. Images, their texts and tones are supplied to him by NeuroLing. He has to understand the concrete lexical word and select continually the image that ought to be assigned to it. Exercise3 of table81 is still less confusing as it has only two objects which share certain semantic or situational features.



Table 81: Wernicke's Aphasic's therapy in an exercise of *Understanding* a concrete lexical word sharing semantic features with another one at the *Reception Level*

Exercise 3 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.das Schloß	2	1<das Haus>		2		
2.die Pfanne	2	1<der Topf>		2		
3.das Haus	1	0	3			
4.der Topf	1	0	3			
5.der Schreibtisch	2	1<der Bürostuhl>		2		
6.der Kuchen	2	1<der Keks>		2		
7.der Keks	2	1<der Kuchen>		2		
8.der Bürostuhl	2	1<der Schreibtisch>		2		
9.der Schrank	2	1<der Tisch>		2		
10.der Fernseher	1	0	3			
11.die Brille	2	1<der Fernseher>		2		
12.der Tisch	2	1<der Schrank>		2		
13.das Fahrrad	2	1<der Rasenmäher>		2		
14.das Auto	2	1<der Traktor>		2		
15.der Traktor	3	2<das Auto, das Fahrrad>			1	
16.der Rasenmäher	2	1<der Traktor>		2		
17.der Besen	2	1<der Schwamm>		2		
18.der Fotoapparat	2	1<das Telefon>		2		
19.der Schwamm	2	1<der Besen>		2		
20.das Telefon	2	1<das Telefonapparat>		2		
Sum of Trials, Errors & Evaluating Scale	38	18		42		

The semantic confusion, which the following exercise of table82, might present to the Wernicke's aphasic can be neither denied nor avoided because of the impact of the syndrome of aphasia the patient suffers from. The difficulty in exercise4 of table82 may arise from the existence of more than one object that share semantic and situational features with each other. It is structured intentionally in this way so that one can draw a comparison between the performance achieved in this exercise and the previous one of table81. The procedures of therapy administration are similar to those of the previous exercises of this session of training.



Table 82: Wernicke's Aphasic's therapy in an exercise of *Understanding* a concrete lexical word sharing semantic features with more than one word at the *Reception Level*

Exercise 4 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.das Messer	2	1<die Kelle>		2		
2.die Kelle	3	2<die Gabel,der Löffel>			1	
3.die Gabel	3	2<die Kelle, der Löffel>			1	
4.der Löffel	3	2<das Messer,die Kelle>			1	
5.die Glühbirne	3	2<die Lampe,die Kerze>			1	
6.die Laterne	2	1<die Lampe>		2		
7.die Kerze	3	2<die Glühbirne,die Laterne>			1	
8.die Lampe	3	2<die Kerze, die Glühbirne>			1	
9.der Schrank	2	1<der Tisch>		2		
10.der Stuhl	3	2<die Bank,der Tisch>			1	
11.die Bank	2	1<der Stuhl>		2		
12.der Tisch	2	1<der Schrank>		2		
13.das Fahrrad	2	1<das Auto>		2		
14.der Bus	3	2<der Zug, das Auto>			1	
15.das Auto	2	1<das Fahrrad,der Bus>		2		
16.der Zug	2	1<der Bus>		2		
17.der Schwamm	3	2<die Bürste,der Eimer>			1	
18.die Bürste	3	2<der Besen,der Schwamm>			1	
19.der Eimer	3	2<der Schwamm, der Besen>			1	
20.der Besen	3	2<die Bürste, der Schwamm>			1	
Sum of Trials, Erros & Evaluating Scale	52	32			28	

Anomic Aphasic

Therapy on Thu. 04, March 2004

Mrs Heinrich will be also trained in the third and fourth exercise (Tab.83 & 84). But the administration of her training procedures will be different from those of the Broca's and Wernicke's aphasics. Four images are to be exposed to her. She listens to the tone of one lexical word being pronounced by a voice stored in the program and visualizes the images whose texts are intentionally omitted from the screen. She has to decipher from the sound aspect of the lexical word the meaning and assign it to an image that shares certain semantic features with another object, but has no visual similarity with it. As it was the case in the above tasks the images below illustrate this aspect of selection and assignment of a lexical word to an image.



Table 83: Anomic Aphasic's therapy in an exercise of *Understanding* a concrete lexical word sharing semantic features with another one at the *Reception Level*

Exercise 3 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.das Schloß	2	1<das Haus>		2		
2.die Pfanne	1	0	3			
3.das Haus	1	0	3			
4.der Topf	1	0	3			
5.der Schreibtisch	1	0	3			
6.der Kuchen	2	1<der Keks>		2		
7.der Keks	1	0	3			
8.der Bürostuhl	1	0	3			
9.der Schrank	1	0	3			
10.der Fernseher	1	0	3			
11.die Brille	1	0	3			
12.der Tisch	1	0	3			
13.das Fahrrad	1	0	3			
14.das Auto	2	1<der Traktor>		2		
15.der Traktor	1	0	3			
16.der Rasenmäher	1	0	3			

17.der Besen	2	1<der Schwamm>		2		
18.der Fotoapparat	1	0	3			
19.der Schwamm	1	0	3			
20.das Telefon	1	0	3			
Sum of Trials, Errors& Evaluating Scale	24	4				56

Mrs Heinrich's therapy will be continued in exercise4 of table84. She is to be confronted only with the tone and its image, whose lexical word may share semantic features with more than one word. Her task is to assign the correct image to the pronounced lexical word.



Table 84: Anomic Aphasic's therapy in an exercise of *Understanding* a concrete lexical word sharing semantic features with more than one word at the *Reception Level*

Exercise 4 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.das Messer	1	0	3			
2.die Kelle	2	1<der Löffel>		2		
3.die Gabel	1	0	3			
4.der Löffel	1	0	3			
5.die Glühbirne	1	0	3			
6..die Laterne	2	1<die Lampe>		2		
7.die Kerze	1	0	3			
8.die Lampe	2	1<die Glühbirne>		2		
9.der Schrank	1	0	3			
10.der Stuhl	2	1<die Bank>		2		
11.die Bank	1	0	3			
12.der Tisch	1	0	3			
13.das Fahrrad	1	0	3			
14.der Bus	2	1<der Zug>		2		
15.das Auto	2	1<der Bus>		2		
16.der Zug	1	0	3			
17.der Schwamm	1	0	3			
18.die Bürste	2	1<der Besen>		2		
19.der Eimer	1	0	3			
20.der Besen	2	1<die Bürste>		2		
Sum of Trials, Errors & Evaluating Scale	28	8				52

Commentary on the 2nd Hour

In the second hour of therapy Mrs Müller's responses show that the exercises of the first hour have endowed her with the ability of differentiating between the terms, which have one generic term. In the first trial she substituted one task for the other, but in the second one she corrected the error. The good results she obtained in exercise3 and 4 of table79 and 80 unfold an increase in the amelioration of her semantic capacity.

However, the Wernicke's aphasic, Mr Fimm still attempts to understand and draw a distinction between terms that can be semantically similar or different from one another. The increase in the number of trials and errors substantiates and supports this observation; three trials and two errors in one task have become frequent; especially in exercise4 of table82 whose results are below the average.

Despite the changes that occurred in the procedures of training, Mrs Heinrich achieved good results both in exercise3 and 4 of table83 and 84, but she made errors of semantic substitution in certain tasks. These mistakes led to a slight increase of trials and errors in exercise4 of table84; however, this had little effect on her excellent results that are illustrated by the evaluating scale of this training session.

* In the **third hour** of therapy of the second week the focus in exercise5 will be on the training of noun phrases, adjectives - which have the function of a noun - and descriptive adjectives. In exercise6 the patients are asked to find the semantic field to which the lexical word of an object belongs. All the terms and images of exercise6 are embedded in semantic and associative relations. Generally, the patients receive a training in concepts which are semantically close to one another or opposite to each other but mainly abstract.

Broca's Aphasic

Therapy on Mo. 08, March 2004

The Broca's aphasic, Mrs Müller hears each noun phrase and individual adjective being spoken. She visualizes the four images of one window, the text it presents and then clicks on the correct image that corresponds to the lexical word. In exercise5 of table85 her training is supported by images, texts and tone during which the patient assigns a noun, a phrase or an adjective to the image it refers to.

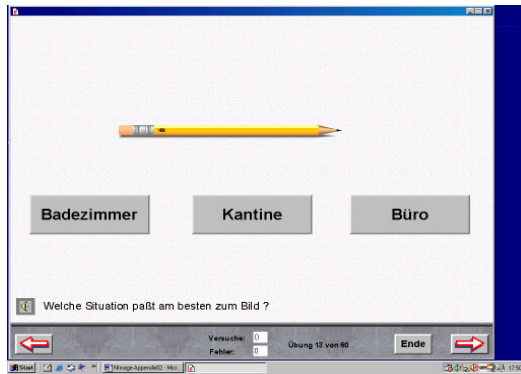


Exer.from 5 to 8

Table 85: Broca's Aphasic's therapy in an exercise of *Understanding* abstract word relations (phrases, nouns and adjectives) at the *Reception Level*

Exercise 5 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.die junge Frau	1	0	3			
2.der junge Mann	1	0	3			
3.der alte Mann	1	0	3			
4.die alte Frau	1	0	3			
5.der Freundliche	2	1<der Komische>		2		
6.der Faule	2	1<der Fleißige>	3			
7.der Fleißige	1	0		2		
8.die Komische	1	0	3			
9.knüsprig	2	1<(Holz) hart>		2		
10.flüssig	1	0		2		
11.weich	2	1<(Chips) knusprig>	3			
12.hart	2	1<(Glaswasser) flüssig>	3			
13.pricklend	2	1<(Suppe) heiß>		2		
14.knackig	2	1<(Kuchen) cremig>	3			
15.heiß	1	0		2		
16.cremig	1	0		2		
17.rot	1	0	3			
18.gelb	2	1(Apfel) grün		2		
19.blau	1	0	3			
20.grün	2	1(Banane) gelb		2		
Sum of Trials, Errors & Evaluating Scale	29	9		51		

In exercise6 of table86 the patient is required to label an image, which stands in this context as a generic term, with a correct term that can be one of its features or functions. The main term of the image is presented without its lexical referent but with other terms that belong to other semantic fields. The patient has to choose the lexical words sharing semantic and situational features with the main generic term.



Exer. From 11 to 15

Table 86: Broca's Aphasic's therapy in an exercise of *Understanding* abstract word relations (nouns, verbs and adjectives) at the *Reception Level*

Exercise 6 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Welche Situation passt am besten zum Bild? (das Auto) - Operation - Reparatur - Marktplatz - (nichts)	2	1<Operation>		2		
2. Welches Wort ist der Oberbegriff?(Auto) - Gebäude - Werkzeug - Fahrzeug - (nichts)	1	0	3			
3. Aus welchem Teil besteht es?(Auto) - Festplatte - Motor - Flügel - (nichts)	1	0	3			
4. Welche Tätigkeit entspricht am besten dem Bild?(Auto) - fahren - rennen - fliegen - (nichts)	2	1<rennen>		2		
5. Welche Eigenschaft passt am besten zum Bild?(Auto) - arm - holzig - schnell - (nichts)	1	0	3			
6. Welche Situation passt am besten zum Bild?(der Mann) - Arbeit - Spielplatz - Schule - (nichts)	2	1<Schule>		2		
7. Welches Wort ist der Oberbegriff?(der Mann) - Mensch - Organ - Pflanze - (nichts)	1	0	3			
8. Aus welchen Teilen besteht er (der Mann) - Stengel - Herz - Pfote - (nichts)	3	2<Stengel, nichts>			1	
9. Welche Tätigkeit entspricht am besten dem Bild(der Mann) - lachen - rauchen - zuhören - (nichts)	2	1<lachen>		2		

10. Welche Eigenschaften passen am besten zum Bild (der Mann) - seriös - arm - krank - (nichts)	1	0	3				
11. Welche Situation passt am besten zum Bild (der Bleistift) - Badezimmer - Kantine - Büro - (nichts)	1	0	3				
12. Welches Wort ist der Oberbegriff? (der Bleistift) - Schriftstück - Schreibgerät - Werkzeug - (nichts)	3	2<Schriftstück,Werkzeug>			1		
13. Aus welchen Teilen besteht er? (der Bleistift) - Mine - Holzbein - Stiel - (nichts)	2	1<Holzbein>		2			
14. Welche Tätigkeit entspricht am besten dem Bild? (der Bleistift) - wandern - drücken - schreiben - (nichts)	1	0	3				
15. Welche Eigenschaft passt am besten zum Bild? (der Bleistift) - spitz - satt - flauschig - (nichts)	1	0	3				
16. Welche Situation passt am besten zum Bild ? (das Blatt) - Wald - Museum - Papierfabrik	3	2<Museum, Papierfabrik>			1		
17. Welches Wort ist der Oberbegriff?(das Blatt) - Lebewesen - Organ - Pflanze - (nichts)	3	2<Pflanze, Lebewesen>			1		
18. Aus welchem Teil besteht es?(das Blatt) - Stamm - Zweig - Faser - (nichts)	3	2<Stamm,Zweig>			1		
19. Welche Tätigkeit entspricht das Bild? (das Blatt) - existieren - fallen - enden - (nichts)	2	1<existieren>		2			
20. Welche Eigenschaft passt am besten zum Bild (das Blatt) - gesund - grün - hart - (nichts)	1	0	3				
Sum of Trials, Errors & Evaluating Scale	36	16			44		

Wernicke's Aphasic

Therapy on Mo. 08, March 2004

The administration of therapy to Mr Fimm will be carried out almost in the same way the Broca's aphasic has been dealt with. Both the text and the tone are supplied to him as an

assistance that makes him decipher the meaning from the arbitrary relationship that exists between the object, its mental concept and sound aspect. The patient is, thus, offered a possibility to use all his receptive senses so as to find the correct image and assign it either to a noun, a noun phrase or an adjective.

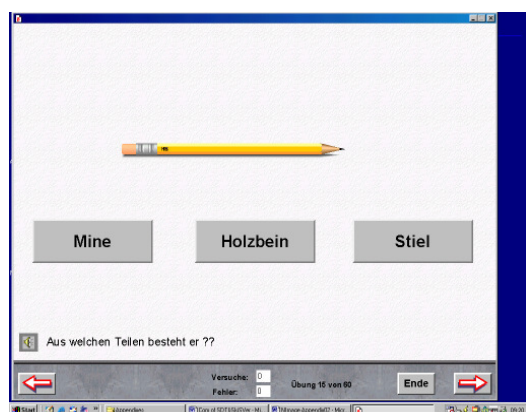


Exer. from 9 to 12

Table 87: Wernicke's Aphasic's therapy in an exercise of *Understanding* abstract word relations (phrases, nouns and adjectives) at the *Reception Level*

Exercise 5 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. die junge Frau	2	1<die alte Frau>		2		
2. der junge Mann	2	1<der alte Mann>		2		
3. der alte Mann	4	3<..junge Frau..junge Mann..alte Frau.....>				0
4. die alte Frau	2	1<die junge Frau>		2		
5. der Freundliche	2	1<die Komische>		2		
6. der Faule	2	1<der Fleißige>		2		
7. der Fleißige	1	0	3			
8. die Komische	2	1<der Faule>		2		
9. knusprig	2	1<(hart)Holz>		2		
10. flüssig	2	1<(weich) Käse>		2		
11. weich	2	1<(flüssig) Glaswasser>	3			
12. hart	1	0		2		
13. pricklend	3	2<(cremig) Kuchen, (heiß) Suppe >		2		
14. knackig	1	0		2		
15. heiß	1	0		2		
16. cremig	2	1<(heiß) Suppe>	3			
17. rot	2	1(Farbe) blau		2		
18. gelb	2	1(Apfel) grün		2		
19. blau	2	1(Apfel) grün		2		
20. grün	2	1(Banane) gelb		2		
Sum of Trials, Errors and Evaluating Scale	38	18	42			

The Wernicke's aphasic's therapy in exercise6 of table88 consists of making the patient assign semantic and situational features, which are shared with a generic term, to an image. These aspects must be selected from nouns, verbs and adjectives.



Exer. from 11 to 15

Table 88: Wernicke's Aphasic's therapy in an exercise of *Understanding* abstract word relations (nouns, verbs and adjectives) at the *Reception Level*

Exercise 6 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Welche Situation passt am besten zum Bild? (das Auto) - Operation - Reparatur - Marktplatz - (nichts)	2	1<operation>		2		
2. Welches Wort ist der Oberbegriff?(Auto) - Gebäude - Werkzeug - Fahrzeug - (nichts)	3	2<Gebäude, nichts>			1	
3. Aus welchem Teil besteht es?(Auto) - Festplatte - Motor - Flügel - (nichts)	2	1<Festplatte>		2		
4. Welche Tätigkeit entspricht am besten dem Bild?(Auto) - fahren - rennen - fliegen - (nichts)	1	0	3			
5. Welche Eigenschaft passt am besten zum Bild?(Auto) - arm - holzig - schnell - (nichts)	3	2<arm, holzig>			1	
6. Welche Situation passt am besten zum Bild?(der Mann) - Arbeit - Spielplatz - Schule - (nichts)	1	0	3			
7. Welches Wort ist der Oberbegriff?(der Mann) - Mensch - Organ - Pflanze - (nichts)	1	0	3			
8. Aus welchen Teilen besteht er (der Mann) - Stengel - Herz - Pfote - (nichts)	3	2<Stengel, nichts>			1	
9. Welche Tätigkeit entspricht am besten dem Bild(der Mann) - lachen - rauchen - zuhören - (nichts)	2	1<lachen>		2		

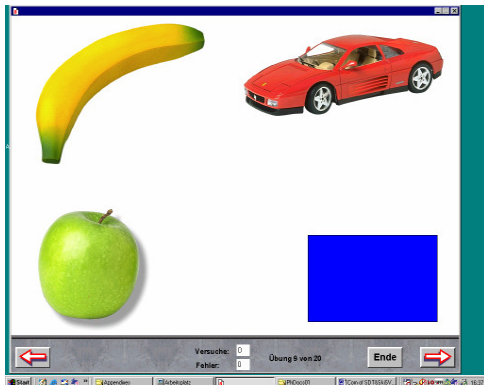
10. Welche Eigenschaften passen am besten zum Bild (der Mann) - seriös - arm - krank - (nichts)	1	0	3				
11. Welche Situation passt am besten zum Bild (der Bleistift) - Badezimmer - Kantine - Büro - (nichts)	2	1<Kantine>		2			
12. Welches Wort ist der Oberbegriff? (der Bleistift) - Schriftstück - Schreibgerät - Werkzeug - (nichts)	3	2<Schriftstück,Werkzeug>			1		
13. Aus welchen Teilen besteht er? (der Bleistift) - Mine - Holzbein - Stiel - (nichts)	3	2<Holzbein,nichts>			1		
14. Welche Tätigkeit entspricht am besten dem Bild? (der Bleistift) - wandern - drücken - schreiben - (nichts)	2	1<drücken>		2			
15. Welche Eigenschaft passt am besten zum Bild? (der Bleistift) - spitz - satt - flauschig - (nichts)	3	2<flauschig, nichts>					0
16. Welche Situation passt am besten zum Bild?(das Blatt) - Wald - Museum - Papierfabrik - (nichts)	1	0	3				
17. Welches Wort ist der Oberbegriff?(das Blatt) - Lebewesen - Organ - Pflanze - (nichts)	3	2<Lebewesen,Pflanze>			1		
18. Aus welchem Teil besteht es?(das Blatt) - Stamm - Zweig - Faser - (nichts)	3	2<Stamm,Zweig>			1		
19. Welche Tätigkeit entspricht das Bild? (das Blatt) - existieren - fallen - enden - (nichts)	2	1<existieren>		2			
20. Welche Eigenschaft passt am besten zum Bild (das Blatt) - gesund - grün - hart - (nichts)	2	1<gesund>		2			
Sum of Trials, Errors & Evaluating Scale	43	23					37

Anomic Aphasic

Therapy on Tu.09, March 2004

Because of Mrs Heinrich's preserved ability of reading, understanding and processing of the auditive stimuli, her therapy will be administered in another way. In exercise5 she has to

understand the text, which is omitted from the screen, but spoken as a tone, and then assign the spoken text to an image.

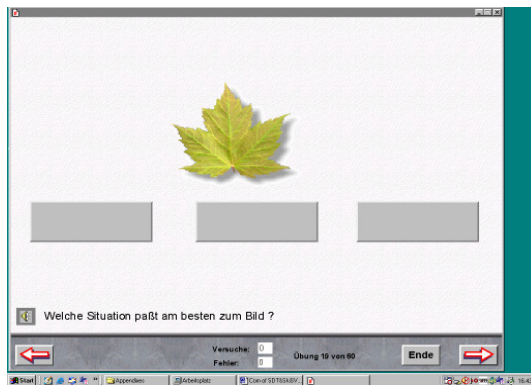


Exer.from 17 to 20

Table 89: Anomic Aphasic's therapy in an exercise of *Understanding* abstract word relations (phrases, nouns and adjectives) at the *Reception Level*

Exercise 5 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.die junge Frau	1	0	3			
2.der junge Mann	1	0	3			
3.der alte Mann	1	0	3			
4.die alte Frau	1	0	3			
5.der Freundliche	2	1<die Komische>		2		
6.der Faule	2	1<der Fleißige>	3			
7.der Fleißige	1	0	3			
8.die Komische	1	0	3			
9.knüsprig	1	0		2		
10.flüssig	2	1<(Käse) weich >		2		
11.weich	1	0	3			
12.hart	2	1<(Chips) knüsprig >	3			
13.pricklend	2	1<(Kuchen) cremig >	3			
14.knackig	1	0		2		
15.heiß	1	0	3			
16.cremig	1	0		2		
17.rot	1	0	3			
18.gelb	2	1(Apfel) Grün		2		
19.blau	1	0	3			
20.grün	1	0	3			
Sum of Trials, Errors & Evaluating Scale	26	6	54			

In exercise6 of table90 therapy will be continued in tasks that train the understanding of abstract word relations. The patient gets the image to which she has to assign one of the semantic or situational features that are pronounced by a voice of NeuroLing. The orthography of the features, which were displayed below the images during the training of the Broca's and Wernicke's aphasics, are now deleted so as to reinforce the word finding ability of the anomic aphasic.



Exer. from 16 to 20

Table 90: Anomic Aphasic's therapy in an exercise of *Understanding* abstract word relations (nouns, verbs and adjectives) at the *Reception Level*

Exercise 6 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Welche Situation passt am besten zum Bild? (das Auto) - Operation - Reparatur - Marktplatz - (nichts)	1	0	3			
2. Welches Wort ist der Oberbegriff?(Auto) - Gebäude - Werkzeug - Fahrzeug - (nichts)	1	0	3			
3. Aus welchem Teil besteht es?(Auto) - Festplatte - Motor - Flügel - (nichts)	1	0	3			
4. Welche Tätigkeit entspricht am besten dem Bild?(Auto) - fahren - rennen - fliegen - (nichts)	1	0	3			
5. Welche Eigenschaft passt am besten zum Bild?(Auto) - arm - holzig - schnell - (nichts)	1	0	3			
6. Welche Situation passt am besten zum Bild?(der Mann) - Arbeit - Spielplatz - Schule - (nichts)	1	0	3			
7. Welches Wort ist der Oberbegriff?(der Mann) - Mensch - Organ - Pflanze - (nichts)	2	1<Organ>		2		
8. Aus welchen Teilen besteht er (der Mann) - Stengl - Herz - Pfote - (nichts)	1	0	3			
9. Welche Tätigkeit entspricht am besten dem Bild(der Mann) - lachen - rauchen - zuhören - (nichts)	2	1<lachen>		2		

10. Welche Eigenschaften passen am besten zum Bild (der Mann) - seriös - arm - krank - (nichts)	2	1<krank>		2		
11. Welche Situation passt am besten zum Bild (der Bleistift) - Badezimmer - Kantine - Büro - (nichts)	1	0	3			
12. Welches Wort ist der Oberbegriff? (der Bleistift) - Schriftstück - Schreibgerät - Werkzeug - (nichts)	2	1<Schriftstück>		2		
13. Aus welchen Teilen besteht er? (der Bleistift) - Mine - Holzbein - Stiel - (nichts)	2	1<Holzbein>		2		
14. Welche Tätigkeit entspricht am besten dem Bild? (der Bleistift) - wandern - drücken - schreiben - (nichts)	1	0	3			
15. Welche Eigenschaft passt am besten zum Bild? (der Bleistift) - spitz - satt - flauschig - (nichts)	1	0	3			
16. Welche Situation passt am besten zum Bild?(das Blatt) - Wald - Museum - Papierfabrik - (nichts)	2	1<Papierfabrik>		2		
17. Welches Wort ist der Oberbegriff?(das Blatt) - Lebewesen - Organ - Pflanze - (nichts)	3	2<Lebewesen, Pflanze>			1	
18. Aus welchem Teil besteht es?(das Blatt) - Stamm - Zweig - Faser - (nichts)	3	2<Zweig, Stamm>			1	
19. Welche Tätigkeit entspricht das Bild? (das Blatt) - existieren - fallen - enden - (nichts)	2	1<existieren>		2		
20. Welche Eigenschaft passt am besten zum Bild (das Blatt) - gesund - grün - hart - (nichts)	1	0	3			
Sum of Trials, Errors & Evaluating Scale	31	11		49		

Commentary on the 3rd Hour

Abstract word relations made the Broca's aphasic have problems of misunderstanding many words. In exercise 5 of table 85 the errors occurred in her attempt to assign descriptive adjectives and nouns, derived from adjectives, to images. Neither the feminine nor the masculine gender is inflicted on. Exercise 6 of table 86 is structured and presented in a way that helped the Broca's aphasic assign many target nouns, phrases and adjective so easily to their

images. This made the score of the evaluating scale, obtained in the two exercises, satisfactory. The patient attained this performance in this session of therapy because the first and second hour of training have been mainly devoted to the selection, understanding and assignment of the lexical words to the images.

The results, which the Wernicke's aphasic managed to get in exercise 5 and 6 of table 87 and 88, have fallen down in comparison with those he obtained in the first and second hour of therapy. This can be referred to the fact that the tasks of training are too abstract. This made him permute and substitute the meaning of the words, phrases and adjectives.

The anomic aphasic, who is confronted in table 90 and 91 with the images of the feminine and masculine gender, nouns and adjectives, provided the highest evaluating scale because of her ability of understanding the abstract relationship between the concepts and their referents. This has been reflected by the lowest score of the errors in the responses. However, her language due to the syndrome of anomic aphasia still carries touches of disturbances, which are well documented in table 90 and 91 in which word finding disturbances can be found in certain places of the tables.

* In the **fourth hour** of therapy the three patients are to be trained in exercise 7 that will introduce them to the use of "SPO" sentences that consist of two almost similar "Akkusativ-objekte" and two similar situations. In exercise 8 the patients are required to identify and recognize how the "Kasus-Markierung" is realized.

Broca's Aphasic

Therapy on Wed. 10, March 2004

In exercise 7 of table 91 four situations, in the middle of which a written sentence is inserted, are presented to the patient. She is confronted with the image, the text and its tone. She has then to understand the SPO sentence and assign it to one of the four situations.



Table 91: Broca's Aphasic's therapy in an exercise of *Understanding* concrete sentences at the *Reception Level*

Exercise 7 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Die Frau wischt Staub	1	0	3			
2.Die Frau liest Akten	2	1<Die Frau schreibt Briefe>		2		
3.Die Frau schreibt Briefe	1	0	3			
4.Die Frau spült Geschirr	1	0	3			
5.Der Mann spielt Billiard	2	1<Der Mann spielt Golf>		2		
6.Der Mann spielt Golf	1	0	3			
7.Der Mann fährt Boot	1	0	3			
8.Der Mann fliegt Drachen	1	0	3			
9.Der Mann erklärt Formeln	2	1<Der Mann entwirft Pläne>		2		
10.Der Mann hebt Gewichte	1	0	3			
11.Der Mann macht Judo	2	1<Der Mann hebt Gewichte>		2		
12.Der Mann entwirft Pläne	1	0	3			
13.Die Frau gießt Blumen	1	0	3			
14.Die Frau macht Gymnastik	2	1<Die Frau misst Kraft>		2		
15.Die Frau schneidet Gras	2	1<Die gießt die Blumen>		2		
16.Die Frau misst Kraft	1	0	3			
17.Das Mädchen pflückt Äpfel	1	0	3			
18.Das Mädchen spielt Tennis	2	1<Das Mädchen spielt Volleyball>		2		
19.Das Mädchen pflegt Blumen	2	1<Das Mädchen pflückt Äpfel>		2		
20.Das Mädchen spielt Volleyball	2	1<Das Mädchen spielt Tennis>		2		
Sum of Trials, Errors & Evaluating Scale	29	9			51	

The image below shows that exercise8 of table92 has a different form; an image is presented together with four sentences in which there is a correct one. She has to select the sentence that contains the correct “Kasus-Markierung” that corresponds to the image of the situation. In this context the patient assigns an image to a sentence.



Table 92: Broca's Aphasic's therapy in an exercise of *Understanding* concrete active/passive sentences at the *Reception Level*

Exercise 8 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Wer umarmt das Mädchen? - des Vaters umarmt das Mädchen - den Vater umarmt das Mädchen - dem Vater umarmt das Mädchen - der Vater umarmt das Mädchen	3	2 <- den Vater umarmt das Mädchen> <- dem Vater umarmt das Mädchen>			1	

2.Wen oder was schiebt die Mutter? - Die Mutter schiebt der Kinderwagen - Die Mutter schiebt den Kinderwagen - Die Mutter schiebt des Kinderwagens - Die Mutter schiebt dem Kinderwagen	2	1 <- Die Mutter schiebt der Kinderwagen>		2		
3.Wer redet zu wem? - Er redet zum ihm - Er redet zu ihr - Er redet zu ihnen - Er redet zu ihm	3	2 <-Er redet zu ihr> <-Er redet zu ihm>			1	
4.Wer legt wem Ergebnisse vor? - Sie legen ihn Ergebnisse vor - Sie legen ihnen Ergebnisse vor - Sie legen ihr Ergebnisse vor - Sie legen ihm Ergebnisse vor	4	3 <-Sie legen ihn Ergebnisse vor> <-Sie legen ihnen Ergebnisse vor> <-Sie legen ihr Ergebnisse vor>				0
5.Zwischen wem sitzt die Frau? - Die Frau sitzt zwischen der Männer - Die Frau sitzt zwischen den Männern - Die Frau sitzt zwischen die Männer - Die Frau sitzt zwischen dem Männer	2	1 <- Die Frau sitzt zwischen der Männer>		2		
6.Wen hält der Angler? - Der Angler hält der Fisch - Der Angler hält dem Fisch - Der Angler hält den Fisch - Der Angler hält des Fisches	3	2 <- Der Angler hält der Fisch> <- Der Angler hält dem Fisch>			1	
7.Was schiebt die Frau hoch? - Die Frau schiebt dem Beincurler hoch - Die Frau schiebt des Beincurlers hoch - Die Frau schiebt der Beincurler hoch - Die Frau schiebt den Beincurler hoch	4	3 <- Die Frau schiebt dem Beincurler hoch> <- Die Frau schiebt des Beincurlers hoch> <- Die Frau schiebt der Beincurler hoch>				0
8.Was hält der Arzt? - Der Arzt hält das Krankenblatt - Der Arzt hält den Krankenblatt - Der Arzt hält dem Krankenblatt - Der Arzt hält des Krankenblattes	1	0	3			
9.Wen und was schieben die Männer? - Die Männer schieben die Boote - Die Männer schieben des Bootes - Die Männer schieben das Boot - Die Männer schieben dem Boot	3	2 <- Die Männer schieben die Boote> <- Die Männer schieben des Bootes>			1	
10.Wen oder was trainiert die Frau? - Die Frau trainiert die Oberschenkel - Die Frau trainiert dem Oberschenkel - Die Frau trainiert des Oberschenkel - Die Frau trainiert der Oberschenkel	1	0	3			
11.Vor wem oder was sitzt die Frau? - Die Frau sitzt vor das Faß - Die Frau sitzt vor den Faß - Die Frau sitzt vor der Faß - Die Frau sitzt vor dem Faß	4	3 <- Die Frau sitzt vor das Faß> <- Die Frau sitzt vor den Faß> <- Die Frau sitzt vor der Faß>				0
12.Wen oder was pflückt die Frau? - Die Frau pflückt des Apfels - Die Frau pflückt den Apfel - Die Frau pflückt dem Apfel - Die Frau pflückt der Apfel	2	1 <- Die Frau pflückt dem Apfel>		2		
13.Worauf sitzt der Mann? - Er sitzt auf den Aufsitzmäher - Er sitzt auf des Aufsitzmähers - Er sitzt auf dem Aufsitzmäher - Er sitzt auf der Aufsitzmäher	3	2 <- Er sitzt auf den Aufsitzmäher> <- Er sitzt auf des Aufsitzmähers>			1	
14.Wen oder was stößt Sie? - Sie stößt den Kugel - Sie stößt der Kugel - Sie stößt dem Kugel - Sie stößt die Kugel	3	2 <- Sie stößt den Kugel> <- Sie stößt dem Kugel>			1	
15.Wer umarmt die Frau? - Sie wird von ihrem Mann umarmt - Sie wird von ihres Mannes umarmt - Sie wird von ihren Mann umarmt - Sie wird von ihrer Mann umarmt	1	0	3			

16.Wen treibt der Jockey an? - Der Jockey treibt sein Pferd an - Der Jockey treibt seinem Pferd an - Der Jockey treibt seine Pferd an - Der Jockey treibt seiner Pferd an	1	0	3				
17.Wen oder was hält der Junge? - Der Junge hält ein Ball - Der Junge hält eines Balles - Der Junge hält einem Ball - Der Junge hält einen Ball	3	2 <- Der Junge hält ein Ball> <- Der Junge hält einem Ball >				1	
18.Von wem wird das Bier serviert? - Das Bier wird von einem Kellnerin serviert - Das Bier wird von eine Kellnerin serviert - Das Bier wird von einer Kellnerin serviert - Das Bier wird von einen Kellnerin serviert	3	2 <- Das Bier wird von einem Kellnerin serviert> <- Das Bier wird von eine Kellnerin serviert>				1	
19.Von wem wird die Probe untersucht? - Die Probe wird von dem Laboranten untersucht - Die Probe wird von den Laboranten untersucht - Die Probe wird von der Laboranten untersucht - Die Probe wird von des Laboranten untersucht	1	0	3				
20.Wohin springt das Pferd? - Das Pferd springt auf die Hürde - Das Pferd springt über den Hürde - Das Pferd springt auf der Hürde - Das Pferd springt über die Hürde	4	3 <- Das Pferd springt auf die Hürde> <- Das Pferd springt auf der Hürde> <- Das Pferd springt über den Hürde>					0
Sum of Trials, Errors & Evaluating Scale	51	31				29	

Wernicke's Aphasic

Therapy on Wed. 10, March 2004

In this session of therapy Mr Fimm will receive a training in exercise 7 and 8. Texts, images and tones are submitted to him. In exercise 7 he has to assign the text to the images that stand for the "SPO" sentences. It is another new level of therapy to which the patient will be exposed. In this situation the therapist must be tactful and vigilant to avoid straining the patient and making him uneasy.



Table 93: Wernicke's Aphasic's therapy in exercise of *Understanding* concrete sentences at the *Reception Level*

Exercise 7 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Die Frau wischt Staub	2	1<Die Frau spült Geschirr>		2		
2.Die Frau liest Akten	2	1<Die Frau schreibt Briefe>		2		

3.Die Frau schreibt Briefe	2	1<Die Frau liest Akten>	2		
4.Die Frau spült Geschirr	2	1<Die Frau wischt Staub>	2		
5.Der Mann spielt Billiard	2	1<Der Mann spielt Golf>	2		
6.Der Mann spielt Golf	1	0	3		
7.Der Mann fährt Boot	2	1<Der Mann fliegt Drachen>	2		
8.Der Mann fliegt Drachen	1	0	3		
9.Der Mann erklärt Formeln	1	0	3		
10.Der Mann hebt Gewichte	2	1<Der Mann macht Judo>	2		
11.Der Mann macht Judo	1	0	3		
12.Der Mann entwirft Pläne	2	1<Der Mann erklärt Formeln>	2		
13.Die Frau gießt Blumen	3	2<-Die Frau misst Kraft> <-Die Frau schneidet Gras>		1	
14.Die Frau macht Gymnastik	2	1<Die Frau misst Kraft>	2		
15.Die Frau schneidet Gras	1	0	3		
16.Die Frau misst Kraft	2	1<Die Frau macht Gymnastik>	2		
17.Das Mädchen pflückt Äpfel	2	1<Das Mädchen pflegt Blumen>	2		
18.Das Mädchen spielt Tennis	2	1<Das Mädchen spielt Volleyball>	2		
19.Das Mädchen pflegt Blumen	3	2<-Das Mädchen pflückt Apfel> <-Das Mädchen spielt Volleyball>		1	
20.Das Mädchen spielt Volleyball	2	1<Das Mädchen spielt Tennis>	2		
Sum of Trials, Errors & Evaluating Scale	37	17	43		

The Wernicke’s aphasic is also to be trained in “Kasus-Markierung”. It is the contrary of what he did in the above exercise. In this context he has to assign the correct case to an image. The procedures of training consist of questions and answers, during which the tone, texts and images are provided by NeuroLing.

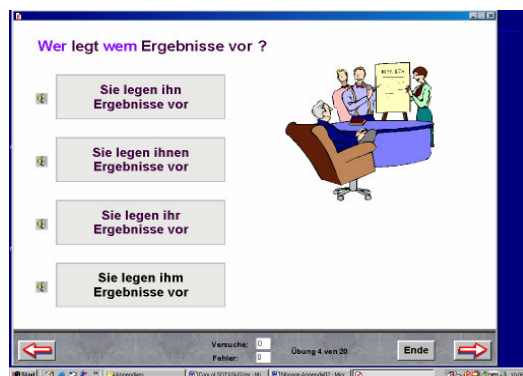


Table 94: Wernicke’s Aphasic’s therapy in an exercise of *Understanding* concrete active/passive sentences at the *Reception Level*

Exercise 8 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Wer umarmt das Mädchen? - des Vaters umarmt das Mädchen - den Vater umarmt das Mädchen - dem Vater umarmt das Mädchen - der Vater umarmt das Mädchen	1	0	3			
2.Wen oder was schiebt die Mutter? - Die Mutter schiebt der Kinderwagen - Die Mutter schiebt den Kinderwagen - Die Mutter schiebt des Kinderwagens - Die Mutter schiebt dem Kinderwagen	2	1 <- Die Mutter schiebt der Kinderwagen>		2		

3. Wer redet zu wem? - Er redet zum ihm - Er redet zu ihr - Er redet zu ihnen - Er redet zu ihm	2	1 <-Er redet zu ihr>		2		
4. Wer legt wem Ergebnisse vor? - Sie legen ihm Ergebnisse vor - Sie legen ihnen Ergebnisse vor - Sie legen ihr Ergebnisse vor - Sie legen ihm Ergebnisse vor	3	2 <Sie legen ihr Ergebnisse vor> <Sie legen ihnen Ergebnisse vor>			1	
5. Zwischen wem sitzt die Frau? - Die Frau sitzt zwischen der Männer - Die Frau sitzt zwischen den Männern - Die Frau sitzt zwischen die Männer - Die Frau sitzt zwischen dem Männer	3	2 <Die Frau sitzt zwischen die Männer> <Die Frau sitzt zwischen der Männer>			1	
6. Wen hält der Angler? - Der Angler hält der Fisch - Der Angler hält dem Fisch - Der Angler hält den Fisch - Der Angler hält des Fisches	2	1 <- Der Angler hält der Fisch>		2		
7. Was schiebt die Frau hoch? - Die Frau schiebt dem Beincurler hoch - Die Frau schiebt des Beincurlers hoch - Die Frau schiebt der Beincurler hoch - Die Frau schiebt den Beincurler hoch	2	1 <Die Frau schiebt dem Beincurler hoch>		2		
8. Was hält der Arzt? - Der Arzt hält das Krankenblatt - Der Arzt hält den Krankenblatt - Der Arzt hält dem Krankenblatt - Der Arzt hält des Krankenblattes	1	0	3			
9. Wen und was schieben die Männer? - Die Männer schieben die Boote - Die Männer schieben des Bootes - Die Männer schieben das Boot - Die Männer schieben dem Boot	2	1 <- Die Männer schieben die Boote>		2		
10. Wen oder was trainiert die Frau? - Die Frau trainiert die Oberschenkel - Die Frau trainiert dem Oberschenkel - Die Frau trainiert des Oberschenkel - Die Frau trainiert der Oberschenkel	2	1 <Die Frau trainiert der Oberschenkel>		2		
11. Vor wem oder was sitzt die Frau? - Die Frau sitzt vor das Faß - Die Frau sitzt vor den Faß - Die Frau sitzt vor der Faß - Die Frau sitzt vor dem Faß	2	1 <Die Frau sitzt vor den Faß>		2		
12. Wen oder was pflückt die Frau? - Die Frau pflückt des Apfels - Die Frau pflückt den Apfel - Die Frau pflückt dem Apfel - Die Frau pflückt der Apfel	3	2 <Die pflückt der Apfel > <Die pflückt dem Apfel>			1	
13. Worauf sitzt der Mann? - Er sitzt auf den Aufsitzmäher - Er sitzt auf des Aufsitzmähers - Er sitzt auf dem Aufsitzmäher - Er sitzt auf der Aufsitzmäher	2	1 <-Er sitzt auf den Aufsitzmäher>		2		
14. Wen oder was stößt Sie? - Sie stößt den Kugel - Sie stößt der Kugel - Sie stößt dem Kugel - Sie stößt die Kugel	3	2 <Sie stößt dem Kugel> <Sie stößt der Kugel>		2		
15. Wer umarmt die Frau? - Sie wird von ihrem Mann umarmt - Sie wird von ihres Mannes umarmt - Sie wird von ihren Mann umarmt - Sie wird von ihrer Mann umarmt	3	2 <Sie wird von ihrer Mann umarmt> <Sie wird von ihren Mann umarmt>			1	
16. Wen treibt der Jockey an? - Der Jockey treibt sein Pferd an - Der Jockey treibt seinem Pferd an - Der Jockey treibt seine Pferd an - Der Jockey treibt seiner Pferd an	1	0	3			

17.Wen oder was hält der Junge? - Der Junge hält ein Ball - Der Junge hält eines Balles - Der Junge hält einem Ball - Der Junge hält einen Ball	2	1 <- Der Junge hält ein Ball>		2		
18.Von wem wird das Bier serviert? - Das Bier wird von einem Kellnerin serviert - Das Bier wird von eine Kellnerin serviert - Das Bier wird von einer Kellnerin serviert - Das Bier wird von einen Kellnerin serviert	2	1 <- Das Bier wird von einem Kellnerin serviert>		2		
19.Von wem wird die Probe untersucht? - Die Probe wird von dem Laboranten untersucht - Die Probe wird von den Laboranten untersucht - Die Probe wird von der Laboranten untersucht - Die Probe wird von des Laboranten untersucht	1	0	3			
20.Wohin springt das Pferd? - Das Pferd springt auf die Hürde - Das Pferd springt über den Hürde - Das Pferd springt auf der Hürde - Das Pferd springt über die Hürde	2	1 <- Das Pferd springt über den Hürde>		2		
Sum of Trials, Errors & Evaluating Scale	41	21		39		

Anomic Aphasic

Therapy on Thu.11, March 2004

Mrs Heinrich will be also introduced to a training in the “SPO” sentences and the identification of the “Kasus-Markierung”. The administration of training will take place in the following way: as far as exercise7 is concerned Mrs Heinrich has to find the situation, whose text is omitted, of course using as a cue of assistance the spoken submitted tone of NeuroLing, after that she proceeds to assign a spoken sentence to a situation.



Table 95: Anomic Aphasic’s therapy in an exercise of *Understanding* concrete sentences at the *Reception Level*

Exercise 7 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Die Frau wischt Staub	1	0	3			
2.Die Frau liest Akten	1	0	3			
3.Die Frau schreibt Briefe	1	0	3			
4.Die Frau spült Geschirr	1	0	3			
5.Der Mann spielt Billiard	1	0	3			

6.Der Mann spielt Golf	1	0	3			
7.Der Mann fährt Boot	1	0	3			
8.Der Mann fliegt Drachen	1	0	3			
9.Der Mann erklärt Formeln	2	1<Der Mann entwirft Pläne>		2		
10.Der Mann hebt Gewichte	1	0	3			
11.Der Mann macht Judo	1	0	3			
12.Der Mann entwirft Pläne	1	0	3			
13.Die Frau gießt Blumen	1	0	3			
14.Die Frau macht Gymnastik	1	0	3			
15.Die Frau schneidet Gras	1	0	3			
16.Die Frau misst Kraft	2	1<Die Frau macht Gymnastik>		2		
17.Das Mädchen pflückt Äpfel	2	1<Das Mädchen pflegt Blumen>		2		
18.Das Mädchen spielt Tennis	1	0	3			
19.Das Mädchen pflegt Blumen	1	0	3			
20.Das Mädchen spielt Volleyball	1	0	3			
Sum of Trials, Errors & Evaluating Scale	23	3		57		

The eighth exercise of table 96 is different from the seventh one. The patient must find the deleted text and assign it to a situation. The texts of the tasks are not submitted during Mrs Heinrich's involvement in training. They are pronounced one after the other by a voice stored in NeuroLing, or on demand the button of the loudspeaker can be clicked and the intended sentence will be pronounced.



Table 96: Anomic Aphasic's therapy in an exercise of *Understanding* concrete active/passive sentences at the *Reception Level*

Exercise 8 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Wer umarmt das Mädchen? - des Vaters umarmt das Mädchen - den Vater umarmt das Mädchen - dem Vater umarmt das Mädchen - der Vater umarmt das Mädchen	1	0	3			
2.Wen oder was schiebt die Mutter? - Die Mutter schiebt den Kinderwagen - Die Mutter schiebt den Kinderwagen - Die Mutter schiebt des Kinderwagens - Die Mutter schiebt dem Kinderwagen	2	1 <- Die Mutter schiebt dem Kinderwagen>		2		

3.Wer redet zu wem? - Er redet zum ihm - Er redet zu ihr - Er redet zu ihnen - Er redet zu ihm	1	0	3				
4.Wer legt wem Ergebnisse vor? - Sie legen ihn Ergebnisse vor - Sie legen ihnen Ergebnisse vor - Sie legen ihr Ergebnisse vor - Sie legen ihm Ergebnisse vor	2	1 <Sie legen ihn Ergebnisse vor>		2			
5.Zwischen wem sitzt die Frau? - Die Frau sitzt zwischen der Männer - Die Frau sitzt zwischen den Männern - Die Frau sitzt zwischen die Männer - Die Frau sitzt zwischen dem Männer	1	0	3				
6.Wen hält der Angler? - Der Angler hält der Fisch - Der Angler hält dem Fisch - Der Angler hält den Fisch - Der Angler hält des Fisches	1	0	3				
7.Was schiebt die Frau hoch? - Die Frau schiebt dem Beincurler hoch - Die Frau schiebt des Beincurlers hoch - Die Frau schiebt der Beincurler hoch - Die Frau schiebt den Beincurler hoch	2	1 <- Die Frau schiebt dem Beincurler hoch>		2			
8.Was hält der Arzt? - Der Arzt hält das Krankenblatt - Der Arzt hält den Krankenblatt - Der Arzt hält dem Krankenblatt - Der Arzt hält des Krankenblattes	1	0	3				
9.Wen und was schieben die Männer? - Die Männer schieben die Boote - Die Männer schieben des Bootes - Die Männer schieben das Boot - Die Männer schieben dem Boot	2	1 <- Die Männer schieben die Boote<		2			
10.Wen oder was trainiert die Frau? - Die Frau trainiert die Oberschenkel - Die Frau trainiert dem Oberschenkel - Die Frau trainiert des Oberschenkel - Die Frau trainiert der Oberschenkel	1	0	3				
11.Vor wem oder was sitzt die Frau? - Die Frau sitzt vor das Faß - Die Frau sitzt vor den Faß - Die Frau sitzt vor der Faß - Die Frau sitzt vor dem Faß	1	0	3				
12.Wen oder was pflückt die Frau? - Die Frau pflückt des Apfels - Die Frau pflückt den Apfel - Die Frau pflückt dem Apfel - Die Frau pflückt der Apfel	1	0	3				
13.Worauf sitzt der Mann? - Er sitzt auf den Aufsitzmäher - Er sitzt auf des Aufsitzmähers - Er sitzt auf dem Aufsitzmäher - Er sitzt auf der Aufsitzmäher	2	1 <Er sitzt auf den Aufsitzmäher>		2			
14.Wen oder was stößt Sie? - Sie stößt den Kugel -Sie stößt der Kugel -Sie stößt dem Kugel -Sie stößt die Kugel	1	0	3				
15.Wer umarmt die Frau? -Sie wird von ihrem Mann umarmt -Sie wird von ihres Mannes umarmt -Sie wird von ihren Mann umarmt -Sie wird von ihrer Mann umarmt	1	0	3				
16.Wen treibt der Jockey an? - Der Jockey treibt sein Pferd an - Der Jockey treibt seinem Pferd an - Der Jockey treibt seine Pferd an - Der Jockey treibt seiner Pferd an	1	0	3				

17.Wen oder was hält der Junge? - Der Junge hält ein Ball - Der Junge hält eines Balles - Der Junge hält einem Ball - Der Junge hält einen Ball	2	1 <- Der Junge hält ein Ball>		2		
18.Von wem wird das Bier serviert? - Das Bier wird von einem Kellnerin serviert - Das Bier wird von eine Kellnerin serviert - Das Bier wird von einer Kellnerin serviert - Das Bier wird von einen Kellnerin serviert	1	0	3			
19.Von wem wird die Probe untersucht? - Die Probe wird von dem Laboranten untersucht - Die Probe wird von den Laboranten untersucht - Die Probe wird von der Laboranten untersucht - Die Probe wird von des Laboranten untersucht	1	0	3			
20.Wohin springt das Pferd? - Das Pferd springt auf die Hürde - Das Pferd springt über den Hürde - Das Pferd springt auf der Hürde - Das Pferd springt über die Hürde	2	1 <- Das Pferd springt auf die Hürde>		2		
Sum of Trials, Errors & Evaluating Scale	27	7		53		

Commentary on the 4th Hour

Assigning a sentence to a pictorial situation is at this stage a task, which the Broca's aphasic, Mrs Müller, managed to accomplish in exercise7 of table91 with a low score of errors. The latter occurred mainly in situations where there is a similarity in the act of doing something for instance “ *Die Frau schneidet das Gras*”and “*Die Frau gießt die Blumen*” or “*Der Mann spielt Billiard*” and “*Der Mann spielt Golf*”. The score attained is of 51/60. This result depicts that Mrs Müller has a good capacity of assigning a sentence to a situation. But in the eighth exercise of table92, in which both the semantic and the syntactic aspects are interwoven, the patient tended to make grammatical errors in many tasks. Thus, the score of trials and errors went up and that of the evaluating scale sank.

The attempts of the Wernicke's aphasic to submit correct responses in exercise7 of table93 show that his involvement in the processes of trials and errors ameliorated his semantic component, hence the slight increase in his communicative ability. The evaluating scale of this exercise is far above the average. This tendency of amelioration is reflected by exercise8 in table94, in which grammatical and case aspects of the sentences have helped the patient make the sum of his errors decrease, and thus achieve a satisfactory score in the “Kasus-Markierung”.

Neither the tasks in exercise7 of table95 nor those in exercise8 of table96 caused the patient, Mrs Heinrich make many syntactic and semantic errors. In the seventh exercise she made 3 errors and in the eighth one 7 errors. These results speak a lucid language that the semantic and the syntactic components of her sentences, where she was required to assign a sentence to a situation and vice versa, show slight disturbances as far as the semantic and the grammatical aspects of the words and the sentences are concerned.

* The **fifth hour** of therapy of the third week encompasses the combination of a semantic exercise for reception and another one for production. The focus will be mainly on the assignment of a word to a sentence; it is “a relational language understanding” at an abstract sentence level.

This becomes, for instance, tangible in exercise9 in which a substantive, a verb or an adjective will be assigned to sentences. They complement them. During training the patient selects one correct word from three terms that share semantic and situational features. Exercise10 introduces other aspects in training. It is an exercise of production. It consists of tasks whose aim is to stimulate both the semantic and the phonological ability of the patients. The latter are required to name an image using mixed, independent vocals and consonants, which must be organized in a correct word form. The aim is to obtain a meaningful lexical word that fits in the blank, and achieves a correct grapheme-phoneme correspondence creating thus a meaningful lexical word that refers to the image presented.

Broca's Aphasic

Therapy on Mo.15, March 2004

Mrs Müller's therapy in exercise9 and 10 will be carried out in another way due to the form and the content of the tasks. In exercise9 she hears a sentence and attempts to complete it using a substantive, a verb or an adjective. The whole exercise contains no image that could help her assign the correct lexical word to a sentence. She is required to select the semantic term on the basis of a spoken sentence; that is, in this context she assigns a word to a sentence. She can hear the sentence being spoken if she clicks on the button of the loudspeaker shown in the window-form of the task that she ought to solve.

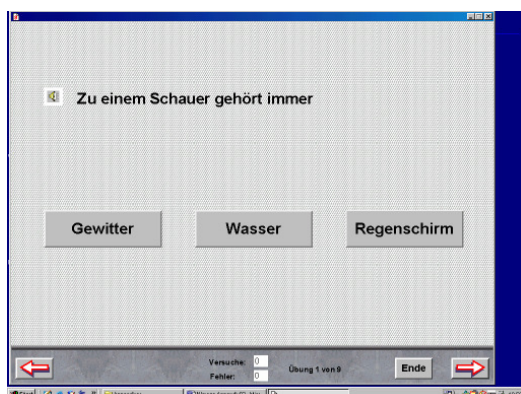


Table 97: Broca's Therapy's therapy in an exercise of *Understanding* and *Assigning* a noun, a verb and an adjective to an abstract sentence at the *Reception level*

Exercise 9 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Zu einem Schauer gehören immer - Gewitter - Wasser - Regenschirm - (nichts)	2	1<Wasser>		2		
2. Ein Lebewesen hat immer - Augen - Lungen - Zellen - (nichts)	3	2<Augen, Zellen>			1	
3. Zur Musik gehört immer - Instrument - Tanz - Geselligkeit - (nichts)	2	1<Tanz>		2		
4. Das Gegenteil von Freude ist - Bosheit - Ernsthaftigkeit - Trauer - (nichts)	1	0	3			
5. Das Gegenteil von Furcht ist - Mut - Kampf - Geduld - (nichts)	2	1<Kampf>		2		
6. Das Gegenteil von Reichtum ist - Elend - Geiz - Armut - (nichts)	2	1<Elend>		2		
7. Das Wort "Not" hat am meisten Ähnlichkeit mit dem Wort - Elend - Unfall - Kummer - (nichts)	2	1<Kummer>		2		
8. Wenn jemand tratscht, dann.....er gerne - lacht - erzählt - meckert - (nichts)	2	1<meckert>		2		
9. Wenn jemand etwas zugibt, danner - vergibt - vergisst - gesteht - (nichts)	2	1<vergibt>		2		
10. Das Gegenteil von loben ist - nötigen - tadeln - erörtern - (nichts)	1	0	3			
11. Das Gegenteil von verlieren ist - wachsen - gewinnen - kaufen - (nichts)	1	0	3			
12. Das Gegenteil von schreien ist - flüstern - flöten - seufzen - (nichts)	2	1<seufzen>		2		
13. Das Wort "stehlen" hat am meisten Ähnlichkeit mit dem Wort - horten - nehmen - klauen - (nichts)	3	2<horten, nehmen>			1	
14. Das Wort "meistern" hat am meisten Ähnlichkeit mit dem Wort - bewältigen - kämpfen	2	1(nichts)		2		

- prügeln - (nichts)						
15. Ein verdorbenes Nahrungsmittel ist nicht mehr - genießbar - abgelaufen - ranzig - (nichts)	2	1<ranzig>		2		
16. Eine unerreichbare Sache ist - absurd - aussichtslos - unbedenklich - (nichts)	2	1<absurd>		2		
17. Jemand, der dick ist, ist - schwer - pfundig - bleiern - (nichts)	2	1<pfundig>		2		
18. Das Gegenteil von "hübsch" ist - eklig - hässlich - dumm - (nichts)	2	1<eklig>		2		
19. Das Gegenteil von "jung" ist - reif - erwachsen - alt - (nichts)	3	2<reif, erwachsen>			1	
20. Das Gegenteil von "antriebslos" ist - stark - dynamisch - fröhlich - (nichts)	2	1<stark>		2		
Sum of Trials, Errors & Evaluating Scale	40	20			40	

Exercise 10 is new in this process of therapy. The patient is given a sentence that has a blank at the end of it, the image of an object, its first phoneme and its scattered vowels and consonants. The task of Mrs Müller is to use the scattered phonemes to form a lexical word that suits to the image of the presented object and therefore make a complete sentence. To assist her in this task she is offered the text and the tone as well as the image to which they refer.



Table 98: Broca's Aphasic's therapy in an exercise of *Word Formation* at the *Production Level*

Exercise 10 of NL Anagramme Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Ich schlage den Nagel in die Wand mit einem H..... (a - e - m - r - m)	3	2<Ham/ICØ/r[ICe]>			1	

2.Du lebst am Rand der Stadt in einem schönen, großen H..... (u - a - s)	2	1<Hu[1V]a>		2		
3.Ich habe Durst. Gibst du mir bitte ein Glas Orangen S... (f - a - t)	1	0(ND)	3			
4.Man schneidet das Brot mit einem großen, scharfen M..... (s - e - r - e - s)	2	1<Mes/1CØ/er>		2		
5.Sie trägt eine kostbare Perlen K..... (e - e - t - t)	2	1<Ket/1CØ/e>		2		
6.Eine Schüssel Milch bekommt die K..... (t - e - z - a)	2	1<Ka/1CØ/ze>		2		
7.Nimm doch ein Stück von dem selbstgebackenen K..... (c - n - u - e - h)	3	2<Ku/1CØ//1CØ/en>			1	
8.Am Abend gucke ich die Tagesschau im F..... (s - r - e - n - h - e - e)	4	3<Fe/1CØ/nse/1CØ//1VØ/n>				0
9.Ich putze mir die Zähne mit der Z..... (b - r - n - ü - h - a - e - s - t)	4	3<Za/1CØ/mbü/1CØ//1CØ/te>				0
10.Man wäscht sich die Hände mit S..... (e - e - f - i)	2	1<Se/1VØ/fe>		2		
11.Ältere Männer haben auf dem Kopf oft wenig H..... (r - a - e - a)	2	1<Ha/1VØ/re>		2		
12.Wir essen viel Brot, und die Chinesen essen viel R..... (i - s - e)	1	0(ND)	3			
13.Wir haben ein eigenes Haus mit einem schönen G..... (e - r - n - a - t)	2	1<Ga/1CØ/ten>		2		
14.Einen feuerspeienden Berg nennt man V..... (n - a - k - l - u)	3	2<Vu/1CØ/k/1CØ/n>			1	
15.Der Kellner serviert das bestellte E..... (s - e - s - n)	2	1<Es/1CØ/en>		2		
16.Wenn ich müde bin, brauche ich einen starken K..... (e - f - e - a - f)	2	1<Ka/1CØ/ee>		2		
17.Wir bezahlen die Ware mit G..... (l - d - e)	1	0(ND)	3			
18.Unsere Familie liegt im Urlaub gern am sandigen S..... (a - r - t - n - d)	2	1<St/1CØ/and>		2		
19.Viele Leute fahren nicht ans Meer, sondern in die B..... (r - e - e - g)	3	2<B/1VØ/r[1Ve]g>			1	
20.Wenn ich auf Reisen gehe, packe ich meinen K..... (f - o - f - e - r)	3	2<Kof/1CØ/r[1Ve]>			1	
Sum of Trials, Errors & Evaluating Scale	46	26			34	

Wernicke's Aphasic

Therapy on Mo.15, March 2004

Mr Fimm will be confronted with difficult tasks during the therapy administration of the following two exercises. In exercise9 of table99 there is no image that could give him a visual assistance as he attempts to link the sentence and the target word he has to select. The form of the exercise, which contains only the tone and the text, will teach him to do without the image

so as to recognize the correct meaning of the lexical words. In other terms the patient attempts to complement an abstract sentence with a lexical word that must be selected from three terms.



Table 99: Wernicke's Aphasic's therapy in an exercise of *Understanding* and *Assigning* a noun, a verb and an adjective to an abstract sentence at the *Reception level*

Exercise 9 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Zu einem Schauer gehören immer - Gewitter - Wasser - Regenschirm - (nichts)	3	2<Regenschirm, Gewitter>			1	
2. Ein Lebewesen hat immer - Augen - Lungen - Zellen - (nichts)	3	2<Augen, Lungen>			1	
3. Zur Musik gehört immer - Instrument - Tanz - Geselligkeit - (nichts)	3	2<Tanz, Instrument>			1	
4. Das Gegenteil von Freude ist - Bosheit - Ernsthaftigkeit - Trauer - (nichts)	2	1<(nichts)>		2		
5. Das Gegenteil von Furcht ist - Mut - Kampf - Geduld - (nichts)	2	1<Geduld>		2		
6. Das Gegenteil von Reichtum ist - Elend - Geiz - Armut - (nichts)	3	2<Elend, Geiz>			1	
7. Das Wort "Not" hat am meisten Ähnlichkeit mit dem Wort - Elend - Unfall - Kummer - (nichts)	3	2<Unfall, Elend>			1	
8. Wenn jemand tratscht, dann.....er gerne - lacht - erzählt - meckert - (nichts)	2	1<lacht>		2		
9. Wenn jemand etwas zugibt, danner - vergibt - vergisst	3	2<vergift, vergisst>			1	

- gesteht - (nichts)						
10. Das Gegenteil von loben ist - nötigen - tadeln - erörtern - (nichts)	2	1<nichts>		2		
11. Das Gegenteil von verlieren ist - wachsen - gewinnen - kaufen - (nichts)	2	1<wachsen>		2		
12. Das Gegenteil von schreien ist - flüstern - flöten - seufzen - (nichts)	2	1<seufzen>		2		
13. Das Wort "stehlen" hat am meisten Ähnlichkeit mit dem Wort - horten - nehmen - klauen - (nichts)	3	2<horten, nehmen>			1	
14. Das Wort "meistern" hat am meisten Ähnlichkeit mit dem Wort - bewältigen - kämpfen - prügeln - (nichts)	2	1<kämpfen>		2		
15. Ein verdorbenes Nahrungsmittel ist nicht mehr - genießbar - abgelaufen - ranzig - (nichts)	2	1<ranzig>		2		
16. Eine unerreichbare Sache ist - absurd - aussichtslos - unbedenklich - (nichts)	2	1<(nichts)>		2		
17. Jemand, der dick ist, ist - schwer - pfundig - bleiern - (nichts)	3	2<pfundig, bleiern>			1	
18. Das Gegenteil von "hübsch" ist - eklig - hässlich - dumm - (nichts)	2	1<eklig>		2		
19. Das Gegenteil von "jung" ist - reif - erwachsen - alt - (nichts)	3	2<reif, erwachsen>			1	
20. Das Gegenteil von "antriebslos" ist - stark - dynamisch - fröhlich - (nichts)	2	1<stark>		2		
Sum of Trials, Errors & Evaluating Scale	49	29			31	

In exercise 10 of table 100 the Wernicke's aphasic will get a therapeutic training in the same way the Broca's aphasic was trained. He receives both the image of the object and the text in the form of a sentence from which the omitted lexical word, that should be formed, is presented in scattered phonemes. A voice in NeuroLing reads the sentence, without pronouncing the lexical word. The patient should try to form a correct phoneme-grapheme conversion

so as to produce a meaningful word that corresponds to the image seen in the window of the task. The lexical word should complement the sentence.

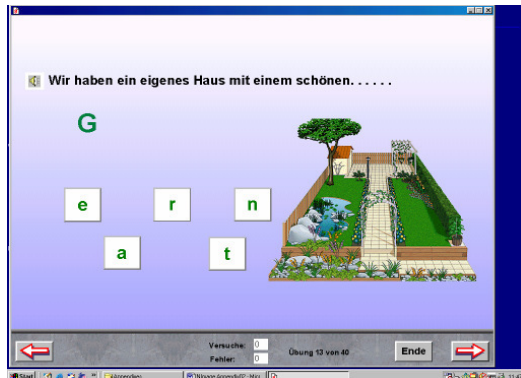


Table 100: Wernicke's Aphasic's therapy in an exercise of *Word Formation* at the *Production Level*

Exercise 10 of NL Anagramme Stimuli (Image, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Ich schlage den Nagel in die Wand mit einem H..... (a - e - m - r - m)	4	3<H[1Ve]m/1CØ/[1Va]r				0
2. Du lebst am Rand der Stadt in einem schönen, großen H..... (u - a - s)	3	2<H/1VØ/us[1Va]>			1	
3. Ich habe Durst. Gibst du mir bitte ein Glas Orangen S..... (f - a - t)	2	1<Sat[1Cf]>		2		
4. Man schneidet das Brot mit einem großen, scharfen M..... (s - e - r - e - s)	4	3<M[1Cr]/1VØ/s/1CØ/e>				0
5. Sie trägt eine kostbare Perlen K..... (e - e - t - t)	3	2<K/1VØ/te[1Ct]>			1	
6. Eine Schüssel Milch bekommt die K..... (t - e - z - a)	3	2<K[1Cz]/[1Va]te>			1	
7. Nimm doch ein Stück von dem selbstgebackenen K..... (c - n - u - e - h)	4	3<K[1Cn]/[1Vu]h[1Cc]e>				0
8. Am Abend gucke ich die Tagesschau im F..... (s - r - e - n - h - e - e)	4	3<Fse[1Cn]he[1Cr]/[1Ve]>				0
9. Ich putze mir die Zähne mit der Z..... (b - r - n - ü - h - a - e - s - t)	3	2<Zh[1Va]nü[1Cb]rste>			1	
10. Man wäscht sich die Hände mit S..... (e - e - f - i)	3	2<Sef[1Vi]/[1CØ]/>			1	
11. Ältere Männer haben auf dem Kopf oft wenig H..... (r - a - e - a)	3	2<Ha[1Ve]r[1Va]>			1	
12. Wir essen viel Brot, und die Chinesen essen viel R..... (i - s - e)	2	1<R[1Vi]es>		2		
13. Wir haben ein eigenes Haus mit einem schönen G..... (e - r - n - a - t)	3	2<Gr[1Va]tn[1Ve]>			1	
14. Einen feuerspeienden Berg nennt man V..... (n - a - k - l - u)	3	2<V[1Va]l k[1Vu]n/>			1	
15. Der Kellner serviert das bestellte E..... (s - e - s - n)	3	2<Es/1CØ/n[1Ve]>			1	

16. Wenn ich müde bin, brauche ich einen starken K..... (e - f - e - a - f)	3	2<K[1Ve]ff[1Va] e/>			1	
17. Wir bezahlen die Ware mit G..... (1 - d - e)	2	1<G[1Cl]ed>		2		
18. Unsere Familie liegt im Urlaub gern am sandigen S..... (a - r - t - n - d)	3	2<Sm[1Va][1Ct]d>			1	
19. Viele Leute fahren nicht ans Meer, sondern in die B..... (r - e - e - g)	2	1<Beg[1Cr]e>		2		
20. Wenn ich auf Reisen gehe, packe ich meinen K..... (f - o - f - e - r)	3	2<K[1Ve][1Vo]ffr>			1	
Sum of Trials, Errors & Evaluating Scale	61	41			19	

Anomic Aphasic

Therapy on Tu.16, March 2004

In the therapy session of exercise 9 of table 101 Mrs Heinrich receives only the spoken sentence. The text and the tone of the lexical words below the sentence, which were an advantageous help in the process of therapy to the Broca's and Wernicke's aphasics, are deleted. Her major difficulties lie in her inability to find the words the reason why her training will have the following procedure; Mrs Heinrich listens to the sentence being spoken, hears the words below it being pronounced, attempts to find the correct one and assigns it to the spoken sentence.

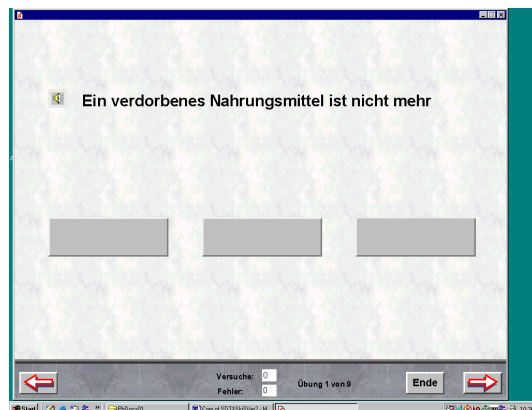


Table 101: Anomic Aphasic's therapy in an exercise of *Understanding* and *Assigning* a noun, a verb and an adjective to an abstract sentence at the *Reception level*

Exercise 9 of NL Stimuli (Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Zu einem Schauer gehören immer - Gewitter - Wasser - Regenschirm - (nichts)	2	1<Gewitter>		2		
2. Ein Lebewesen hat immer - Augen - Lungen	2	1<Lungen>		2		

- Zellen - (nichts)						
3.Zur Musik gehört immer - Instrument - Tanz - Geselligkeit - (nichts)	2	1<Tanz>		2		
4.Das Gegenteil von Freude ist - Bosheit - Ernsthaftigkeit - Trauer - (nichts)	1	0	3			
5.Das Gegenteil von Furcht ist - Mut - Kampf - Geduld - (nichts)	1	0	3			
6.Das Gegenteil von Reichtum ist - Elend - Geiz - Armut	1	0	3			
7.Das Wort "Not" hat am meisten Ähnlichkeit mit dem Wort - Elend - Unfall - Kummer - (nichts)	1	0	3			
8.Wenn jemand tratscht, dann.....er gerne - lacht - erzählt - meckert - (nichts)	2	1<meckert>		2		
9.Wenn jemand etwas zugibt, danner - vergibt - vergisst - gesteht - (nichts)	1	0	3			
10.Das Gegenteil von loben ist - nötigen - tadeln - erörtern - (nichts)	1	0	3			
11.Das Gegenteil von verlieren ist - wachsen - gewinnen - kaufen - (nichts)	1	0	3			
12.Das Gegenteil von schreien ist - flüstern - flöten - seufzen - (nichts)	2	1<seufzen>		2		
13.Das Wort "stehlen" hat am meisten Ähnlichkeit mit dem Wort - horten - nehmen - klauen - (nichts)	2	1<nehmen>		2		
14.Das Wort "meistern" hat am meisten Ähnlichkeit mit dem Wort - bewältigen - kämpfen - prügeln - (nichts)	2	1<kämpfen>		2		
15.Ein verdorbenes Nahrungsmittel ist nicht mehr - genießbar - abgelaufen - ranzig - (nichts)	1	0	3			
16.Eine unerreichbare Sache ist - absurd - aussichtslos - unbedenklich - (nichts)	2	1<absurd>		2		
17.Jemand, der dick ist, ist - schwer	2	1<pfundig>		2		

- pfundig - bleiern - (nichts)						
18. Das Gegenteil von "hübsch" ist - eklig - hässlich - dumm - (nichts)	2	1<eklig>		2		
19. Das Gegenteil von "jung" ist - reif - erwachsen - alt	2	1<erwachsen>		2		
20. Das Gegenteil von "antriebslos" ist - stark - dynamisch - fröhlich - (nichts)	2	1<stark>		2		
Sum of Trials, Errors & Evaluating Scale	32	12		48		

In exercise 10 of table 102, because of the difficulties of the tasks, Mrs Heinrich is offered the images of the objects and the tone of the sentence that precedes the lexical word, she has to produce. The demand made on her is to form, through the deleted scattered phonemes, a correct lexical word that corresponds to the image and insert it in the blank of the sentence.



Table 102: Anomic Aphasic's therapy in an exercise of *Word Formation* at the *Production Level*

Exercise 10 of NL Anagramme Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Ich schlage den Nagel in die Wand mit einem H..... (a - e - m - r - m)	2	1<Hammr[1Ve]>		2		
2. Du lebst am Rand der Stadt in einem schönen, großen H..... (u - a - s)	1	0(ND)	3			
3. Ich habe Durst. Gibst du mir bitte ein Glas Orangen S.... (f - a - t)	1	0(ND)	3			
4. Man schneidet das Brot mit einem großen, scharfen M..... (s - e - r - e - s)	2	1<Mese[1Cs]r>		2		
5. Sie trägt eine kostbare Perlen K..... (e - e - t - t)	1	0(ND)	3			
6. Eine Schüssel Milch bekommt die K..... (t - e - z - a)	2	1<Ka[1Cz]te>		2		
7. Nimm doch ein Stück von dem selbstgebackenen K..... (c - n - u - e - h)	2	1<Kuchn[1Ve]>		2		

8.Am Abend gucke ich die Tagesschau im F..... (s-r-e-n-h-e-e)	2	1<Fernse[ICØ]en>		2			
9.Ich putze mir die Zähne mit der Z..... (b-r-n-ü-h-a-e-s-t)	2	1<Zahnbürt[ICs]e>		2			
10.Man wäscht sich die Hände mit S..... (e-e-f-i)	1	0(ND)	3				
11.Ältere Männer haben auf dem Kopf oft wenig H..... (r-a-e-a)	1	0(ND)	3				
12.Wir essen viel Brot, und die Chinesen essen viel R..... (i-s-e)	1	0(ND)	3				
13.Wir haben ein eigenes Haus mit einem schönen G..... (e-r-n-a-t)	2	1<Gartn[IVe]>		2			
14.Einen feuerspeienden Berg nennt man V..... (n-a-k-l-u)	1	0(ND)	3				
15.Der Kellner serviert das bestellte E..... (s-e-s-n)	1	0(ND)	3				
16.Wenn ich müde bin, brauche ich einen starken K..... (e-f-e-a-f)	2	1<Ka[IVe]ffe>		2			
17.Wir bezahlen die Ware mit G..... (l-d-e)	1	0(ND)	3				
18.Unsere Familie liegt im Urlaub gern am sandigen S..... (a-r-t-n-d)	2	1<Sta[ICr]nd>		2			
19.Viele Leute fahren nicht ans Meer, sondern in die B..... (r-e-e-g)	1	0(ND)	3				
20.Wenn ich auf Reisen gehe, packe ich meinen K..... (f-o-f-e-r)	1	0(ND)	3				
Sum of Trials, Errors & Evaluating Scale	29	9		51			

Commentary on the 5th Hour

Mrs Müller is required in the ninth exercise of table97 to understand the situation and assign it to the correct term. All her trials to find the correct nouns, verbs or adjectives are either single, double or triple. The errors are quite balanced in the already mentioned lexical words. There is no tendency that shows that she made more errors in a particular word form than in the other. One can then formulate the following deduction about the performance achieved in this exercise: the sum of trials and errors is higher and that of the evaluating scale acceptable (Tab.97/ Exer.9). As far as the tenth exercise is concerned, one can infer that in every trial, in which Mrs Müller attempted to combine the phonemes of a word that has more than one syllable, there is at least one articulatory disorder either at the level of the vowels or consonants. It must be noted that the click on one phoneme is considered as a trial, the reason why the number of trials has gone up to 116 trials of 20 tasks. Despite the articulatory disorders that are displayed by the substitution and omission of the phonemes, the patient made morphophonemic combinations from which the meaning of the lexical words can be

deciphered. This sustained the sum of the evaluating scale that has not sunk below the average (Tab.98/ Exer.10).

There should be no doubt that at this stage of therapy training Mr Fimm will be faced with difficult tasks. Trying to find the concept of a word that corresponds to a situation has confused Mr Fimm, despite the pictorial (Exer.10) and the acoustic assistance (Exer.9) that were offered to him by NeuroLing. This can be deduced from task 4, 10 & 16 in exercise9 of table99 to which the patient could not give any response. A peculiar linguistic behaviour of the patient popped up here and there as he started to click on the words at random. This had as a matter of fact a bad influence on his trials, errors and evaluating scale (Tab.99/ Exer.9). The language of the Wernicke's aphasic unfolds extreme disturbances as he tried to combine phonemes to produce meaningful lexical words that complete the blank of the sentence. His morpho-phonemic combination rendered no meaningful word in exercise10 of table100. The substitution of the phonemes has distorted the form of the words that new word forms, which have no sense, were created. The number of the errors has reached the highest peak and the score of the evaluating scale reached the lowest level of the whole tasks with which the Wernicke's aphasic had been confronted since the beginning of the first phase of therapy (Tab.100/ Exer.10).

Apart from some substitutions Mrs Heinrich was in a position to select most of the correct lexical words that complement the meaning of the sentence (Tab.101/ Exer.9). In the tenth exercise of table102 there are also phonemic substitutions, but they were rare in comparison with those that occurred in the exercises of the Broca's and Wernicke's aphasics (Tab.98 & 100). This good performance of Mrs Heinrich made her achieve an excellent score in exercise9 and 10 that the Broca's and Wernicke's aphasics did not manage to attain.

* In the **sixth hour** of the third week's treatment the patients are still to be trained in exercises of production, whose form and content thoroughly differ from the above ones of the fifth hour of training. In exercise11 the patients will be trained to learn how to cue every day used terms that are semantically close to one another. It is a selection of suitable semantic terms from a range of very frequently used cues, that should be assigned to an image. Exercise12 offers to the patients the possibility to type what they want to cue and even correct it. The program asks them whether to submit a solution or the possibility to attempt to solve the task again if a mistake happens to occur in it. The two exercises instruct the patients how to remember and associate different cues. Both of them - mainly the first one (Exer.11) - instruct the patient how to recognize, differentiate and associate different cues that refer to a generic term. In

other words the patients learn to select and label terms that belong to a semantic category and assign them to an image, which can be labelled with a lexical word, that stands in this context as a generic term at the production level.

Broca's aphasic

Therapy on Wed.17, March 2004

In exercise 11 of table 103 Mrs Müller clicks on the image of a word, which is pronounced by a voice stored in LingWare, or on the text, whose article and phonemes are shown on the screen, just then a complete word appears below the image of the object. Supported by the acoustic, pictorial and textual elements Mrs Müller selects the terms that share semantic and situational features with the generic term, which is displayed by the image.



Table 103: Broca's Aphasic's therapy in an exercise of *Selecting* terms and *Assigning* them to a generic term at the Production Level

Exercise 11 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Wie heißt das Wort? der F..... (Finger)	2	1<der Fingr[1Ve]>		2		
2. Welche Begriffe passen am besten? Tasten - schmecken Bein - Hand Kopf - zeigen Nagel - putzen	4	1<Nagel>		2		
3. Wie heißt das Wort? Das Sch..... (Schloß)	1	0(ND)	3			
4. Welche Begriffe passen am besten? Jungfrau - Auto Schüssel - Gold Hochhaus - Tür Abschließen	4	1<Hochhaus>		2		
5. Wie heißt das Wort? Der Sch.....l (Schmetterling)	2	1<der Schmette/1CØ/ling		2		

6. Welche Begriffe passen am besten? Frosch – bunt Herbst – Sammlung Raupe – flattern	5	1<Herbst>		2			
7. Wie heißt das Wort? Der Sch.....sch..... (Schraubenschlüssel)	3	2<Der Schra/1VØ/benschl/1Cu/ssel>				1	
8. Welche Begriffe passen am besten? Werkzeugkasten – Mutter Drehen – Hausputz Strom – aufräumen Garage – Schraube	5	1<Garage>		2			
9. Wie heißt das Wort? Die Sch..... (Schuhe)	1	0(ND)	3				
10. Welche Begriffe passen am besten? Kaufen – Filz Reich – bequem Sohle – Schuster Hamster – Leder	6	2<kaufen, Filz>				1	
11. Wie heißt das Wort? Der S..... (Sekt)	1	0(ND)	3				
12. Welche Begriffe passen am besten? Weinachten - Sylvester Korken knallen – prickelnd Warm – zisch – Bier Schaumig – weinen Anstoßen	7	1<Weinachten>		2			
13. Wie heißt das Wort die S.....b..... (Sonnenbrille)	2	1<die Sonne/1CØ/brille>		2			
14. Welche Begriffe passen am besten? Getönte Gläser Regen – Sonne Wind – Augen Schützen Lesen – Mantel	6	2<Regen, Wind>				1	
15. Wie heißt das Wort? Das F..... (Fleisch)	1	0(ND)	3				
16. Welche Begriffe passen am besten? Wurst – Scheibe Käse – mager Braten – Obst	4	1<Wurst>		2			
17. Wie heißt das Wort? Der St..... (Stuhl)	1	0(ND)	3				
18. Welche Begriffe passen am besten? Lehne – sitzen Holz – stehen Tasse – Polster	5	1<stehen>		2			
19. Wie heißt das Wort? Die S..... (Suppe)	1	0(ND)	3				
20. Welche Begriffe passen am besten? Heiß – Teller Trinken – Gabel Löffel – essen	5	1<trinken>		2			
Sum of Trials, Errors & Evaluating Scale	67	17		43			

In exercise 12 she types the word and enters it in the program. NeuroLing checks whether it is correct or faulty. Both the possibility to get a solution and a second attempt to solve the task

are offered to her again by the program. She can click on the image and hear it being spoken. The following window illustrates the form and the training steps involved in this exercise.

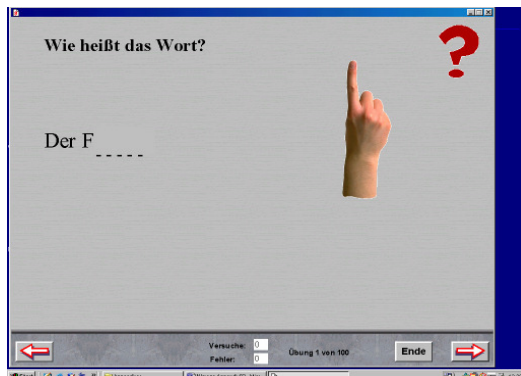


Table 104: Broca's Aphasic's therapy in an exercise of *Typing at the Production Level*

Exercise 12 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.der F..... (Finger)	1	0(ND)	3			
2.der A.....(Apfel)	1	0(ND)	3			
3.das A.....(Auto)	3	2<das A[1Vo]t[1Vu]>			1	
4.der A.....(Adler)	2	1<der Adlr[1Ce]>		2		
5.die B.....(Banane)	1	0(ND)	3			
6.die S.....(Schere)	2	1<die Sch[+1Vi]ere>		2		
7.die M.....(Möhren)	2	1<die Mö/1CØ/ren>		2		
8.die B.....(Birne)	2	1<die Bi[+1Ve]rne>		2		
9.die B.....(Bohrmaschine)	3	2<die Bo/1CØ/rmas/1CØ/hine>			1	
10.die B.....(Broccoli)	3	2<die Broc/1CØ/oli, die Broccol/1Ve/>			1	
11.das B.....(Brot)	1	0(ND)	3			
12.der B.....(Bus)	1	0(ND)	3			
13.das E.....(Ei)	1	0(ND)	3			
14.die C.....f.....(Cornflakes)	3	2<die Cornf/1CØ/akes, die Cornfla/1CØ/es>			1	
15.das E.....(Eis)	1	0(ND)	3			
16.die E.....(Eule)	2	1<die E[+1Vo]l[1Vu]e>			1	
17.das F.....(Fenster)	2	1<das Fent[1Cs]er		2		
18.der W.....(Wein)	1	0(ND)	3			
19.das F.....(Flugzeug)	3	2<das Flu/1Ck/z/1VØ/ug			1	
20.der G.....(Gartenschlauch)	4	3<der Ga/1CØ/tens/1CØ/hl/1VØ/u/1CK/>				0
Sum of Trials, Errors & Evaluating Scale	39	19	41			

Wernicke's Aphasic

Therapy on Wed.17, March 2004

Mr Fimm will be also trained in the same exercises using the same procedures that have been used to train the Broca's aphasic. His task is to complete the word which is accompanied with an image, an article and some phonemes of a lexical word. Thereupon, he has to select the correct terms that have shared situations or features with the target word (Tab.105/ Exer.11).



Table 105: Wernicke's Aphasic's therapy in an exercise of *Selecting* terms and *Assigning* them to a generic term at the *Production Level*

Exercise 11 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Wie heißt das Wort? der F..... (Finger)	2	1<der F...[Hand(SF)]>			1	
2. Welche Begriffe passen am besten? Tasten - schmecken Bein - Hand Kopf - zeigen Nagel - putzen	6	3<schmecken, Nagel, putzen>				0
3. Wie heißt das Wort? Das Sch..... (Schloß)	3	2<[Das Schlüssel(SS)], [das Schluß(D)]>			1	
4. Welche Begriffe passen am besten? Jungfrau - Auto Schüssel - Gold Hochhaus - Tür Abschließen	5	2<Gold, Hochhaus>			1	
5. Wie heißt das Wort? Der Sch.....l (Schmetterling)	4	3<der Schme/ICk/er/ICØ/in/ICØ/				0
6. Welche Begriffe passen am besten? Frosch - bunt Herbst - Sammlung Raupe - flattern	6	2<Frosch, bunt>			1	
7. Wie heißt das Wort? Der Sch.....sch..... (Schraubenschlüssel)	4	[+...ist schwer..] 3<der /{1M Schreib}/ /{1M schluß}/, Schrauben /{1M schloß}/>				0
8. Welche Begriffe passen am besten? Werkzeugkasten - Mutter Drehen - Hausputz Strom - aufräumen Garage - Schraube	6	2<Strom, Garage>			1	
9. Wie heißt das Wort? Die Sch..... (Schuhe)	1	0(ND)	3			
10. Welche Begriffe passen am besten? Kaufen - Filz Reich - bequem Sohle - Schuster Hamstern - Leder	6	2<Reich, kaufen>			1	
11. Wie heißt das Wort? Der S..... (Sekt)	1	0(ND)	3			

12. Welche Begriffe passen am besten? Weihnachten - Sylvester Korke knallen – pricklend Warm – zisch – Bier Schaumig – weinen Anstoßen	8	2<Weihnachten, warm>			1	
13. Wie heißt das Wort die S.....b..... (Sonnenbrille)	3	3<die {1MØ}Brille, /{1M schwarz}/brille, Sonnen{1MØ}>				0
14. Welche Begriffe passen am besten? Getönte Gläser Regen – Sonne Wind – Augen Schützen Lesen – Mantel	7	3<Regen, Wind, Lesen>				0
15. Wie heißt das Wort? Das F..... (Fleisch)	2	1<[+das ist] [Wurst(SF)]>		2		
16. Welche Begriffe passen am besten? Wurst – Scheibe Käse – mager Braten – Obst	5	2<Wurst, Obst>			1	
17. Wie heißt das Wort? Der St..... (Stuhl)	2	1<der Stu/1Ck/l>		2		
18. Welche Begriffe passen am besten? Lehne – sitzen Holz – stehen Tasse – Polster	5	1<stehen>		2		
19. Wie heißt das Wort? Die S..... (Suppe)	1	0(ND)	3			
20. Welche Begriffe passen am besten? Heiß – Teller Trinken – Gabel Löffel – essen	5	1<trinken>		2		
Sum of trials, Errors & Evaluating Scale	84	34		26		

Exercise 12 of table 106 is a challenge to the Wernicke's aphasic because he must understand the meaning of the image, which is presented together with an article and some of its phonemes and type its lexical word as well. In exercise 11 and 12 the Wernicke's aphasic can be urged to click on the image to hear it being spoken or on the word to have it being displayed as a whole on the screen so that the complexity of this exercise does not discourage him.

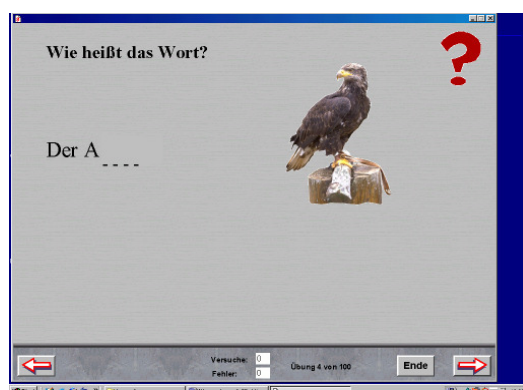


Table 106: Wernicke's Aphasic's therapy in an exercise of *Typing* at the *Production Level*

Exercise 12 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.der F..... (Finger)	3	2<der Fi/1CØ/gr[1Ve]>			1	
2.der A.....(Apfel)	1	0(ND)	3			
3.das A.....(Auto)	1	0(ND)	3			
4.der A.....(Adler)	2	1<der A/1CØ/ler>		2		
5.die B.....(Banane)	1	0(ND)	3			
6.die S.....(Schere)	3	2<die S/1CØ/h[+1Vi]ere>			1	
7.die M.....(Möhren)	3	2<die M/1Vu/h[1Cn]ren>			1	
8.die B.....(Birne)	2	1<die Bi/1CØ/ne>		2		
9.die B.....(Bohrmaschine)	3	2<die /{1M Bau }/ma/1CØ/chine>			1	
10.die B.....(Broccoli)	3	2<die Bro/1Ck/oli/[+1Ve]>			1	
11.das B.....(Brot)	1	0(ND)	3			
12.der B.....(Bus)	1	0(ND)	3			
13.das E.....(Ei)	2	1<das Ei[+1Cs]	3			
14.die C.....f.....(Cornflakes)	4	3<die Cor/1Ck/fla/1Cm/es, Cornfla/1Ct/es>			1	
15.das E.....(Eis)	1	0(ND)	3			
16.die E.....(Eule)	3	2<die /{1M Ente }/, die Eu/1Cg/e>			1	
17.das F.....(Fenster)	2	1<das Fenstr/1Ve/>		2		
18.der W.....(Wein)	1	0(ND)	3			
19.das F.....(Flugzeug)	2	1<das Flugz/1VØ/ug>		2		
20.der G.....(Gartenschlauch)	4	3<der [Gießen(SS)], [Gießröhr(SS)].. [röhr chen(SS)]>				0
Sum of Trials, Errors & Evaluating Scale	43	23	37			

Anomic Aphasic

Therapy on Thu.18, March 2004

During the administration of therapy in exercise11 of table107, Mrs Heinrich will be confronted with the image of an object, the article and some phonemes of simple or compound words. She is then required to find the lexical word and assign the terms to the generic one.



Table 107: Anomic Aphasic's therapy in an exercise of *Selecting* terms and *Assigning* them to a generic term at the *Production Level*

Exercise 11 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Wie heißt das Wort? der F..... (Finger)	1	0(ND)	3			
2. Welche Begriffe passen am besten? Tasten - schmecken Bein - Hand Kopf - zeigen Nagel - putzen	4	1<Nagel>		2		
3. Wie heißt das Wort? Das Sch..... (Schloß)	1	0(ND)	3			
4. Welche Begriffe passen am besten? Jungfrau - Auto Schüssel - Gold Hochhaus - Tür Abschließen	3	0(ND)	3			
5. Wie heißt das Wort? Der Sch.....l (Schmetterling)	2	1<der Schmetter /{1Mding}/		2		
6. Welche Begriffe passen am besten? Frosch - bunt Herbst - Sammlung Raupe - flattern	5	1<Herbst>		2		
7. Wie heißt das Wort? Der Sch.....sch..... (Schraubenschlüssel)	3	2<der Schlüssel/{1M schließen}/, Schrauben /{1Mschloß}/>			1	
8. Welche Begriffe passen am besten? Werkzeugkasten - Mutter Drehen - Hausputz Strom - aufräumen Garage - Schraube	5	1<Garage>		2		
9. Wie heißt das Wort? Die Sch..... (Schuhe)	1	0(ND)	3			
10. Welche Begriffe passen am besten? Kaufen - Filz Reich - bequem Sohle - Schuster Hamster - Leder	5	1<Kaufen>		2		
11. Wie heißt das Wort? Der S..... (Sekt)	1	0(ND)	3			
12. Welche Begriffe passen am besten? Weihnachten - Sylvester Korken knallen - pricklend Warm - zisch - Bier Schaumig - weinen Anstoßen	7	1<Weihnachten>		2		
13. Wie heißt das Wort die S.....b..... (Sonnenbrille)	1	0(ND)	3			
14. Welche Begriffe passen am besten? Getönte Gläser Regen - Sonne Wind - Augen Schützen Lesen - Mantel	5	1<Wind>		2		
15. Wie heißt das Wort? Das F..... (Fleisch)	1	0(ND)	3			
16. Welche Begriffe passen am besten? Wurst - Scheibe Käse - mager Braten - Obst	4	1<Wurst>		2		

17. Wie heißt das Wort? Der St..... (Stuhl)	1	0(ND)	3				
18. Welche Begriffe passen am besten? Lehne – sitzen Holz – stehen Tasse – Polster	5	1<stehen>		2			
19. Wie heißt das Wort? Die S..... (Suppe)	1	0(ND)	3				
20. Welche Begriffe passen am besten? Heiß – Teller Trinken – Gabel Löffel - essen	4	0(ND)	3				
Sum of Trials, Errors & Evaluating Scale	59	11		49			

As far as exercise 12 of table 108 is concerned the anomic patient will deal with it in the same way the Broca's and Wernicke's aphasics did in the previous session because text or image deletions will make the task very difficult. The patient proceeds in the following way: she types the phonemes and expects a feedback from NeuroLing, which provides the possibility of trying it again.

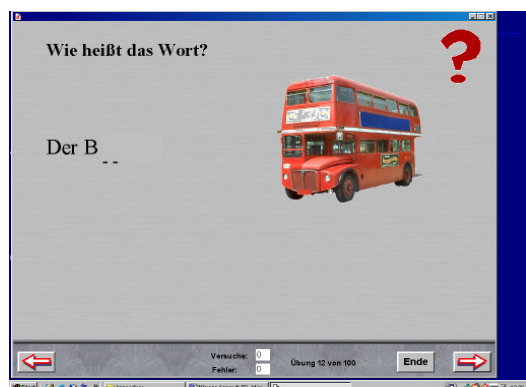


Table 108: Anomic Aphasic's therapy in an exercise of *Typing at the Production Level*

Exercise 12 of NL Stimuli (Images & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. der F..... (Finger)	1	0(ND)	3			
2. der A..... (Apfel)	1	0(ND)	3			
3. das A..... (Auto)	1	0(ND)	3			
4. der A..... (Adler)	2	1<der Adle/1CØ/>		2		
5. die B..... (Banane)	1	0(ND)	3			
6. die S..... (Schere)	1	0(ND)	3			
7. die M..... (Möhren)	2	1<die Möhre/1CØ/>		2		
8. die B..... (Birne)	1	0(ND)	3			
9. die B..... (Bohrmaschine)	1	0(ND)	3			
10. die B..... (Broccoli)	2	1<die Bro/1Ckk/oli>		2		
11. das B..... (Brot)	1	0(ND)	3			
12. der B..... (Bus)	1	0(ND)	3			
13. das E..... (Ei)	1	0(ND)	3			
14. die C..... f..... (Cornflakes)	3	2<die Cornfla[+1Cc]ke/1CØ/>			1	
15. das E..... (Eis)	1	0(ND)	3			
16. die E..... (Eule)	2	1<die /{1M Ente}/>		2		
17. das F..... (Fenster)	1	0(ND)	3			
18. der W..... (Wein)	1	0(ND)	3			

19.das F.....(Flugzeug)	2	1<das /{1W Flieger}/>		2		
20.der G.....(Gartenschlauch)	4	3<der /{1M Garagen}/schlauch auch, [/{1Mgaragen(D)}/{1Mrohre(SS)}/>				0
Sum of Trials, Errors & Evaluating Scale	30	10		50		

Commentary on the 6th Hour

Most of the lexical words, which the three patients were asked to find, were trained in the previous sessions of therapy. Mrs Müller, who assigned terms to the generic one, did quite good in exercise11 of table103, with the exception of the omission and substitution of some consonants and vowels in the lexical word, as well as the selection, at random, of certain terms that can not be assigned to the main lexical word she was asked to figure out (Tab.103/ Exer.11). In typing the words in exercise12 of table104 she substituted the vowels and the consonants; and omitted voiceless phonemes. The disturbances occurred in the words that were not frequently trained in the previous therapy settings, such words are: “*die Broccoli*”, “*die Cornflakes*” and “*der Gartenschlauch*”. Apart from that the general score shows that her language depicts signs of amelioration (Tab.104 / Exer.12).

The Wernicke’s aphasic is in a position to understand the form of the eleventh exercise of table105 and what the therapist requires from him to do, but the assignment of the terms to the generic one has suffered many setbacks. This leads one to conclude that the patient still needs more therapeutic re-training in terms that share semantic and situational features. The relationship between conception and production is still badly disturbed. This is the reason why the evaluating scale decreased to score of 28/60 correct points. His performance rose in exercise12 of table106 because most of the words, he was asked to type, were seen in the previous sessions of therapy.

Mrs Heinrich, the anomic aphasic made 10 errors in exercise11 of table107 and only 8 errors in exercise12 of table108. Her responses show little disorders in selecting from many terms that refer to a lexical word and typing words that are mono- bi- and polysyllabic. The results of the two exercises comply with her achievements (Tab.107 & 108/ Exer.11 & 12).

* In the **seventh hour** the fourth week’s therapeutic training the patients are to be trained in exercises of production and grammar, but it should not be ignored that the understanding of a sentence is also necessary in this context. In exercise13 the focus will be, mainly, on case marking, where the patients have to find the correct articles, their substantives and insert them in the blank of the sentences. In exercise14 the concentration will be on predicates where the patients have to assign the correct conjugated verbs to sentences. In this session of therapy

there are no images that could assist the patients to find the correct answers to the stimuli. The text involved in training is being pronounced to simplify the tasks to the patients.

Broca's Aphasic

Therapy on Mo.22, March 2004

In exercise13 of table109 the patient, Mrs Müller hears a sentence from which a substantive was omitted. The latter is but presented below the sentence as a “Nominativ”, “Dativ”, “Akkusativ” or “Genitiv”. Mrs Müller must choose the correct one and place it in the blank of a sentence.



Table 109: Broca's Aphasic's therapy in an exercise of *Production* in which grammatical “Kasus-Markierung” is assigned to a sentence.

Exercise 13 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Das Wasser spritzt aus (der Schlauch, dem Schlauch, den Schlauch, des Schlauches)	2	1<der Schlauch>		2		
2.Die Tasse steht auf (der Tisch, den Tisch, des Tisches, dem Tisch)	4	3<den Tisch, der Tisch, des Tisch>				0
3.Das alte Café an der Ecke hatgewechselt (sein Besitzer, seinem Besitzer, seinen Besitzer, seines Besitzers)	3	2<sein Besitzer, seinem Besitzer>			1	
4.....Nährstoffgehalt ist groß (den Weizen, der Weizen, dem Weizen, des Weizens)	4	3<den Weizen, der Weizen, dem Weizen>				0
5.Ich gebeeine Mark (der Bettler, dem Bettler, den Bettler, des Bettlers)	3	2<der Bettler, den Bettler>			1	
6.Ich magmeines Nachbarn (der Hund, dem Hund, des Hundes, den Hund)	3	2<der Hund, des Hundes>			1	
7.Heute treffe ich (der Schulkollegen, den Schulkollegen, des Schulkollegen, dem Schulkollegen)	2	1<der Schulkollegen>		2		
8.Du verstehst dich gut mit (das Mädchen, den Mädchen, dem Mädchen, des Mädchen)	2	1<das Mädchen>		2		

9.Überhabe ich die Stelle bekommen (dem Stadtanzeiger, des Stadtanzeigers, der Stadt- anzeiger, den Stadtanzeiger)	3	2<dem Stadtanzeiger, des Stadtanzeigers>			1	
10.Überbefinden sich viele Brücken (den Rhein, der Rhein, des Rheines, dem Rhein	3	2<den Rhein, der Rhein>			1	
11.Ich gehe heute um 8:00 Uhr aus (das Haus, dem Haus, des Hauses, den Haus)	2	1<das Haus>		2		
12.Der Verlag gibtfür das Buch 20% des Buchpreises (der Autor, des Autors, dem Autor, den Autor)	2	1<der Autor>		2		
13.Mitschlägt man Nägel in die Wand (einen Hammer, ein Hammer, eines Hammers, einem Hammer)	2	1<ein Hammer>		2		
14.Ich brauche endlich (ein Hut, einen Hut, eines Hutes, einem Hut)	2	1<ein Hut>		2		
15.Der Kopf ist abgefallen (dieses Hemdes, diesen Hemd, diesem Hemd, dieses Hemdes)	1	0	3			
16.....möchte ich bestellen (diesen Sofa, dieses Sofa, diesem Sofa, dieses Sofas)	2	1<diesen Sofa>		2		
17.Mir liegt nicht viel an (diesem Geld, diesen Geld, dieses Geldes, dieses Geldes)	1	0	3			
18.....mag ich gern (dieser Junge, diesem Jungen, diesen Jungen, dieses Jungens)	3	2<dieser Junge, diesem Jungen>			1	
19.Ich bin mitverheiratet, der sehr ehrgeizig ist (ein Mann, einen Mann, einem Mann, eines Mannes)	2	1<ein Mann>		2		
20.Die Freundinist Grundschullehrerin (meines Sohnes, mein Sohn, meinem Sohn, meinen Sohn)	1	0	3			
Sum of Trials, Errors & Evaluating Scale	47	27		33		

In exercise 14 of table 10 the patient is required to follow the same procedure; that is, choose the correct conjugated verb and insert it in a sentence. Both the tone and the text are provided to the patient to facilitate the procedures of training in this exercise.



Table 110: Broca's Aphasic's therapy in an exercise of *Production* in which a correct verb is inserted in a sentence

Exercise14 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Annafrüh am Morgen auf (stehe – steht – stehst – stehen)	2	1<stehst>		2		
2. Sieunter die Dusche (springt – springen – springe – springst)	2	1<springe>		2		
3. Rolfdas Frühstück (machen – macht – machst – mache)	2	1<machst>		2		
4. Anna sich inzwischen die Haare (fönt – föne – fönen – fönst)	2	1<fönst>		2		
5. Sie sich Hose, Pulli und Strumpfe an (ziehen – ziehst – zieht – ziehe)	3	2<ziehen, ziehe>			1	
6. Rolf und Anna.....gemeinsam (frühstückst – frühstücken – frühstücke – frühstückt)	2	1<frühstückst>		2		
7. Die beiden.....Kaffee mit Milch und Zucker (trinkt – trinke – trinken – trinkst)	3	2<trinkt, trinke>			1	
8. Das EhepaarBrötchen mit Käse und Schinken (essen – isst – esse – esst)	2	1<isst>		2		
9. Nach dem FrühstückRolf die Zeitung (lesen – lest – lese – liest)	3	2<lese, lest>			1	
10. Anna sagt: "Rolf, bitteden Tisch ab!" (räumst – räumen – räumt – räume)	3	2<räumst, räumt>			1	
11. Rolf meint: "Ichnoch den Sportteil zu Ende lesen." (möchte – möchtest – möchten – möchtest)	1	0	3			
12. Anna antwortet: "Aber ichjetzt los zur Arbeit." (müssen – musst – muß – müsst)	2	1<müssen>		2		
13. Rolf erwidert: "Ja, ichdas jetzt gleichfertig." (machen – mache – machst – macht)	2	1<machen>		2		
14. Rolfheute zu Hause bleiben. (können – könnt – kannst – kann)	2	1<könnt>		2		
15. Annasich von Rolf und fährt zur Arbeit. (verabschieden – verabschiedest – verabschiedet – verabschiede)	2	1<verabschieden>		2		
16. Erheute einen Urlaubstag. (habe – haben – hast – hat)	2	1<habe>		2		
17. Annamit dem Bus zum Büro. (fährt – fährst – fahre – fahren – fährt)	1	0	3			
18. Der Buspünktlich um 7:30 (komme – kommst – kommen – kommt)	3	2<kommst, kommen>			1	
19. Im BusAnna die Fahrkarte. (löse – löst – lösen)	2	1<löse>		2		
20. Annakeinen Sitzplatz, weil der Bus voll ist. (findest – finde – findet – finden)	3	2<findest, finde>			1	
Sum of Trials, Errors & Evaluating Scale	44	24	36			

Wernicke's Aphasic

Therapy on Mo. 22, March 2004

Mr Fimm is also confronted with exercise13 of table111 and 14 of 112. In exercise13 he has to choose the correct case and make a correct sentence. The tone of the sentence is supplied so that the patient can understand other parts of the sentence.

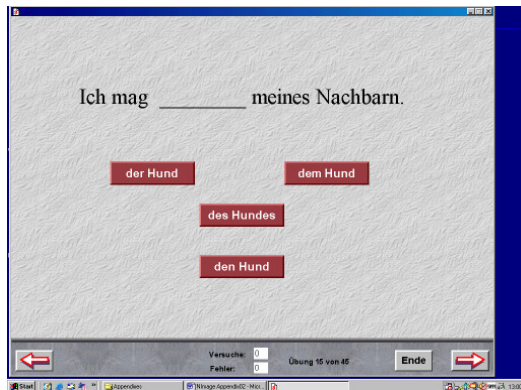


Table 111: Wernicke's Aphasic's therapy in an exercise of *Production* in which grammatical "Kasus-Markierung" is assigned to a sentence.

Exercise 13 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Das Wasser spritzt aus (der Schlauch, dem Schlauch, den Schlauch, des Schlauches)	2	1<der Schlauch>		2		
2. Die Tasse steht auf (der Tisch, den Tisch, des Tisches, dem Tisch)	3	2<den Tisch, dem Tisch>			1	
3. Das alte Café an der Ecke hatgewechselt (sein Besitzer, seinem Besitzer, seinen Besitzer, seines Besitzers)	3	2<sein Besitzer, seinem Besitzer>			1	
4.Nährstoffgehalt ist groß (den Weizen, der Weizen, dem Weizen, des Weizens)	3	2<dem Weizen, des Weizens>			1	
5. Ich gebeeine Mark (der Bettler, dem Bettler, den Bettler, des Bettlers)	1	0	3			
6. Ich magmeines Nachbarn (der Hund, dem Hund, des Hundes, den Hund)	1	0	3			
7. Heute treffe ich (der Schulkollegen, den Schulkollegen, des Schulkollegen, dem Schulkollegen)	2	1<dem Schulkollegen>		2		
8. Du verstehst dich gut mit (das Mädchen, den Mädchen, dem Mädchen, des Mädchen)	1	0	3			
9. Überhabe ich die Stelle bekommen (dem Stadtanzeiger, des Stadtanzeigers, der Stadtanzeiger, den Stadtanzeiger)	2	1<dem Stadtanzeiger>		2		
10. Überbefinden sich viele Brücken (den Rhein, der Rhein, des Rheines, dem Rhein)	1	0	3			

11. Ich gehe heute um 8:00 Uhr aus (das Haus, dem Haus, des Hauses, den Haus)	2	1<das Haus>		2		
12. Der Verlag gibtfür das Buch 20% des Buchpreises (der Autor, des Autors, dem Autor, den Autor)	2	1<den Autor>		2		
13. Mitschlägt man Nägel in die Wand (einen Hammer, ein Hammer, eines Hammers, einem Hammer)	1	0	3			
14. Ich brauche endlich (ein Hut, einen Hut, eines Hutes, einem Hut)	2	1<ein Hut>		2		
15. Der Kopf ist abgefallen (dieses Hemdes, diesen Hemd, diesem Hemd, dieses Hemdes)	1	0	3			
16.möchte ich bestellen (diesen Sofa, dieses Sofa, diesem Sofa, dieses Sofas)	2	1<diesen Sofa>		2		
17. Mir liegt nicht viel an (diesem Geld, diesen Geld, dieses Geldes, dieses Geldes)	1	0	3			
18.mag ich gern (dieser Junge, diesem Jungen, diesen Jungen, dieses Jungens)	2	1<diesem Jungen>		2		
19. Ich bin mitverheiratet, der sehr ehrgeizig ist (ein Mann, einen Mann, einem Mann, eines Mannes)	2	1<ein Mann>		2		
20. Die Freundinist Grundschullehrerin (meines Sohnes, mein Sohn, meinem Sohn, meinen Sohn)	1	0	3			
Sum of Trials, Errors & Evaluating Scale	35	15		45		

In exercise 12 of table 112 the Wernicke's aphasic has to proceed almost in the same way he did in the above exercise, but now with the insertion of the verbs in a sentence. He picks from the conjugated verbs the correct one and places it in a sentence which is displayed on the screen. Tone assistance is also provided in this context.

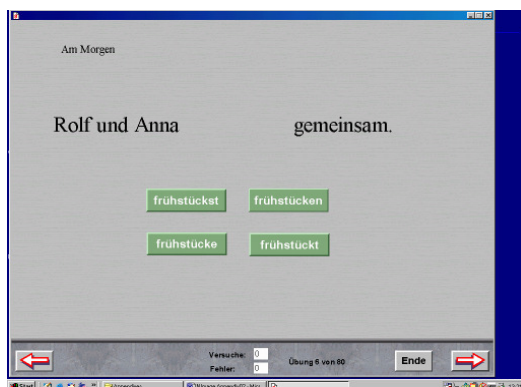


Table 112: Wernicke's Aphasic's therapy in an exercise of *Production* in which a correct verb is inserted in a sentence

Exercise14 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Annafrüh am Morgen auf (stehe – steht – stehst – stehen)	2	1<stehe>		2		
2. Sieunter die Dusche (springt – springen – springe – springt)	2	1<springen>		2		
3. Rolfdas Frühstück (machen – macht – machst – mache)	2	1<machen>		2		
4. Anna sich inzwischen die Haare (fönt – föne – fönen – fönst)	1	0	3			
5. Sie sich Hose, Pulli und Strumpfe an (ziehen – ziehst – zieht – ziehe)	2	1<ziehe>		2		
6. Rolf und Anna.....gemeinsam (frühstückst – frühstücken – frühstücke – frühstückt)	1	0	3			
7. Die beiden.....Kaffee mit Milch und Zucker (trinkt – trinke – trinken – trinkst)	1	0	3			
8. Das EhepaarBrötchen mit Käse und Schinken (essen – isst – esse – esst)	2	1<essen>		2		
9. Nach dem FrühstückRolf die Zeitung (lesen – lest – lese – liest)	2	1<lest>		2		
10. Anna sagt : “Rolf, bitteden Tisch ab!“ (räumst – räumen – räumt – räume)	3	2<räumst, räumt>			1	
11. Rolf meint : “Ichnoch den Sportteil zu Ende lesen.“ (möchte – möchtest – möchten – möchtest)	1	0	3			
12. Anna antwortet: “Aber ichjetzt los zur Arbeit.“ (müssen – musst – muß – müsst)	1	0	3			
13. Rolf erwidert : “Ja, ichdas jetzt gleichfertig.“ (machen – mache – machst – macht)	2	1<machen>		2		
14. Rolfheute zu Hause bleiben. (können – könnt – kannst – kann)	2	1<kannst>		2		
15. Annasich von Rolf und fährt zur Arbeit. (verabschieden – verabschiedest – verabschiedet – verabschiede)	3	2<verabschieden, verabschiede>			1	
16. Erheute einen Urlaubstag. (habe – haben – hast – hat)	2	1<haben>		2		
17. Annamit dem Bus zum Büro. (fährt – fährst – fahre – fahren)	1	0	3			
18. Der Buspünktlich um 7:30 (komme – kommst – kommen – kommt)	3	2<..{+1W fähre....}..., komme>			1	
19. Im BusAnna die Fahrkarte. (löse – löst – lösen)	3	2<{+1W kauft....}...., löst>			1	
20. Annakeinen Sitzplatz, weil der Bus voll ist. (findest – finde – findet – finden)	2	1<finde>		2		
Sum of Trials, Errors & Evaluating Scale	38	18	42			

Anomic Aphasic

Therapy on Tu. 23, March 2004

Mrs Heinrich will also get a therapy training in exercise 13 of table 113. She has to choose a correct case marking and insert it in a sentence. The tone is omitted due to her intact reading ability.

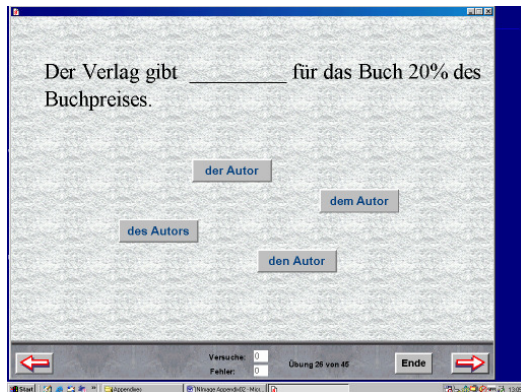


Table 113: Anomic Aphasic’s therapy in an exercise of *Production* in which grammatical “Kasus-Markierung” is assigned to a sentence.

Exercise 13 of NL Stimuli (Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Das Wasser spritzt aus (der Schlauch, dem Schlauch, den Schlauch, des Schlauches)	1	0	3			
2. Die Tasse steht auf (der Tisch, den Tisch, des Tisches, dem Tisch)	1	0	3			
3. Das alte Café an der Ecke hat gewechselt (sein Besitzer, seinem Besitzer, seinen Besitzer, seines Besitzers)	1	0	3			
4. Nährstoffgehalt ist groß (den Weizen, der Weizen, dem Weizen, des Weizens)	3	2 <den Weizen, dem Weizen>			1	
5. Ich gebe eine Mark (der Bettler, dem Bettler, den Bettler, des Bettlers)	1	0	3			
6. Ich mag meines Nachbarn (der Hund, dem Hund, des Hundes, den Hund)	2	1 <dem Hund>		2		
7. Heute treffe ich (der Schulkollegen, den Schulkollegen, des Schulkollegen, dem Schulkollegen)	1	0	3			
8. Du verstehst dich gut mit (das Mädchen, den Mädchen, dem Mädchen, des Mädchen)	1	0	3			
9. Über habe ich die Stelle bekommen (dem Stadtanzeiger, des Stadtanzeigers, der Stadtanzeiger, den Stadtanzeiger)	2	1 <dem Stadtanzeiger>		2		
10. Über befinden sich viele Brücken (den Rhein, der Rhein, des Rheines, dem Rhein)	1	0	3			

11. Ich gehe heute um 8:00 Uhr aus (das Haus, dem Haus, des Hauses, den Haus)	2	1<das Haus>		2		
12. Der Verlag gibtfür das Buch 20% des Buchpreises (der Autor, des Autors, dem Autor, den Autor)	2	1<den Autor>		2		
13. Mitschlägt man Nägel in die Wand (einen Hammer, ein Hammer, eines Hammers, einem Hammer)	1	0	3			
14. Ich brauche endlich (ein Hut, einen Hut, eines Hutes, einem Hut)	1	0	3			
15. Der Kopf ist abgefallen (dieses Hemdes, diesen Hemd, diesem Hemd, dieses Hemde)	2	1<dieses Hemd>		2		
16.möchte ich bestellen (diesen Sofa, dieses Sofa, diesem Sofa, dieses Sofas)	1	0	3			
17. Mir liegt nicht viel an (diesem Geld, diesen Geld, dieses Geldes, dieses Geldes)	1	0	3			
18.mag ich gern (dieser Junge, diesem Jungen, diesen Jungen, dieses Jungens)	2	1<dieser Junge>		2		
19. Ich bin mitverheiratet, der sehr ehrgeizig ist (ein Mann, einen Mann, einem Mann, eines Mannes)	1	0	3			
20. Die Freundinist Grundschullehrerin (meines Sohnes, mein Sohn, meinem Sohn, meinen Sohn)	1	0	3			
Sum of Trials, Errors & Evaluating Scale	28	8		52		

In exercise 14 of table 114 Mrs Heinrich will get a treatment through the same procedures with which the other two aphasics have been trained. She gets no acoustic assistance. She has to choose the correct conjugated verb and insert it in a sentence.



Table 114: Anomic Aphasic's therapy in an exercise of *Production* in which a correct verb is inserted in a sentence

Exercise 14 of NL Stimuli (Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Annafrüh am Morgen auf (stehe – steht – stehst – stehen)	1	0	3			

2.Sieunter die Dusche (springt – springen – springe – springt)	1	0	3				
3.Rolfdas Frühstück (machen – macht – machst – mache)	1	0	3				
4.Anna sich inzwischen die Haare (fönt – föne – fönen – fönst)	1	0	3				
5.Sie sich Hose, Pulli und Strumpfe an (ziehen – ziehst – zieht – ziehe)	1	0	3				
6. Rolf und Anna.....gemeinsam (frühstückst – frühstückten – frühstücke – frühstückt)	2	1<frühstückt>		2			
7.Die beiden.....Kaffee mit Milch und Zucker (trinkt – trinke – trinken – trinkst)	1	0	3				
8.Das EhepaarBrötchen mit Käse und Schinken (essen – isst – esse – esst)	2	1<essen>		2			
9.Nach dem FrühstückRolf die Zeitung (lesen – lest – lese – liest)	1	0	3				
10.Anna sagt :“Rolf, bitteden Tisch ab!“ (räumst – räumen – räumt – räume)	2	1<räumst>		2			
11.Rolf meint: “Ichnoch den Sportteil zu Ende lesen.“ (möchte – möchtest – möchten – möchtest)	1	0	3				
12.Anna antwortet :“Aber ichjetzt los zur Arbeit.“ (müssen – musst – muß – müsst)	1	0	3				
13.Rolf erwidert : “Ja, ichdas jetzt gleichfertig.“ (machen – mache – machst – macht)	1	0	3				
14.Rolfheute zu Hause bleiben. (können – könnt – kannst – kann)	2	1<könnst>		2			
15.Annasich von Rolf und fährt zur Arbeit. (verabschieden – verabschiedest – verabschiedet – verabschiede)	2	1<verabschiede>		2			
16.Erheute einen Urlaubstag. (habe – haben – hast – hat)	1	0	3				
17.Annamit dem Bus zum Büro. (fährt – fährst – fahre – fahren – fährt)	2	1<fährt>		2			
18.Der Buspünktlich um 7:30 (komme – kommst – kommen – kommt)	1	0	3				
19.Im BusAnna die Fahrkarte. (löse – löst – lösen)	1	0	3				
20.Annakeinen Sitzplatz, weil der Bus voll ist. (findest – finde – findet – finden)	1	0	3				
Sum of Trials, Errors & Evaluating Scale	26	6		54			

Commentary on the 7th Hour

During the administration of therapy in the seventh hour the therapist has directed the effect of training to the grammatical ability of the patients. But to deliver a correct grammatical sentence the patient is required first of all to understand its semantic component. In the case of Mrs Müller although she understands the sentences, she selected in many tasks the wrong

case; she often tended to choose the “nominativ” case. Her grammatical ability shows many traces of grammatical disturbances. This observation is also valid for exercise14 of table110 in which many verbs were not conjugated and others assigned to the sentences just at random. The patient knew that the conjugated verbs express the same meaning, which she chose and inserted in the blank of the sentences without taking into account their syntactic structure. As a consequence, one can find in many sentences of the Broca’s aphasic grammatical disorders (Tab.109/Exer.13 & Tab.110/Exer.14) that made the score of the evaluating scale stand just above the average.

In the exercises for case marking and verbs Mr Fimm’s performance shows that if he gets the multiple choice tasks, he can derive from them the correct syntactic structure. The reason that made the sum of his evaluating scale higher than that of the Broca’s aphasic as far as the grammaticality of the sentences is concerned (Tab.111/Exer.13 & Tab.112/Exer.14).

The disturbances in the grammar of the anomic aphasic occurred just at certain intervals where there are complex syntactic structures at the sentence level. These cases can be seen in task4, 9 and 18 of exercise13 of table113 and in 8 and 10 of exercise14 of table114. A concluding deduction about Mrs Heinrich’s responses should unfold that in 40tasks of exercise13 and 14 she made only 14errors. This is a clear confirmation that her word finding disturbance did not affect her grammatical and syntactic understanding of the above offered sentences.

* The **eight hour** of therapy in the fourth week is the continuation of a therapeutic training in the understanding of grammatical structures. The procedures of training will be carried out through the adjectives in exercise15 and prepositions in exercise16. In exercise15 the patients are required to select one solution from four cases; in exercise16 they have to select the correct prepositions that fit in the structures of the sentences. Thus, the patients are made to think about the structures of language, positions of the constituents, word order and gender (masculine, feminine and neuter gender). At this stage the patients receive no images that could assist them to find the correct tasks. It is an abstract level of training because of the focus on grammatical aspects of language, but in this context understanding is also primordial to the completion of any sentence. The exercises are made to foreground these characteristics; that is, the way they are structured in NeuroLing reflects a close relationship between grammaticality and meaningfulness.

Broca's Aphasic

Therapy on Wed. 24, March 2004

In exercise 13 and 14 Mrs Müller has been already acquainted with the form of the following exercises and the way of their administration. As it was shown above she was trained in substantives (cases) and verbs. In exercises 15 of table 115 she is going to deal with adjectives; she must find the correct one and place it in the blank of the sentence. The therapist assists her now and then during the administration of training; his intervention consists of reading the sentences so that the patient will not resign in her trials. It is a motivation that even the Wernicke's aphasic needs in certain situations so as not to become depressive and develop feelings of failure and helplessness.

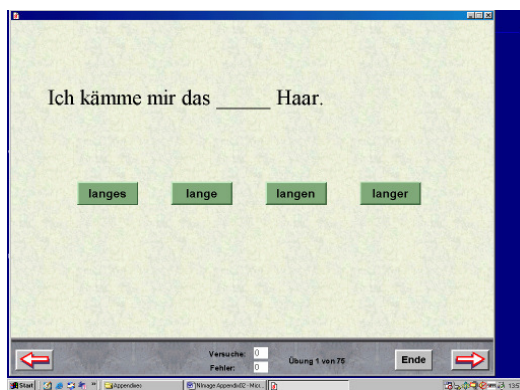


Table 115: Broca's Aphasic's therapy in an exercise of *Production* in which she inserts inflected adjectives in the sentences

Exercise 15 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Ich kämme mir das.....Haar. (langes – lange – langen – langer)	2	1<langes>		2		
2. Die Kette hat einenVerschluß (schöne – schönen – schönes – schöner)	2	1<schöne>		2		
3. In der Großstadt ist oftLuft. (verunreinigte – verunreinigter – verunreinigten – verunreinigtes)	1	0	3			
4. Dein neuer Freund ist einMensch. (nette – netten – netter – nettes)	2	1<netten>		2		
5. Gibst du mir mal dasHemd aus dem Schrank? (blauer – blaue – blauen – blaues)	3	2<blaues,blauer>			1	
6. Mein Sohn schreibt in Mathe meistArbeiten. (schlechtes – schlechter – schlechte – schlechten)	2	1<schlechten>		2		
7. Ach, ich weiß seineTel. Nr. nicht mehr. (neue – neuen – neuer – neues)	1	0	3			

8.Kommst du heute Abend auch zum Gartenfest? (toller – tolle – tollen – tolles)	3	2<toller, tolle>			1	
9.Mein Geschäftspartner ist einKollege. (kompetente – kompetenten – kompetenter – kompetentes)	3	2<komptente, kompetenten>			1	
10.DieKatze schleicht um ihre Beine (hungrige – hungrigen – hungriger – hungriges	1	0	3			
11.Du hast ihm aber heute seinMundwerk gestopft. (freche – frecher – frechen – freches)	3	2<frechen, frecher>			1	
12.Die Verkäuferin schenkt dem Kind eine Tüte Bonbons. (kleine – kleinen – kleines – kleiner)	3	2<kleines, kleine>			1	
13.Der Vater desAngestellten ist ein erfolgreicher Manager (neuen – neues – neue – neuer)	3	2<neues, neuer>			1	
14.Für ihrKostüm hat Sie große Bewunderung bekommen (elegante – eleganter – elegantes – eleganten)	2	1<elegante>		2		
15.Durch seinenEhrgeiz hat er wieder das Sprechen erlernt (beständige – beständiges – beständigen – beständiger)	3	2<beständiger, beständige>			1	
16.IhrHumor macht Sie nicht überall beliebt. (trockene – trockenens – trockenens – trockener)	4	3<trockenen, trockenens, trockene>				0
17.Sie haben einJacht am Hafen von Saint-Tropez gekauft. (alte – alter – altes – alten)	3	2<alter, altes>			1	
18.Die Familie muß demVermieter jedes Jahr 135.- mehr Miete zahlen. (habgierige – habgieriges – habgierigen – habgieriger)	3	2<habgieriger, habgierige>			1	
19.Sie behandeln dasMädchen wie ihre eigene Tochter. (adoptierte– adoptierter – adoptiertes – adoptierten)	3	2<adoptierten, adoptiertes>			1	
20.Den Hund wollten sie nicht mehr abgeben. (zugelaufene – zugelaufenes – zugelaufenen – zugelaufener)	2	1<zugelaufener>		2		
Sum of Trials, Errors & Evaluating Scale	49	29			31	

The form of exercise 16 in table 115 is not different from the fifteenth one in table 116, but its content is totally different from the previous exercises in which the patients were required to insert lexical constituents in the blanks of the sentences. In exercise 16 the patient has to slot function words in complete sentences. The procedures of therapy administration will not be different from those applied in the seventh hour to train the Broca's aphasic.

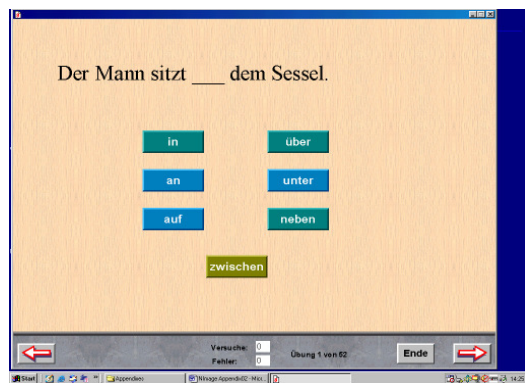


Table 116: Broca's Aphasic's therapy in exercise of *Production* in which she inserts a preposition in a sentence

Exercise 16 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Mann sitztdem Sessel. in über an unter auf neben zwischen	3	2<auf, über>			1	
2. Die Dose stehtdem Tisch. unter über an zwischen neben auf in	3	2<unter, über>			1	
3. Der Teppich liegtdem Boden. neben auf an unter zwischen in über	2	1<über>		2		
4. Trotz des Schicksalsschlags steht die Ehefrau vollihrem Mann. in über an unter auf neben zwischen durch vor hinter	3	2<auf, neben>			1	
5. Das Bild hängtder Wand. in über an unter auf neben zwischen	3	2<auf, über>			1	
6. Die Lampe hängt dem Tisch unter über zwischen in auf an neben	4	3<auf, neben, an>				0
7. Der Kaugummi klebt dem Stuhl auf an über unter zwischen neben in (3 Antworten sind richtig)	4	1<über>		2		
8. Die Familie sitztdem Tisch zwischen über unter auf an in neben	2	1<neben>		2		
9. Ein Vogel sitzt dem Ast unter neben an über zwischen in auf	3	2<an, über>			1	

10. Ich stelle mich einen Baum neben an unter zwischen auf in über (3 Antworten sind richtig)	5	2<auf, über>			1	
11. Das Flugzeug fliegt den Wolken in über an zwischen auf neben unter durch (2 Antworten sind richtig)	4	2<durch, neben>			1	
12. Die Sonne blitzt den Bäumen auf in zwischen an unter neben auf über	3	2<auf, über>			1	
13. Der Zug fährt der Brücke den Rhein unter über zwischen in auf neben an	4	2<an, neben>			1	
14. Sylvester gehe ich das Aachener Spielkasino zwischen an über unter auf neben in durch	2	1<auf>		2		
15. Das Schiff fährt die Schleuse über unter neben in durch an zwischen auf	3	2<neben, in>			1	
16. Dort drüben der Ecke ist unsere Stammkneipe in über an unter auf neben zwischen durch	2	1<in>		2		
17. Die Bäckerei befindet sich gleich der Sparkasse in über an unter auf neben zwischen durch	2	1<unter>		2		
18. Der Mund befindet sich der Nase durch über an unter auf zwischen neben in	1	0	3			
19. Die Brille sitzt der Nase in zwischen an unter durch neben über auf	3	2<an, über>			1	
20. Der Gast sitzt dem Tresen hinter über an unter auf neben zwischen durch vor in	3	2<hinter, neben>			1	
Sum of Trials, Errors & Evaluating Scale	59	33			27	

Wernicke's Aphasic

Therapy on Wed. 24, March 2004

The method of aphasia therapy with which Mr Fimm is to be trained in exercise 15 of table 117 will not be different in form, content and way of administration from the one which was used to train the Broca's aphasic. The therapist reads a sentence and the patient attempts to pick the correct case and insert it in a sentence.

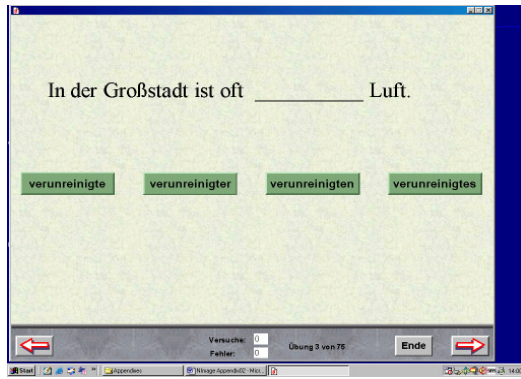


Table 117: Wernicke’s Aphasic’s therapy in an exercise of *Production* in which he inserts inflected adjectives in the sentences

Exercise 15 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1. Ich kämme mir das.....Haar. (langes – lange – langen – langer)	2	1<langes>		2		
2. Die Kette hat einenVerschluß (schöne – schönen – schönes – schöner)	3	2<schöne, schöner>			1	
3. In der Großstadt ist oftLuft. (verunreinigte – verunreinigter – verunreinigten – verunreinigtes)	1	0	3			
4. Dein neuer Freund ist einMensch. (nette – netten – netter – nettes)	2	1<netten>		2		
5. Gibst du mir mal dasHemd aus dem Schrank? (blauer – blaue – blauen – blaues)	2	1<blaues>		2		
6. Mein Sohn schreibt in Mathe meistArbeiten. (schlechtes – schlechter – schlechte – schlechten)	2	1<schlechten>		2		
7. Ach, ich weiß seineTel. Nr. nicht mehr. (neue – neuen – neuer – neues)	1	0	3			
8. Kommst du heute Abend auch zumGartenfest? (toller – tolle – tollen – tolles)	2	1<toller>		2		
9. Mein Geschäftspartner ist einKollege. (kompetente – kompetenten – kompetenter – kompetentes)	2	1<kompetenten>		2		
10. DieKatze schleicht um ihre Beine (hungrige – hungrigen – hungriger – hungriges)	1	0	3			
11. Du hast ihm aber heute seinMundwerk gestopft. (freche – frecher – frechen – freches)	2	1<frechen>		2		
12. Die Verkäuferin schenkt demKind eine Tüte Bonbons. (kleine – kleinen – kleines – kleiner)	2	1<kleines>		2		
13. Der Vater desAngestellten ist ein erfolgreicher Manager (neuen – neues – neue – neuer)	1	0	3			
14. Für ihrKostüm hat Sie große Bewunderung bekommen (elegante – eleganter – elegantes – eleganten)	2	1<elegante>		2		
15. Durch seinenEhrgeiz hat er wieder das Sprechen erlernt (beständige – beständiges – beständigen – beständiger)	2	1<beständiger>		2		

16.IhrHumor macht Sie nicht überall beliebt. (trockene – trockenes – trockenen – trockener)	2	1<trockene>		2		
17.Sie haben einJacht am Hafen von Saint-Tropez gekauft. (alte – alter – altes – alten)	1	0	3			
18.Die Familie muß demVermieter jedes Jahr 135.- mehr Miete zahlen. (habgierige – habgieriges – habgierigen – habgieriger)	2	1<habgieriger>		2		
19.Sie behandeln dasMädchen wie ihre eigene Tochter. (adoptierte– adoptierter – adoptiertes – adoptierten)	2	1<adoptiertes>		2		
20.Den Hund wollten sie nicht mehr abgeben. (zugelaufene – zugelaufenes – zugelaufenen – zugelaufener)	2	1<zugelaufener>		2		
Sum of Trials, Errors & Evaluating Scale	36	16		44		

Wernicke's aphasic's therapy will be continued in exercise 16 of table 118. Form, content and way of administration will not be different from the previous session of therapy in which the aphasic was trained in the prepositions. In each sentence the Wernicke's Aphasic has to insert the suitable preposition in a sentence.

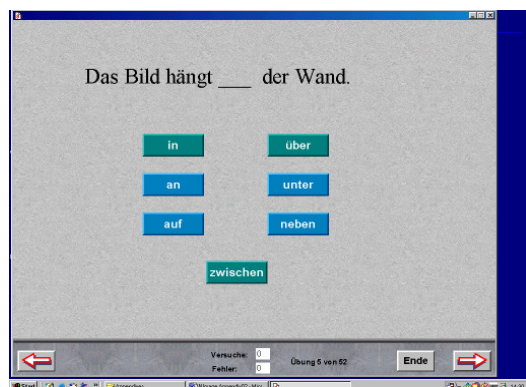


Table 118: Wernicke's Aphasic's therapy in an exercise of *Production* in which he inserts a preposition in a sentence

Exercise 16 of NL Stimuli (Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.Der Mann sitztdem Sessel. in über an unter auf neben zwischen	2	1<auf>		2		
2.Die Dose stehtdem Tisch. unter über an zwischen neben auf in	2	1<über>		2		
3.Der Teppich liegtdem Boden. neben auf an unter zwischen in über	1	0	3			

4. Trotz des Schicksalsschlags steht die Ehefrau voll ihrem Mann. in über an unter auf neben zwischen durch vor hinter	2	1<neben>		2		
5. Das Bild hängt der Wand. in über an unter auf neben zwischen	1	0	3			
6. Die Lampe hängt dem Tisch unter über zwischen in auf an neben	2	1<neben>		2		
7. Der Kaugummi klebt dem Stuhl auf an über unter zwischen neben in (3 Antworten sind richtig)	4	1<über>		2		
8. Die Familie sitzt dem Tisch zwischen über unter auf an in neben	1	0	3			
9. Ein Vogel sitzt dem Ast unter neben an über zwischen in auf	2	1<über>		2		
10. Ich stelle mich einen Baum neben an unter zwischen auf in über (3 Antworten sind richtig)	4	1<auf>		2		
11. Das Flugzeug fliegt den Wolken in über an zwischen auf neben unter durch (2 Antworten sind richtig)	3	1<durch>		2		
12. Die Sonne blitzt den Bäumen auf in zwischen an unter neben auf über	2	1<in>		2		
13. Der Zug fährt der Brücke den Rhein unter über zwischen in auf neben an	4	2<über, auf>			1	
14. Sylvester gehe ich das Aachener Spielkasino zwischen an über unter auf neben in durch	2	1<durch>		2		
15. Das Schiff fährt die Schleuse über unter neben in durch an zwischen auf	2	1<in>		2		
16. Dort drüben der Ecke ist unsere Stammkneipe in über an unter auf neben zwischen durch	2	1<neben>		2		
17. Die Bäckerei befindet sich gleich der Sparkasse in über an unter auf neben zwischen durch	1	0	3			

18. Der Mund befindet sich der Nase durch über an unter auf zwischen neben in	1	0	3				
19. Die Brille sitzt der Nase in zwischen an unter durch neben über auf	2	1<über>		2			
20. Der Gast sitzt dem Tresen hinter über an unter auf neben zwischen durch vor in	3	2<hinter, neben>			1		
Sum of Trials, Errors & Evaluating Scale	43	17	43				

Anomic Aphasic

Therapy on Thu. 25, March 2004

Mrs Heinrich will be also trained in adjectives and prepositions. Therapy in exercise 15 of table 119 will be administered without any tone assistance as the patient's reading ability has not been impaired. The window below presents the way training will be run.

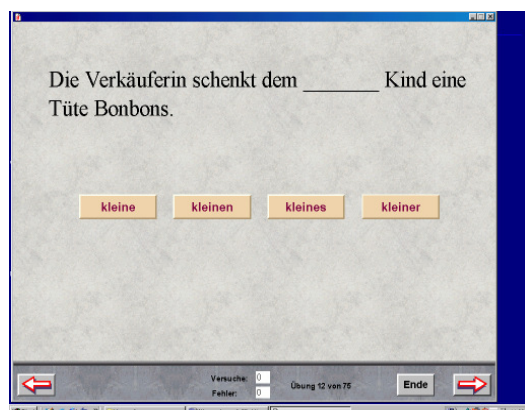


Table 119: Anomic Aphasic's therapy in an exercise of *Production* in which she inserts inflected adjectives in the sentences

Exercise 15 of NL Stimuli (Text)	Trials	Responses Errors	Evaluating Scale			
			3	2	1	0
1. Ich kämme mir das.....Haar. (langes – lange – langen – langer)	1	0	3			
2. Die Kette hat einenVerschluß (schöne – schönen – schönes – schöner)	1	0	3			
3. In der Großstadt ist oftLuft. (verunreinigte – verunreinigter – verunreinigten – verunreinigtes)	1	0	3			
4. Dein neuer Freund ist einMensch. (nette – netten – netter – nettes)	2	1<netten>		2		
5. Gibst du mir mal dasHemd aus dem Schrank? (blauer – blaue – blauen – blaues)	1	0	3			

6.Mein Sohn schreibt in Mathe meistArbeiten. (schlechtes – schlechter – schlechte – schlechten)	1	0	3				
7.Ach, ich weiß seineTel.Nr. nicht mehr. (neue – neuen – neuer – neues)	1	0	3				
8.Kommst du heute abend auch zum Gartenfest? (toller – tolle – tollen – tolles)	2	1<toller>		2			
9.Mein Geschäftspartner ist einKollege. (kompetente – kompetenten – kompetenter – kompetentes)	1	0	3				
10.DieKatze schleicht um ihre Beine (hungrige – hungrigen – hungriger – hungriges)	1	0	3				
11.Du hast ihm aber heute seinMundwerk gestopft. (freche – frecher – frechen – freches)	2	1<freche>		2			
12.Die Verkäuferin schenkt demKind eine Tüte Bonbons. (kleine – kleinen – kleines – kleiner)	1	0	3				
13.Der Vater desAngestellten ist ein erfolgreicher Manager (neuen – neues – neue – neuer)	1	0	3				
14.Für ihrKostüm hat Sie große Bewunderung bekommen (elegante – eleganter – elegantes – eleganten)	2	1<elegante>		2			
15.Durch seinenEhrgeiz hat er wieder das Sprechen erlernt (beständige – beständiges – beständigen – beständiger)	1	0	3				
16.IhrHumor macht Sie nicht überall beliebt. (trockene – trockenes – trockenem – trockener)	2	1<trockenes>		2			
17.Sie haben einJacht am Hafen von Saint-Tropez gekauft. (alte – alter – altes – alten)	1	0	3				
18.Die Familie muß demVermieter jedes Jahr 135.- mehr Miete zahlen. (habgierige – habgieriges – habgierigen – habgieriger)	1	0	3				
19.Sie behandeln dasMädchen wie ihre eigene Tochter. (adoptierte– adoptierter – adoptiertes – adoptierten)	1	0	3				
20.Den Hund wollten sie nicht mehr abgeben. (zugelaufene – zugelaufenes – zugelaufenen – zugelaufener)	2	1<zugelaufener>		2			
Sum of Trials, Errors & Evaluating Scale	26	6		54			

Even though the anomic aphasic's sentences show very slight traces of grammatical disorders, she will be also trained in the insertion of a preposition in a sentence; the same way she did with the adjectives in the previous exercise. This type of therapy and training at this stage is necessary as far as this research work is concerned. It is an occasion for the therapist to draw a comparison between and among the three aphasics' language re-acquisition and linguistic abilities.

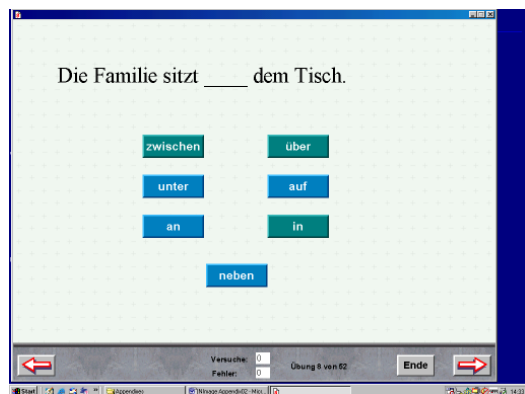


Table 120: Anomic Aphasic's therapy in an exercise of *Production* in which she inserts a preposition in a sentence

Exercise 16 of NL Stimuli (Text)	Trials	Reponses with Errors	Evaluating Scale			
			3	2	1	0
1. Der Mann sitztdem Sessel. in über an unter auf neben zwischen	1	0	3			
2. Die Dose stehtdem Tisch. unter über an zwischen neben auf in	1	0	3			
3. Der Teppich liegtdem Boden. neben auf an unter zwischen in über	1	0	3			
4. Trotz des Schicksalsschlags steht die Ehefrau vollihrem Mann. in über an unter auf neben zwischen durch vor hinter	1	0	3			
5. Das Bild hängtder Wand. in über an unter auf neben zwischen	1	0	3			
6. Die Lampe hängt dem Tisch unter über zwischen in auf an neben	1	0	3			
7. Der Kaugummi klebt dem Stuhl auf an über unter zwischen neben in (3 Antworten sind richtig)	4	1<über>		2		
8. Die Familie sitztdem Tisch zwischen über unter auf an in neben	1	0	3			
9. Ein Vogel sitzt dem Ast unter neben an über zwischen in auf	2	1<über>		2		
10. Ich stelle mich einen Baum neben an unter zwischen auf in über (3 Antworten sind richtig)	4	1<auf>		2		

11. Das Flugzeug fliegt den Wolken in über an zwischen auf neben unter durch (2 Antworten sind richtig)	4	2<in, durch>			1	
12. Die Sonne blitzt den Bäumen auf in zwischen an unter neben auf über	2	1<auf>		2		
13. Der Zug fährt der Brücke den Rhein unter über zwischen in auf neben an	4	2<über, auf>			1	
14. Sylvester gehe ich das Aachener Spielkasino zwischen an über unter auf neben in durch	1	0	3			
15. Das Schiff fährt die Schleuse über unter neben in durch an zwischen auf	2	1<in>		2		
16. Dort drüben der Ecke ist unsere Stamm-kneipe in über an unter auf neben zwischen durch	1	0	3			
17. Die Bäckerei befindet sich gleich der Sparkasse in über an unter auf neben zwischen durch	1	0	3			
18. Der Mund befindet sich der Nase durch über an unter auf zwischen neben in	1	0	3			
19. Die Brille sitzt der Nase in zwischen an unter durch neben über auf	2	1<über>		2		
20. Der Gast sitzt dem Tresen hinter über an unter auf neben zwischen durch vor in	2	1<neben>		2		
Sum of Trials, Errors & Evaluating Scale	37	11		49		

Commentary on the 8th Hour

Mrs Müller recognized the adjectives of exercise 15 in table 115 and assigned them the right position, but in most of her responses she submitted the adjectives that have flexional morphemes that do not fit in the grammatical category; in other words she could not find the correct declension of the adjective that suits the gender, case and number. She selected from four adjectives the one she thought to be the correct one. This selection, she made at random, decreased the sum of her correct points shown by the evaluating scale (Tab. 115/ Exer. 15). She behaved also in the same way as far as exercise 16 is concerned. Any preposition she assigned to the sentences was done involuntarily. She could not figure out the grammatical structure in

which the correct preposition can be inserted (Tab.116/ Exer.16). The reason why the sum of her correct scores has not even reached an average level.

The responses of Mr Fimm, the Wernicke's aphasic in exercise15 and 16 of table117 and 118 depict that he understood the grammatical structures in which he inserted the adjectives and the prepositions. In the therapy session of the sentences where he is required to choose the adjectives, whose grammatical declension did not agree with the gender, case and number, he was able to correct the errors and pick the right one (Tab.117/ Exer.115). The patient was also required to deal with the prepositions in the same way he did with the adjectives. He followed the same steps of trial and error. This demonstrates that he did not lose the instinct for a correct grammatical structure (Tab.118/ Exer.16). The results of the evaluating scale obtained in the two exercises substantiate these findings.

Comparing the selected adjectives and prepositions of the anomic aphasic, Mrs Heinrich with those of the two previous patients, one can conclude that almost all her responses delineate the correct declension, gender, case and number. There are certain tasks in which errors occurred, but they were very few. An overview about these examples and the results of the patient ought to be seen in exercise15 and 16 of table119 and 120.

* The **ninth hour** of therapy in the fifth week will consist of exercise17 and 18 which have a similar form. The exercises contain, mainly, "S-P" and "S-P-O" sentences. How to construct correct grammatical and meaningful sentences is the task in which the patients will be trained. Each patient, with the exception of Mrs Heinrich, is asked to construct a sentence using mixed, scattered lexical and grammatical words that are presented on the screen together with an image.

Broca's Aphasic

Therapy on Mo. 29, March 2004

During the administration of therapy in exercise17 of table121 Mrs Müller, because of her articulatory problems, is given both the text - in the form of mixed, scattered lexical and grammatical words - and the image that could help her build a sentence. The scattered words are pronounced individually as they are presented on the screen, without conferring any meaningful or grammatical structure on them.



Table 121: Broca's Aphasic's therapy in an exercise of *Production* in which she builds sentences

Exercise 17 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.lacht – Kind – Das	1	0(ND)	3			
2.Volleyball – Sie – spielt	1	0(ND)	3			
3.macht – Clown – Spaß – Der	2	1<{1MØ} Clown macht Spaß>		2		
4.Junge – lächelt – Die – Dame	3	2<{1MØ} {1MØ} Dame lacht>			1	
5.umarmen – beiden – Die – sich	3	2<{1MØ} beiden umarmen {1MØ}>			1	
6.Getränke – Die – Bedienung – serviert	3	2<{1MØ} Bedienung [{1Wgetränke}] serviert >			1	
7.Der – Geschäftsmann – freundlich – lächelt	1	0(ND)	3			
8.Ist – Seine – Kaffeebraun – Hautfarbe	3	2<{1MØ} Hautfarbe {1MØ} Kaffeebraun>			1	
9.telefoniert – Die – Frau – schwangere	2	1<Die {1MØ} Frau telefoniert>		2		
10.Schlägertyp – Er – ein – ist	3	2<Er {1MØ} {1MØ} Schlägertyp>			1	
11.trinkt – Kaffee – Die – Frau	2	1<{1MØ} Frau trinkt Kaffee>		2		
12.Familie – Die – geht – spazieren	3	2<{1MØ} Familie {1WØ} spazieren>			1	
13.gegeneinander – Die – Sportler – kämpfen	4	3<[{1W gegeneinander}] {1MØ} kämpfen [{1W Sportler}]>				0
14.Mädchen – Ballet – tanzt – Das – klassisches	3	2< {1MØ} Mädchen {1WØ} klassisches Ballet>			1	
15.sieht – Braut – Die – festlich – aus	3	2<{1MØ} Braut sieht [{1M aus}] festlich>			1	
16.aus – ruht – Mann – sich – Der	3	2<{1MØ} Mann ruht [{1M aus}] sich>			1	
17.Frau – ist – Die – altmodisch – gekleidet	3	2<{1MØ} Frau {1MØ} altmodisch gekleidet>			1	
18.junge – Der – Inline-Skating – Mann – macht	3	2<Der {1MØ}Mann {1MØ} Inline-Skating>			1	
19.dem – Sie – Handy – mit – telefoniert	2	1<Sie telefoniert mit {1MØ} Handy>		2		
20.Akten – Schreibtisch – überhäufen – die – den	3	2<{1MØ}Akten überhaufen {1MØ} Schreibtisch>			1	
Sum of Trials, Errors & Evaluating Scale	51	31	29			

Due to the importance of the above exercise, its training will be continued in exercise 18 of table 122. The patient has to form a meaningful sentence that describes the image. It is a therapy that trains the syntactic and semantic capacity of the patients. The reinforcement of this ability can be triggered by the combination of different constituents to make a correct meaningful sentence.



Table 122: Broca's Aphasic's therapy in an exercise of *Production* in which she builds sentences

Exercise 18 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.einen – Der – trägt – Radiorecorder– Jugendliche	3	2<Der Jugendliche {1WØ} {1WØ} Radiorecorder			1	
2.Sie – der – Schule – kommt – aus	3	2<{1MØ} kommt aus {1MØ} Schule>			1	
3.ist – am – Der – Mann – Ende	2	1<Der Mann {1MØ} am Ende>		2		
4.weint – Kind – Das – kleine bitterlich	4	3<{1MØ} {1MØ} Kind [{1M bitterlich}] weint>				0
5.den – Der – trägt – Aktenkoffer – Geschäftsmann	2	1<Der Geschäftsmann trägt {1MØ} Aktenkoffer>		2		
6.mit – spielt – Das – Kind – dem – LKW	3	2<{1MØ} Kind spielt mit {1MØ} LKW>			1	
7.dem – Frau – Die – liegt – auf – Badetuch	3	2<Die Frau {1MØ} auf {1MØ} Badetuch>			1	
8.für – Die – Familie – posiert – Familienfoto – ein	3	2<Die Familie {1MØ} für {1MØ} Familienfoto>			1	
9.sich – Der – schneidet – die Zehennägel – Mann	3	2<Der Mann schneidet{1MØ}{1MØ}Zehennägel>			1	
10.Die – jungen – Männer – beiden – brüsten– sich	2	1<Die beiden {1W Ø}Männer brüsten sich>		2		
11.jüngere – lila – Mädchen – hat – Haare – Das	3	2< {1MØ} junge Mädchen lila Haare [{1M hat}]>			1	
12. neckisch – Sie – blinzelt – Augen – mit – den	4	+3<{1MØ} mit den Augen [{1W blinzelt}] [{1W neckisch}]>				0
13. Die – Klötzchen – kleinen – Mädchen – spielen - mit	3	2<Die {1WØ} Mädchen spielen {1WØ} Klötzchen>			1	
14. eine – Die – macht – dramatische –Ballerina-Gebärde	4	3<{1M Ø} Ballerina macht {1WØ} {1WØ} Gebärde>				0
15. Sie – hat – sehr – eine Figur – gute	3	2<Sie hat {1WØ} {1MØ} gute Figur>			1	
16. als – Mann – ist – Pirat – Der – verkleidet	3	2<Der Mann {1MØ} {1MØ} Pirat verkleidet>			1	
17. in – der – liegt – Der – Mann – Sonne	2	1<Der Mann in {1MØ} Sonne [{1W liegt}] >		2		
18.dem – Er – mit – Skateboard – ist – gestürzt	3	2<Er {1MØ} mit {1MØ} Skateboard gestürzt>			1	
19.Melone – Der – Mann – trägt – Smoking – und	3	2<{1MØ} Mann trägt Melone {1MØ} Smoking>			1	
20.Der – Holzfällerhemd – im – Mann – Gitarre - spielt	3	2<Der Mann {1MØ} {1WØ} spielt Gitarre>			1	
Sum of Trials, Errors & Evaluating Scale	59	39	21			

Wernicke's Aphasic

Therapy on Mo. 29, March 2004

The Wernicke's aphasic's form and administration of therapy will be similar to that of the Broca's aphasic. The former will get the text, its image and the tone that can help him construct correct grammatical and meaningful sentences (Tab.123/ Exer.17).



Table 123: Wernicke's Aphasic's therapy in an exercise of *Production* in which he builds sentences

Exercise 17 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.lacht – Kind – Das	1	0(ND)	3			
2.Volleyball – Sie – spielt	1	0(ND)	3			
3.macht – Clown – Spaß – Der	2	1<Der {1WØ} macht Spaß>		2		
4.Junge – lächelt – Die – Dame	2	1<{1MØ} junge {1MØ} lächelt>			1	
5.umarmen – beiden – Die – sich	2	1<Die {1MØ} umarmen sich>		2		
6.Getränke – Die – Bedienung – serviert	2	1<Die Bedienung serviert {1MØ}>		2		
7.Der – Geschäftsmann – freundlich – lächelt	2	1<Der [{1Wfreundlich}] Geschäftsmann lächelt>		2		
8.Ist – Seine – Kaffeebraun – Hautfarbe	3	2<Seine{1MØ} Kaffeebraun [{1W Hautfarbe}]>			1	
9.telefoniert – Die – Frau – schwangere	2	1<Die {1MØ} Frau telefoniert>		2		
10.Schlägertyp – Er – ein – ist	3	2<{1MØ} ist {1MØ} Schlägertyp>			1	
11.trinkt – Kaffee – Die – Frau	1	0(ND)	3			
12.Familie – Die – geht – spazieren	3	2<Die {1MØ} spazieren [{1W geht}]>			1	
13.gegenseinander – Die – Sportler – kämpfen	2	1<Die gegenseinander [{1Wsportler}] kämpfen>		2		
14.Mädchen – Ballet – tanzt – Das – klassisches	2	1<Das Mädchen tanzt klassisches{1MØ}>		2		
15.sieht – Braut – Die – festlich – aus	3	2<Die {1MØ} sieht festlich {1MØ}>			1	
16.aus – ruht – Mann – sich – Der	3	2<Der {1MØ} Ruht sich {1MØ}>			1	
17.Frau – ist – Die – altmodisch – gekleidet	3	2<Die Frau {1WØ} gekleidet [{1M ist}]>			1	
18.junge – Der – Inline-Skating – Mann – macht	3	2<Der {1MØ} {1MØ} Inline-skating>			1	
19.dem – Sie – Handy – mit – telefoniert	3	2< dem Handy [{1M mit}] [{1P sie telefoniert}]>			1	
20.Akten – Schreibtisch – überhäufen – die – den	4	3<{1MØ} Akten {1WØ} Schreibtisch [{1M überhäufen}]>				0
Sum of Trials, Errors & Evaluating Scale	47	27	33			

The Wernicke's aphasic, who encountered a great deal of difficulties in the above exercise, will be trained again in exercise18 in tasks that have the same form as the above ones.



Table 124: Wernicke's Aphasic's therapy in an exercise of *Production* in which he builds sentences

Exercise 18 of NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.einen – Der – trägt – Radiorecorder– jugendliche	3	2<Jugendliche [{1Mder}] trägt {1MØ} Radio-recorder >			1	
2.Sie – der – Schule – kommt – aus	3	2<Sie [{1P der Schule}] aus [{1W kommt}]>			1	
3.ist – am – Der – Mann – Ende	3	2<[{1M Ø} Mann am Ende [{1M ist}]>			1	
4.weint – Kind – Das – kleine – bitterlich	4	3<Das [{1M bitterlich}] weint {1MØ} [{1M kind}]>				0
5.den – Der – trägt – Aktenkoffer – Geschäftsmann	4	+3<Der [{1W Aktenkoffer}] {1MØ} [{1W trägt}] [{1W Geschäftsmann}]>				0
6.mit – spielt – Das – Kind – dem – LKW	4	3<Das Kind dem LKW [{1M mit}] [{1W spielt}]>			1	
7.dem – Frau – Die – liegt – auf – Badetuch	3	2<Die Frau auf {1MØ} Badetuch [{1W liegt}] >			1	
8.für – Die – Familie – posiert – Familienfoto – ein	3	2<[{1P Ein Familienfoto}] posiert für [{1P die Familie}] >			1	
9.sich – Der – schneidet – die - Zehennägel – Mann	3	2<Der Mann schneidet {1MØ} Zehennägel [{1M sich}]>			1	
10.Die – jungen – Männer – beiden – brüsten– sich	3	2<Die Männer jungen {1MØ} brüsten {1MØ}>			1	
11.jüngere – lila – Mädchen – hat – Haare – Das	3	2Das hat lila Haare [{1W jüngere}] [{1M Mädchen}]			1	
12. neckisch – Sie – blinzelt – Augen – mit – den	3	2 Sie[{1P Mit den Augen}] blinzelt {1WØ}			1	
13. Die – Klötzchen – kleinen – Mädchen – spielen - mit	2	1<Die spielen mit [{1P kleinen Mädchen}] Klötzchen>		2		
14. eine – Die – macht – dramatische –Ballerina–Gebärde	3	2<[{1W Eine}] macht dramatische [{1P die Ballerina}] Gebärde>			1	
15. Sie – hat – sehr – eine Figur – gute	2	1<Sie hat eine Figur [{1Psehr gute}]>		2		
16. als – Mann – ist – Pirat – Der – verkleidet	4	3<[{1P Pirat verkleidet}] [{1M als}] [{1P der Mann}] ist >				0
17. in – der – liegt – Der – Mann – Sonne	3	2<Sonne [{1P in der}] [{1S der Mann liegt}]>			1	
18.dem – Er – mit – Skateboard – ist – gestürzt	2	1<Er gestürzt [{1M ist}] mit dem Skate-board>		2		
19.Melone – Der – Mann – trägt – Smoking – und	3	2<Der Mann [{1W Smoking}] und [{1W trägt}] Melone>			1	
20.Der – Holzfällerhemd – im – Mann – Gitarre - spielt	4	3[{1P Im Holzfällerhemd}] spielt [{1P der Mann}] [{1M Gitarre}] >				0
Sum of Trials, Errors & Evaluating Scale	62	42	18			

Anomic Aphasic

Therapy on Tu. 30, March 2004

The exercises, in which Mrs Heinrich will be trained, will be the same as the above ones, but administered otherwise. Both images and tones are deleted from the procedures of therapy. This patient will be asked to form a correct sentence using only mixed, submitted lexical and grammatical words.

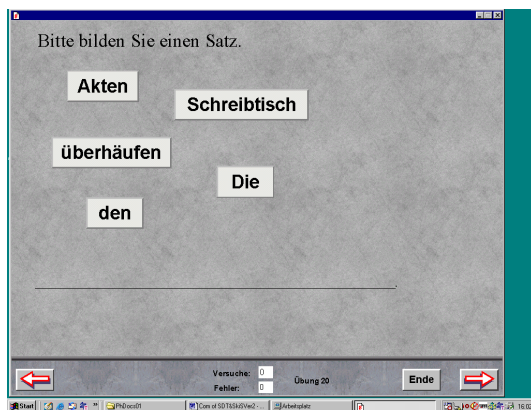


Table 125: Anomic's Aphasic's therapy in an exercise of *Production* in which she builds sentences

Exercise 17 of NL Stimuli (Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.lacht – Kind – Das	1	0(ND)	3			
2.Volleyball – Sie – spielt	1	0(ND)	3			
3.macht – Clown – Spaß – Der	1	0(ND)	3			
4.Junge – lächelt – Die – Dame	1	0(ND)	3			
5.umarmen – beiden – Die – sich	2	1<Die beiden sich [{1W umarmen}]>		2		
6.Getränke – Die – Bedienung – serviert	2	1<Bedienung serviert [{1M die}] Getränke>		2		
7.Der – Geschäftsmann – freundlich – lächelt	1	0(ND)	3			
8.Ist – Seine – Kaffeebraun – Hautfarbe	1	0(ND)	3			
9.telefoniert – Die – Frau – schwangere	2	1<Die { 1W Ø}Frau telefoniert>		2		
10.Schlägertyp – Er – ein – ist	1	0(ND)	3			
11.trinkt – Kaffee – Die – Frau	1	0(ND)	3			
12.Familie – Die – geht – spazieren	1	0(ND)	3			
13.gegeneinander – Die – Sportler – kämpfen	2	1<Gegeneinander [{1P die Sportler kämpfen}]>		2		
14.Mädchen – Ballet – tanzt – Das – klassisches	2	1<Das [{1P klassisches}] Mädchen tanzt Ballet>		2		
15.sieht – Braut – Die – festlich – aus	2	1<[{1W Festlich}] die Braut sieht aus>		2		
16.aus – ruht – Mann – sich – Der	2	1<Der Mann ruht {1M Ø} aus>		2		
17.Frau – ist – Die – altmodisch – gekleidet	1	0(ND)	3			
18.junge – Der – Inline-Skating – Mann – macht	2	1<[{1P Inline-Skating}] der junge Mann macht>		2		
19.dem – Sie – Handy – mit – telefoniert	1	0(ND)	3			
20.Akten – Schreibtisch – überhäufen – die – den	1	0(ND)	3			
Sum of Trials, Errors & Evaluating Scale	28	8	52			

The therapy of the anomic aphasic is to be continued in exercise 17 of table 125. The aim of continuing this therapy in two exercises, which have similar forms and contents, is to get an insight into the performance of the three patients, mainly, into the results they managed to achieve in a therapeutic training of similar tasks.

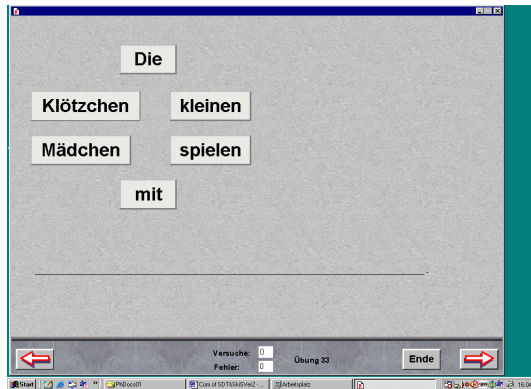


Table 126: Anomic's Aphasic's therapy in an exercise of *Production* in which she builds sentences

Exercise 18 of NL Stimuli (Text)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
1.einen – Der – trägt – Radiorecorder– jugendliche	3	2<[{1W Einen}] jugendliche trägt [{1M der}] Radio-recorder>			1	
2.Sie – der – Schule – kommt – aus	1	0(ND)	3			
3.ist – am – Der – Mann – Ende	1	0(ND)	3			
4.weint – Kind – Das – kleine – bitterlich	2	1<[{1W weint}] das kleine Kind bitterlich>		2		
5.den – Der – trägt – Aktenkoffer – Geschäftsmann	1	0(ND)	3			
6.mit – spielt – Das – Kind – dem – LKW	2	1<Das Kind spielt mit {1M Ø} LKW>		2		
7.dem – Frau – Die – liegt – auf – Badetuch	2	1<Die Frau [{ 1P auf dem Badetuch }] liegt>		2		
8.für – Die – Familie – posiert – Familienfoto – ein	1	0(ND)	3			
9.sich – Der – schneidet – die - Zehennägel – Mann	2	1<Der Mann schneidet {1M Ø}Zehennägel>		2		
10.Die – jungen – Männer – beiden – brüsten– sich	3	2<Die{1MØ}jungen Männer brüsten {1MØ}>			1	
11.jüngere – lila – Mädchen – hat – Haare – Das	1	0(ND)	3			
12. neckisch – Sie – blinzelt – Augen – mit – den	2	1<[{1Mneckisch}] sie blinzelt mit den Augen>		2		
13. Die – Klötzchen – kleinen – Mädchen – spielen – mit	1	0(ND)	3			
14. eine – Die – macht – dramatische –Ballerina-Gebärde	3	2<[{1W eine}] Ballerina macht [{1M die}] dramatische Gebärde>			1	
15. Sie – hat – sehr – eine Figur – gute	2	1<Sie hat eine {1M Ø}gute Figur>		2		
16. als – Mann – ist – Pirat – Der – verkleidet	2	1<Der Mann ist verkleidet [{ 1P als Pirat }]>		2		
17. in – der – liegt – Der – Mann – Sonne	1	0(ND)	3			
18.dem – Er – mit – Skateboard – ist – gestürzt	1	0(ND)	3			
19.Melone – Der – Mann – trägt – Smoking – und	1	0(ND)	3			
20.Der – Holzfällerhemd – im – Mann – Gitarre – spielt	2	1<Der Mann spielt Gitarre [{1P im Holzfällerhemd}]>		2		
Sum of Trials, Errors & Evaluating Scale	34	14	46			

Commentary on the 9th Hour

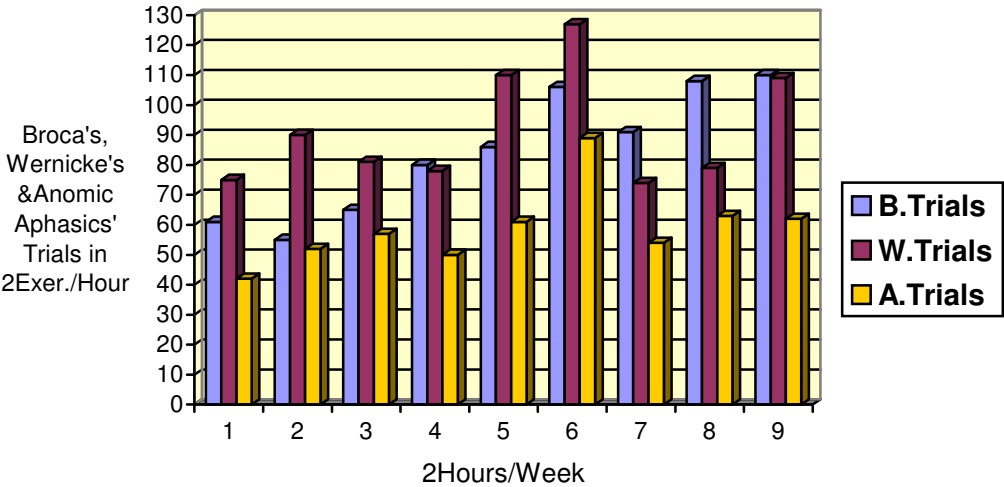
Exercises 17 and 18 were a challenge to the linguistic capacities of the three patients because, first of all, they must understand the constituents and use them to form a correct grammatical and meaningful sentence. These tasks were not so easy as they appear to be; especially, to the Broca's and Wernicke's aphasics. The trials, that Mrs Müller made, depict that she understood the meaning of the constituents from which she attempted to form the correct sentences. As she formulated the sentences, certain articles, pronouns, particles, adjectives and verbs were omitted from her responses. Thus, she reached an average evaluating scale of 29/60 points in exercise 17 of table 121. This value stands below the average. In exercise 18 of table 122 the intensity of the difficulty of the tasks increased. This made the number of the occurring errors increase in the grammatical, lexical words and word order, hence the score of the correct points sunk to 21/60 points (Tab. 122/ Exer. 18).

Because of omissions and substitutions, the sentences of the Wernicke's aphasic, Mr Fimm are a combination of constituents that have no meaning. This can be deduced from the tasks of exercise 17 of table 123 and exercise 18 of table 124 in which many tasks were combined only at random; that is, being confronted with difficult tasks, the patient simply threw the constituents together. This can be referred to his inability to understand the meaning of the constituents due to the syndrome of aphasia he suffers from. This handicap, which has an effect on performance, diminished the evaluating scale to a lowest score (Tab. 124/ Exer. 18).

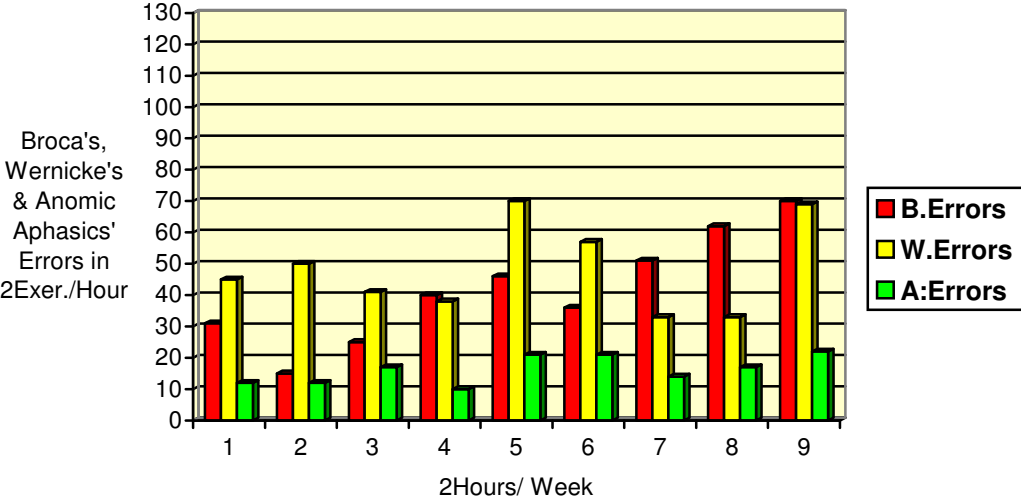
Even though the anomic aphasic, Mrs Heinrich got no image and tone assistance through the program, NeuroLing so as to combine the written constituents in grammatical and meaningful sentences, she achieved in the exercises of this session of training good results (Tab. 125/ Exer. 7 & Tab. 126/ Exer. 18). A close look at her sentences unfold that in many responses there are substitutions, wrong word order and traces of word finding disturbances, but this did not lead to a decrease in the score of the evaluating scale. It remained far above the average (Tab. 125 & 126).

The following bar- and graph-diagrams illustrate how the rate of trials, errors and evaluating scale developed over a period of five weeks in the language of three aphasic patients.

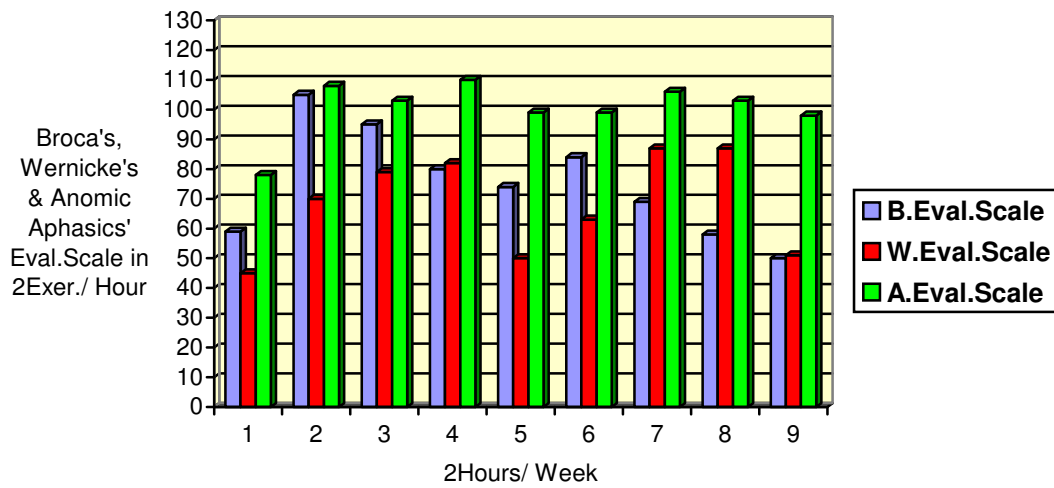
6.6.3.1.4 - Schematic Representation of the Second Phase of Training with NeuroLing



(a)

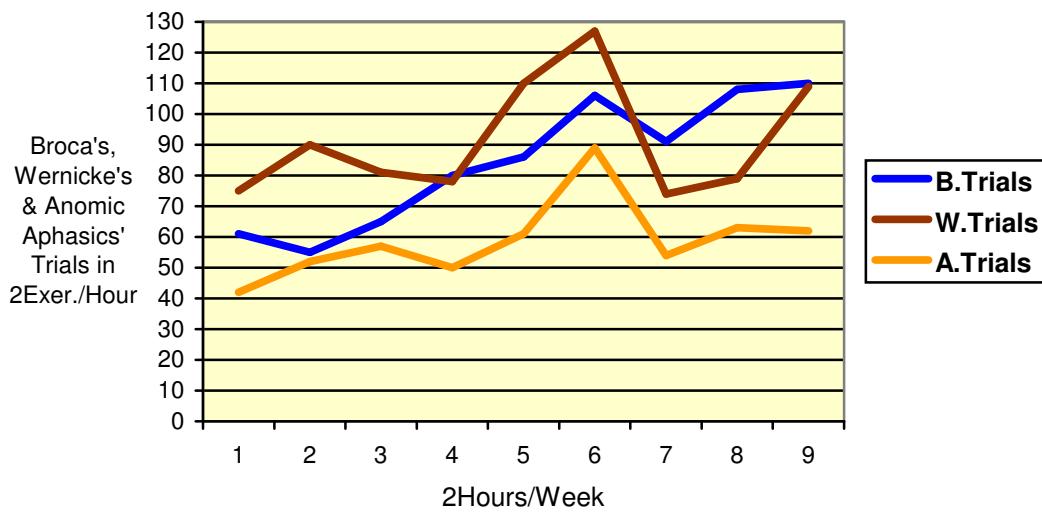


(b)

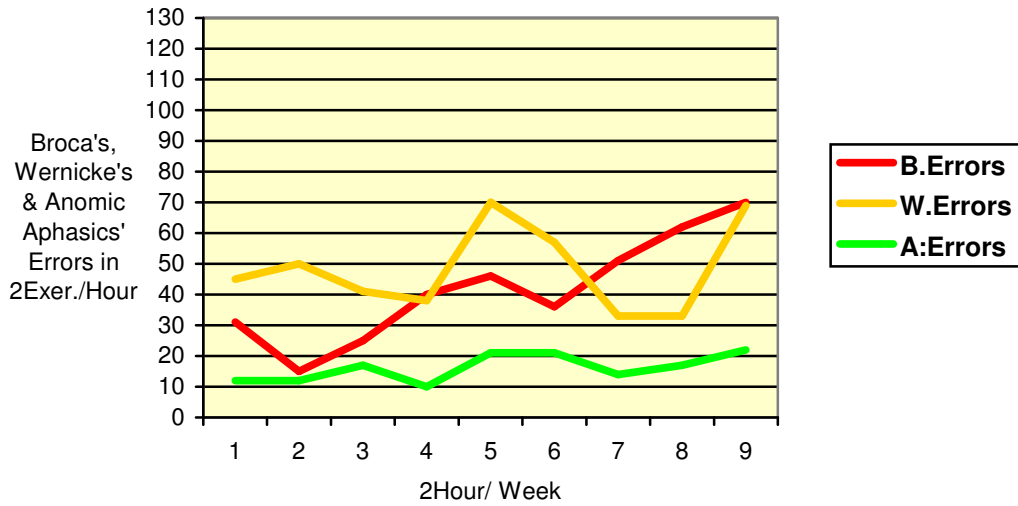


(c)

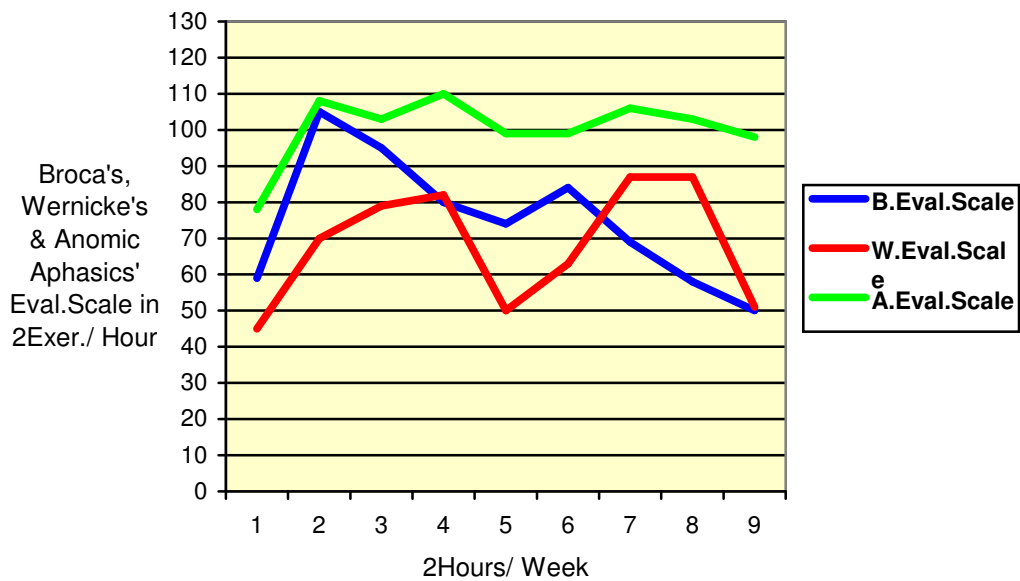
Fig.27. The (a), (b) and (c) bar-diagrams present the level of trials, errors and evaluating scale over a period of five weeks



(d)



(e)



(f)

Fig.28. The (d), (e) and (f) graph-diagrams show the progress of trials, errors and evaluating scale

The graph-diagrams, that represent the second phase of aphasia therapy with NeuroLing, display another form. It gives us an insight into the competence and performance of each patient in the recognition, understanding and production/perception of language over a period of five weeks (see the aphasics' responses in the tables of the 2nd period of aphasia therapy).

The rise and fall of the graphs show the intensity of a re-training and the reaction of the patients to newly introduced materials of therapy. They also unfold the development of the stimuli, the score of the responses and the effect of stimulation on the patients' communicative abilities.

The important aim, that was achieved in the two periods of aphasia therapy, was not to have separated between the material of training, strategy of testing and therapy steps. The rate of recovery, that ought to have been achieved by LingWare and NeuroLing, will be re-tested in the next section.

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7 - Defining the Average of each Patient's Recovery with the Re-Testing Method

After the second phase of therapy the aphasic patient got a break of one week. This rest was necessary at this stage to avoid involving them in situations of strain, tiredness and boredom that may arise from the re-testing procedures that ought to have followed the second period of therapy. It must be clear that from the whole exercises, that were used in the first and second phase of therapy, five of them will be chosen from LingWare and the other five from NeuroLing. The intention of this choice is to check the effect of training that was achieved by the use of the two programs of aphasia therapy.

The re-testing of each patient will take a period of 90minutes. During its administration, consideration will be given to the following points: types of exercises that will be used in re-testing; the modalities they trained in the hours of therapy; the effect they had on the disorders and what they changed in the linguistic ability of each patient. In a context of re-testing the two programs of aphasia therapy will be assigned two tasks: the selected exercises of LingWare will be used to re-test the repetition and naming capacity and those of NeuroLing will re-test the comprehension ability.

As a matter of course, attention will be directed to the way the relationship between Diagnosis, Therapy and Re-Testing has been structured and interwoven. As it was mentioned above and in the section of the diagnostic approaches (See 5.3), the diagnostic items, which were used as stimuli of Testing, were taken from LingWare and NeuroLing. The aim of this method is to attempt to bridge the vacuum that should have existed between the various tasks of testing and therapy if the diagnostic items were taken from different sources and thrown together at random. In other words if the diagnostic, therapeutic and re-testing materials vary, to a large extent, from each other in form and content, the patients will be placed in various, separate and strange environments from which may result the patients' confusion and retardation in recovery.

The purpose of this link between the materials of therapy and re-testing is to unfold the rate of recovery each patient, suffering from a particular syndrome of aphasia, managed to achieve through a planned and programmed aphasia therapy. This should be as a sample-checking all along the process of a therapeutic training that may stretch over different periods of time and carried out now and then. This has to mean that at different intervals of a progressive therapy exercises are picked out and examined by certain selected subtests of the AAT; it is an intermittent and reoccurring procedure. It must be hinted at that in the course of re-testing the three patients will be required to submit only one response to a particular stimulus as the trial procedures will not be involved in re-testing.

7.1 - Re-Testing through the Exercises of *LingWare* Using the *Repetition Test* and the *Confrontation Naming Test*

To define the rate of recovery that might have been achieved by the use of LingWare, each patient, as it was mentioned above, will be re-tested in this period through five exercises of this program, of course, using in this process of Re-Testing the Repetition Test and Confrontation Naming Test of the AAT. The exercises consist of mono-, bi-syllabic and compound words as well as simple and complex sentences.

The tests are to be used to unfold whether there have been any amelioration in the linguistic performance and competence of the patients. Attention will be directed to the stimuli, in which they have been trained continuously and repeatedly, using different strategies that should be directed to the different modalities. The effect of these strategies on the syndromes of aphasia will be shown by the Re-Testing procedures. It must be pointed out that the whole pictures that will be used in Re-Testing are illustrated in *the Image Appendix*.

Broca's Aphasic

Repetition Test

Re-Testing on Tu. 06, April 2004

In the following 5 exercises the patient is required to repeat a word, a phrase or a sentence. The tasks of these exercises, that will be used to re-test Mrs Müller's linguistic recovery rate, are accompanied with images. The demand on the Broca's aphasic is to hear the task being pronounced by the examiner once and then repeat it. The patient is allowed to make only one trial. There is no intention of trying to ameliorate her performance or attempting to make her submit a correct response to a stimulus.

In exercise 1 of table 127 the patient, Mrs Müller is asked to repeat mono-syllabic words.

Table 127: Re-Testing of the Broca's Aphasic's Repetition of mono-syllabic words

Exercise 1 of LW Stimuli (Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Eis	0(ND)	3			
2. eine Uhr	0(ND)	3			
3. Tee	0(ND)	3			
4. eine Kuh	1<ein/IVØ/ Kuh		2		
5. Bier	0(ND)	3			
6. ein Bett	0(ND)	3			
7. ein Buch	0(ND)	3			
8. Mehl	0(ND)	3			
9. Fisch	0(ND)	3			
10. ein Topf	1<ein To/ICØ/f		2		
11. ein Wirt	0(ND)	3			
12. ein Schirm	0(ND)	3			

13. Brot	0(ND)	3			
14. ein Stuhl	1<ein S/ICØ/uhl>		2		
15. Fleisch	0(ND)	3			
16. ein Schrank	0(ND)	3			
17. ein Zelt	1<ein /ICs/elt>		2		
18. ein Pferd	0(ND)	3			
19. ein Strumpf	1<ein St/Ø/umpf>		2		
20. Wein	0(ND)	3			
Sum of Errors & Evaluating Scale	4		56		

In exercise8 of table128 the repetition takes another dimension. The patient will be re-tested in the repetition of compound words, phrases and sentences, whose texts are partly omitted from the images, but pronounced by the examiner.

Table 128: Re-Testing of Broca's Aphasic's Repetition of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images , "Text" & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.(Aktenordner)	0(ND)	3			
2. der(Taschenrechner)	1<der Taschenrechner/ICØ/		2		
3. die(Bohrmaschine)	0(ND)	3			
4. der(Rasierapparat)	1<{/IMdie}/ Rasierapparat>		2		
5. die(Kaffeemaschine)	0(ND)	3			
6. der(Tischtennisschläger)	1<der Tischtennissch/ICØ/äger		2		
7. ein Kreis (weißer)	0(ND)	3			
8. ein Viereck (grünes)	1<ein grün/{IMer}/ Viereck>		2		
9. ein rotes (Dreieck)	0(ND)	3			
10. ein Kreis (blauer)	0(ND)	3			
11. ein gelbes (Viereck)	0(ND)	3			
12. ein Kreis (schwarzer)	2<ein schwa/ICØ/ze/ICØ/ Kreis>			1	
13. Der Mann (läuft)	0(ND)	3			
14. Der fliegt (Hubschrauber)	2<De/ICØ/ Hubschrau/ICf/er fliegt>			1	
15. Die Frau (telefoniert)	0(ND)	3			
16. Der Junge ein Buch (liest)	0(ND)	3			
17. Die Oma einen (schreibt/ Brief)	1<Die Oma schreibt ein{IMØ}Brief>		2		
18. Der Mann ein (trinkt / Bier)	0(ND)	3			
19. Das Mädchenzu seiner (läuft / Mutter)	0(ND)	3			
20. Der Junge s.....t Trompete (spielt)	0(ND)	3			
Sum of Errors & Evaluating Scale	9		51		

Re-testing with exercise10 of table129 will be carried out through the use of the articles and the words that are bi-syllabic and compound. Each image, which requires a lexical word, is accompanied with an infinite article.

Table 129: Re-Testing of Broca's Aphasic's Repetition of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images, 'Text' & 'Tone')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. ein..... (Auto)	0(ND)	3			
2. ein.....(Affe)	0(ND)	3			
3. eine.....(Ente)	1<ein/ICØ/ Ente>		2		
4. eine(Hose)	0(ND)	3			
5. ein Stück(Seife)	1<ein Stück Se/IVØ/fe>		2		
6. ein(Apfel)	0(ND)	3			
7. ein(Mantel)	0(ND)	3			
8. ein(Gürtel)	0(ND)	3			
9. eine.....(Schnalle)	2<ein/IVØ/ Sch/ICØ/alle>			1	
10. eine..... (Krone)	1<ein/IVØ/ Krone>		2		
11. eine.....(Bluse)	1<ein/IVØ/ Bluse>		2		
12. ein(Brötchen)	0(ND)	3			
13. ein..... (Traktor)	0(ND)	3			

14. ein..... (Stempel)	0(ND)	3			
15. ein..... (Flieger)	0(ND)	3			
16. ein.....(Bleistift)	1<ein Blei/1CØ/tift>		2		
17. ein.....(Kühlschrank)	0(ND)	3			
18. ein.....(Hubschrauber)	0(ND)	3			
19. ein.....(Blumenkohl)	0(ND)	3			
20. ein.....(Aktendordner)	1<ein Akte/1CØ/ordner>		2		
Sum of Errors & Evaluating Scale	8		52		

As the re-testing goes on through the use of exercise11 of table130, the patient is required to repeat the sentences whose lexical words are deleted. The focus will be, mainly, on the errors that the patient may make in the words that should be filled in the blanks.

Table 130: Re-Testing of Broca's Aphasic's Repetition of lexical words in the sentences

Exercise11 of LW Stimuli (Images, 'Text' & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Der Wirt zapft (Bier)	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	0(ND)	3			
3. Der Bäcker backt frisches (Brot)	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	1<Eier esse ich Pfeffer und Sa/1CØ/z>		2		
5. Im Sommer schleckte ich gerne (Eis)	0(ND)	3			
6. Der Angler fängt einen (Fisch)	0(ND)	3			
7. Das Baby trinkt aus der (Flasche)	1<Das Baby trinkt aus der Fl/1Ve/sche>		2		
8. Ich trinke Saft aus dem (Glas)	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	0 (ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	1<Nachmittag gibt es Kaffee und Ku/1Ck/en>		2		
11. Suppe esse ich mit dem (Löffel)	0(ND)	3			
12. Ich schneide das Brot mit dem (Messer)	1<Ich schneide das Brot mit dem Messe/1CØ/		2		
13. Kaffee schmeckt mit Zucker und (Milch)	0(ND)	3			
14. Aus Apfelsinen presse ich frischen (Saft)	1<Aus Apfelsinen presse ich frischen Sa[+1Cnf]t>		2		
15. Im Glas perlt der (Wein)	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	0(ND)	3			
17. Ich trinke Kaffee aus der (Tasse)	0(ND)	3			
18. Anna trinkt schwarzen (Tee)	0(ND)	3			
19. Ich esse Suppe vom (Teller)	1<Ich esse die Suppe vom Telle/1CØ/		2		
20. Die Suppe kocht im (Topf)	0(ND)	3			
Sum of Errors & Evaluating Scale	6		54		

The repetition of a sentence in which a verb must be conjugated simultaneously, as the patient repeats the sentence, is to be re-tested through exercise13 of table131. As it was done in the above exercise of table130, the examiner in exercise13 concentrates, mainly, on the errors that may occur in the verbs. Other errors are to be noted, but given only a secondary consideration.

Table 131: Re-Testing of Broca's Aphasic's Repetition of verbs in the sentences

Exercise 13 of LW Stimuli (Images, 'Text' & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Anna(lacht)	0(ND)	3			
2. Jürgen(raucht)	0(ND)	3			
3. Vater(kocht)	0(ND)	3			
4. Er(schläft)	0(ND)	3			
5. Vater und Sohn(baden)	0(ND)	3			
6. Eva(kämmt) sich	0(ND)	3			
7. Sie(schreibt) einen Brief	0(ND)	3			
8. Er(trinkt) ein Bier	0(ND)	3			
9. Der Junge.....(läuft) schnell weg	0(ND)	3			
10. Der Hubschrauber.....(fliegt) über den See	1<Der Hubschrauber f//1CØ/iegt über den See>		2		
11. Die Schülerin.....(lernt) für das Abitur	0(ND)	3			
12. Der Hund(bellt)	0(ND)	3			

13. Tim(spielt) Fußball	0(ND)	3			
14. Laura(singt) ein Lied	0(ND)	3			
15. Die Frau(putzt) das Fenster	1<Die Frau pu/ICs/t das Fenster>		2		
16. Der Junge(springt) ins Wasser	1<Der Junge s/ICØ/ringt ins Wasser>		2		
17. Er(zeigt) auf die Karte	1<Er /ICs/eigt auf die Karte>		2		
18. Hannibal(öffnet) die Tür	1<Hannibal öff/ICØ/et die Tür>		2		
19. Klaus(liest) ein Buch	0(ND)	3			
20. Der Vater(arbeitet) im Garten	0(ND)	3			
Sum of Errors & Evaluating Scale	5		55		

Confrontation Naming Test

Re-Testing on Tu. 06, April 2004

In the exercises below the therapist confronts the patient, Mrs Müller with the images of mono-, bi-syllabic and compound words as well as phrases, simple and complex sentences. The whole tasks of the exercises can be categorized in grammatical and lexical words. The patient has to assign the appropriate name to each task. Morpho-phonemic disorders are to be given little consideration - during the running of the confrontation naming test - because in this context of testing the importance will be given to the patient's mental process and the way how she labels the stimuli in which she had been trained in many sessions. Re-testing in exercise 1 of table 132 will be carried out through the images of mono-syllabic words.

Table 132: Re-Testing of Broca's Aphasic's Naming of images of mono-syllabic words

Exercise 1 of LW Stimuli (Images & Text)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Eis	0(ND)	3			
2. eine Uhr	0(ND)	3			
3. Tee	0(ND)	3			
4. eine Kuh	1<ein Tier[SS]>		2		
5. Bier	0(ND)	3			
6. ein Bett	0(ND)	3			
7. ein Buch	0(ND)	3			
8. Mehl	0(ND)	3			
9. Fisch	0(ND)	3			
10. ein Topf	1<ein T/IVu/pf>		2		
11. ein Wirt	0(ND)	3			
12. ein Schirm	1<ein Schi/1Ø/m>		2		
13. Brot	0(ND)	3			
14. ein Stuhl	1<ein St/IVe/hl>		2		
15. Fleisch	0(ND)	3			
16. ein Schrank	0(ND)	3			
17. ein Zelt	1<ein /ICS/elt>		2		
18. ein Pferd	0(ND)	3			
19. ein Strumpf	1<ein St/ICØ/umpf>		2		
20. Wein	1</ICV/ein>		2		
Sum of Errors & Evaluating Scale	7		53		

During the administration of re-testing through exercise 8 of table 133, the patient has to name the images of compound words, phrase and sentences. In the texts of the tasks there are many

blanks of the lexical type, which should be labeled by the patient. Any mistakes that may occur in the articles and proper nouns are given a slight consideration.

Table 133: Re-Testing of Broca's Aphasic's Naming of images of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images & "Text")	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.(Aktendordner)	1<{1MØ}ordner>		2		
2. der(Taschenrechner)	1<der Tasche/1CØ/rechner>		2		
3. die(Bohrmaschine)	0(ND)	3			
4. der(Rasierapparat)	1<der Rasier{1MØ}>		2		
5. die(Kaffeemaschine)	0(ND)	3			
6. der(Tischtennisschläger)	1<der Tennis{1MØ}schläger>		2		
7. ein Kreis (weißer)	0(ND)	3			
8. ein Viereck (grünes)	0(ND)	3			
9. ein rotes (Dreieck)	0(ND)	3			
10. ein Kreis (blauer)	1<ein blau/{1Mes}/ Kreis>		2		
11. ein gelbes (Viereck)	0(ND)	3			
12. ein Kreis (schwarzer)	0(ND)	3			
13. Der Mann (läuft)	0(ND)	3			
14. Der fliegt (Hubschrauber)	1<Der Hubschrau/1Cf/er fliegt >		2		
15. Die Frau (telefoniert)	1<Die Frau te/1C1VØ/foniert>		2		
16. Der Junge ein Buch (liest)	0(ND)	3			
17. Die Oma einen (schreibt/ Brief)	2<Die Oma schreibt einen [/{1W Test}/ SF]>			1	
18. Der Mann ein (trinkt / Bier)	0(ND)	3			
19. Das Mädchenzu seiner (läuft / Mutter)	1<Das Mädchen l/1VØ/uft zu seiner Mutter		2		
20. Der Junge s.....t Trompete (spielt)	1<Der Junge spie/1CØ/t Trompete>		2		
Sum of Errors & Evaluating Scale	10	50			

The patient, who - in exercise10 of table134 - is offered the images and the articles without their nouns, is asked during re-testing to name images, whose lexical words are either bi-syllabic or compound. The word to be found must fit in the blank that follows the article.

Table 134: Re-Testing of Broca's Aphasic's Naming of images of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images & "Text")	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. ein..... (Auto)	0(ND)	3			
2. ein.....(Affe)	0(ND)	3			
3. eine.....(Ente)	0(ND)	3			
4. eine(Hose)	1<eine H[+1Va]ose>		2		
5. ein Stück(Seife)	2<...das..ein /1CØ/tück S/1Vu/ife>			1	
6. ein(Apfel)	0(ND)	3			
7. ein(Mantel)	0(ND)	3			
8. ein(Gürtel)	1<ein G/1Vo/rtel>		2		
9. eine.....(Schnalle)	1<eine Schn/1Ve/lle>		2		
10. eine.....(Krone)	0(ND)	3			
11. eine.....(Bluse)	1<eine Bu[1Cl]se>		2		
12. ein(Brötchen)	0(ND)	3			
13. ein..... (Traktor)	0(ND)	3			
14. ein..... (Stempel)	1<ein Stem/1CØ/el>		2		
15. ein..... (Flieger)	1<ein [Fugzug(SF)]..nein Fel..Flieger >		2		
16. ein.....(Bleistift)	1<ein{+1Mer} Bleistift>		2		
17. ein.....(Kühlschrank)	0<ein Kühl....(pause) ...schrank>	3			
18. ein.....(Hubschrauber)	1<ein H/1Ve/bschrauber>		2		
19. ein.....(Blumenkohl)	0(ND)	3			
20. ein.....(Aktendordner)	1<ein {1MØ}ordner>		2		
Sum of Errors & Evaluating Scale	11	49			

During the application of re-testing through exercise 11 of table 135 the patient is to be supplied by the examiner, who controls the program, with an image under which there is a sentence from which a lexical word was omitted. She has to name the picture attempting to find the correct lexical word that suits to the blank of the sentence. The errors, which may occur in other parts of the sentence, will not decrease the general score of the evaluating scale.

Table 135: Re-Testing of Broca's Aphasic's Naming of images of nouns in the sentences

Exercise 11 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Der Wirt zapft (Bier)	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	1<Ich esse Kassler mit dicken Boh /ICØ/en>		2		
3. Der Bäcker backt frisches (Brot)	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	1<Eier esse ich mit Pfeffer und Sa/ICt/z>		2		
5. Im Sommer schleckte ich gerne (Eis)	0(ND)	3			
6. Der Angler fängt einen (Fisch)	0(ND)	3			
7. Das Baby trinkt aus der (Flasche)	1<Das Baby trinkt aus der F/ICØ/asche>		2		
8. Ich trinke Saft aus dem (Glas)	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	0(ND)	3			
11. Suppe esse ich mit dem (Löffel)	1<Suppe esse ich mit dem L/IVe/ffel>		2		
12. Ich schneide das Brot mit dem (Messer)	0(ND)	3			
13. Kaffee schmeckt mit Zucker und (Milch)	1<Kaffee schmeckt mit Zucker und Mil[+ICs]ch>		2		
14. Aus Apfelsinen presse ich frischen (Saft)	0(ND)	3			
15. Im Glas perlt der (Wein)	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	0(ND)	3			
17. Ich trinke Kaffee aus der (Tasse)	1<Ich trinke Kaffee aus der /{1Wglas(SF)}>		2		
18. Anna trinkt schwarzen (Tee)	0(ND)	3			
19. Ich esse Suppe vom (Teller)	1<Ich esse die Suppe vom Telle/ICØ/>		2		
20. Die Suppe kocht im (Topf)	2<Die Suppe kocht im [/ {1W Ofen} / (SS)] hm To/ICØ/f>			1	
Sum of Errors & Evaluating Scale	9		51		

Re-testing through the naming of images, whose verbs are deleted from the sentences, is the task in which the patient will be involved in exercise 13 of table 136. As the process of naming goes on, the patient is expected to submit to each sentence a conjugated verb. Re-testing will focus only on this aspect of language. Other constituents of the following sentences can be considered in the other sessions of re-testing.

Table 136: Re-Testing of Broca's Aphasic's Naming of images of verbs in the sentences

Exercise 13 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Anna (lacht)	0(ND)	3			
2. Jürgen (raucht)	0(ND)	3			
3. Vater (kocht)	0(ND)	3			
4. Er (schläft)	0(ND)	3			
5. Vater und Sohn (baden)	0(ND)	3			
6. Eva (kämmt) sich	1<Eva k/IVa/mmt sich>		2		
7. Sie (schreibt) einen Brief	2<Sie sch/ICØ/eib[+1Ce]t einen Brief>			1	
8. Er (trinkt) ein Bier	1<Er t/ICØ/inkt ein Bier>		2		
9. Der Junge (läuft) schnell weg	1<Der Junge lä/IVØ/ft schnell weg>		2		
10. Der Hubschrauber (fliegt) über den See	1<Der Hubschrauber fie[1C]gt über den See>		2		
11. Die Schülerin (lernt) für das Abitur	1<Die Schülerin /{1Wlest(SS)}/ für das Abitur>		2		

12. Der Hund(bellt)	0(ND)	3			
13. Tim(spielt) Fußball	0(ND)	3			
14. Laura(singt) ein Lied	1<Laura sin/ICØ/t ein Lied>		2		
15. Die Frau(putzt) das Fenster	0(ND)	3			
16. Der Junge(springt) ins Wasser	1<Der Junge s/ICt/ringt>		2		
17. Er(zeigt) auf die Karte	1<Er /ICs/eigt auf die Karte>		2		
18. Hannibal(öffnet) die Tür	1<Hannibal öff/ICØ/et die Tür>		2		
19. Klaus(liest) ein Buch	0(ND)		2		
20. Der Vater(arbeitet) im Garten	2<Der Vater {+1Wsteht} ...un..arbeit{1MØ}.. im Garten>			1	
Sum of Errors & Evaluating Scale	13				47

Wernicke's Aphasic

Repetition Test

Re-Testing on Wed. 07, April 2004

Although the Wernicke's Aphasic will be re-tested with the same exercises with which the Broca's aphasic was re-examined, the administration of the repetition test will be planned and carried out in certain exercises somehow otherwise. In this process of re-testing the examination will concentrate on the repetition of lexical words which were badly disturbed. This was a conclusion that was inferred from the period of therapy and diagnosis. The grammatical words, which were scarcely impaired, will be granted a limited attention.

In carrying out the re-testing procedures through exercise 1 of table 137, the patient is provided with an image under which there is an article and a phoneme of a mono-syllabic word. The task of the Wernicke's aphasic is to repeat these words that are presented to him by the program, LingWare, but planned and controlled by the examiner.

Table 137: Re-Testing of Wernicke's Aphasic's Repetition of mono-syllabic words

Exercise 1 of LW Stimuli (Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. E.. (Eis)	0(ND)	3			
2. eine U.. (eine Uhr)	0(ND)	3			
3. T.. (Tee)	0(ND)	3			
4. eine K.. (eine Kuh)	0(ND)	3			
5. B... (Bier)	0(ND)	3			
6. ein B... (ein Bett)	0(ND)	3			
7. ein B... (ein Buch)	0(ND)	3			
8. M... (Mehl)	0(ND)	3			
9. Fi.... (Fisch)	0(ND)	3			
10. ein T... (ein Topf)	0(ND)	3			
11. ein W... (ein Wirt)	0(ND)	3			
12. ein Sch... (ein Schirm)	2<ein [+1CT]sch/IVu/rm			1	
13. B... (Brot)	0(ND)	3			
14. ein St... (ein Stuhl)	0(ND)	3			
15. Fl.... (Fleisch)	0(ND)	3			
16. ein Sch.... (ein Schrank)	1<ein Sch[+1CT]rank>		2		
17. ein Z... (ein Zelt)	0(ND)	3			
18. ein Pf... (ein Pferd)	1<ein Pf[1Cr]ed>		2		
19. ein St.... (ein Strumpf)	1 <ein St/IVØ/umpf		2		
20. W... (Wein)	0(ND)	3			
Sum of Errors & Evaluating Scale	5				55

It must be taken into account that the intensity of the difficulty of the exercises plays a little role in re-testing because the patient has been trained many times in the tasks to which he is to be exposed. The quick shift from exercise1 of table137 to exercise8 of table138 should not be considered as a setback. The whole re-testing is only a random spot-checking that takes place at different intervals. It shows what each patient managed to retain in the whole process of therapy.

To carry out the re-testing method, the examiner reads a word, which is not presented together with its images, and asks the patient to repeat it. A voice stored in the program, LingWare may be used to pronounce the words.

Table 138: Re-Testing of Wenicke’s Aphasic’s Repetition of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.(Aktenordner)	0(ND)	3			
2. der(Taschenrechner)	0(ND)	3			
3. die(Bohrmaschine)	0(ND)	3			
4. der(Rasierapparat)	1<der Ra[+1Ct]sierapparat>		2		
5. die(Kaffeemaschine)	0(ND)	3			
6. der(Tischtennisschläger)	1<der Tischtennis/1Cf/läge/Ø/>		2		
7. ein Kreis (weißer)	0(ND)	3			
8. ein Viereck (grünes)	0(ND)	3			
9. ein rotes (Dreieck)	0(ND)	3			
10. ein Kreis (blauer)	0(ND)	3			
11. ein gelbes (Viereck)	0(ND)	3			
12. ein Kreis (schwarzer)	0(ND)	3			
13. Der Mann (läuft)	0(ND)	3			
14. Der fliegt (Hubschrauber)	2< Der Hubsch[+1Ct]rauber flie/1Ch/t			1	
15. Die Frau (telefoniert)	0(ND)	3			
16. Der Junge ein Buch (liest)	0(ND)		2		
17. Die Oma einen (schreibt/ Brief)	0(ND)		2		
18. Der Mann ein (trinkt / Bier)	1<Der Mann /1Csch/rinkt ein Bier>		2		
19. Das Mädchenzu seiner (läuft / Mutter)	1<Das Mädchen läuft zu seiner {1WMutti}>		2		
20. Der Junge s.....t Trompete (spielt)	0(ND)	3			
Sum of Errors & Evaluating Scale	6	45			

The patient’s recovery rate is also to be re-tested through bi-syllabic and compound words. The demand made on the patient is to repeat the word of the images that are being spoken by a voice during the running of the program, LingWare. This can be seen in exercise10 of table 139.

Table 139: Re-Testing of Wernicke’s Aphasic’s Repetition of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images, ‘Tex’t & ‘Tone’)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.ein(Auto)	0(ND)	3			
2.ein(Affe)	0(ND)	3			
3.eine(Ente)	0(ND)	3			
4.eine(Hose)	0(ND)	3			
5.ein Stück(Seife)	0(ND)	3			
6.ein(Apfel)	0(ND)	3			
7.ein(Mantel)	0(ND)	3			
8.ein(Gürtel)	1<ein /1CT/ürtel>		2		
9.eine(Schnalle)	1<eine Sch/1CØ/alle>		2		
10.eine(Krone)	0(ND)	3			

11.eine(Bluse)	0(ND)	3			
12.ein(Brötchen)	0(ND)	3			
13.ein(Traktor)	0(ND)	3			
14.ein(Stempel)	0(ND)	3			
15.ein(Flieger)	0(ND)	3			
16.ein(Bleistift)	1<ein Bleis/1Ch/ift>		2		
17.ein(Kühlschrank)	1<ein Küh/1CØ/schrank>		2		
18.ein(Hubschrauber)	1<ein Hubsch/1Cn/auber>		2		
19.ein(Blumenkohl)	1<ein Blu/1Ct/enkohl>		2		
20.ein(ein Aktenordner)	0(ND)	3			
Sum of Errors & Evaluating Scale	6		54		

The Wernicke's aphasic's repetition of the lexical words in the sentences will be re-tested through the tasks of exercise 11 of table 140. It is a checking which will display whether the length of a sentence has an effect on the repetition of a lexical word in which he was trained as an independent constituent and part of a sentence. The patient has to repeat the spoken acoustic stimuli.

Table 140: Re-Testing of Wernicke's Aphasic's Repetition of nouns in the sentences

Exercise 11 of LW Stimuli (Images, 'Text' & 'Tone')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Der Wirt zapft (Bier)	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	1<ich esse Kassler mit dicken Boh/1Cd/en>		2		
3. Der Bäcker backt frisches (Brot)	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	1<Eier esse ich mit Pfeffer und Sal[+1Cf]z>		2		
5. Im Sommer schleckte ich gerne (Eis)	0(ND)	3			
6. Der Angler fängt einen (Fisch)	0(ND)	3			
7. Das Baby trinkt aus der (Flasche)	1<Das Baby trinkt aus der Fa[1C]sche>		2		
8. Ich trinke Saft aus dem (Glas)	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	0(ND)	3			
11. Suppe esse ich mit dem (Löffel)	0(ND)	3			
12. Ich schneide das Brot mit dem (Messer)	0(ND)	3			
13. Kaffee schmeckt mit Zucker und (Milch)	0(ND)	3			
14. Aus Apfelsinen presse ich frischen (Saft)	1<Aus Apfelsinen presse ich frischen Sa[+1Cn]ft>		2		
15. Im Glas perlt der (Wein)	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	0(ND)	3			
17. Ich trinke Kaffee aus der (Tasse)	0(ND)	3			
18. Anna trinkt schwarzen (Tee)	0(ND)	3			
19. Ich esse Suppe vom (Teller)	0(ND)	3			
20. Die Suppe kocht im (Topf)	1<Die Suppe kocht im T[1Cr]opf>		2		
Sum of Errors & Evaluating Scale	5		55		

The ability of the Wernicke's aphasic's repetition of the conjugated verbs will be re-tested in exercise 13 of table 141. The whole verbs are in the present tense. The patient, as was the case in the whole exercises of repetition, visualizes the image, hears the sentence that corresponds to it and carries out the task of repetition. More attention is paid to the repetition of the conjugated verbs.

Table 141 : Re-Testing of Wernicke's Aphasic's Repetition of verbs in the sentences

Exercise 13 of LW Stimuli (Images, 'Text' & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Anna (lacht)	0(ND)	3			
2. Jürgen (raucht)	0(ND)	3			
3. Vater (kocht)	0(ND)	3			

4.Er(schläft)	0(ND)	3			
5.Vater und Sohn(baden)	0(ND)	3			
6.Eva(kämmt) sich	0(ND)	3			
7.Sie(schreibt) einen Brief	0(ND)	3			
8.Er(trinkt) ein Bier	1<Er t/1CØ/inkt ein Bier>		2		
9.Der Junge.....(läuft) schnell weg	0(ND)	3			
10.Der Hubschrauber.....(fliegt) über den See	0(ND)	3			
11.Die Schülerin.....(lernt) für das Abitur	0(ND)	3			
12.Der Hund(bellt)	0(ND)	3			
13.Tim(spielt) Fußball	1<Tim spie/1CØ/t Fußball>		2		
14.Laura(singt) ein Lied	1<Laura s[+1Ct]ingt ein Lied>		2		
15.Die Frau(putzt) das Fenster	0(ND)	3			
16.Der Junge(springt) ins Wasser	1<Der Junge s/1Ch/ringt ins Wasser>		2		
17.Er(zeigt) auf die Karte	0(ND)		2		
18.Hannibal(öffnet) die Tür	0(ND)	3			
19.Klaus(liest) ein Buch	0(ND)	3			
20.Der Vater(arbeitet) im Garten	0(ND)	3			
Sum of Errors & Evaluating Scale	4			56	

Confrontation Naming Test

Re-Testing on Wed. 07, April 2004

The confrontation naming test will be carried out with the same tasks that were used in the repetition test. But in this session of re-testing the patient has to name the images of mono-syllabic and compound words, phrases and sentences.

In exercise 1 of table 142 the examiner presents to the patient an image under which there are certain initial phonemes of a word. On the basis of these phoneme cues and pictorial stimulation the Wernicke's aphasic has to assign a name to each image.

Table 142: Re-Testing of Wernicke's Aphasic's Naming of images of mono-syllabic words

Exercise 1 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. E.. (Eis)	0(ND)	3			
2. eine U.. (eine Uhr)	0(ND)	3			
3. T.. (Tee)	2<eine [/{1WTasse}/(SS)]>			1	
4. eine K.. (eine Kuh)	0(ND)	3			
5. B... (Bier)	1<{+1MGlas}bier>		2		
6. ein B... (ein Bett)	0(ND)	3			
7. ein B... (ein Buch)	0(ND)	3			
8. M... (Mehl)	1<Meh[+1CVte]l		2		
9. Fi.... (Fisch)	1<Fi[+1CVle]sch>		2		
10. ein T... (ein Topf)	1<ein T[+1Cr]opf>		2		
11. ein W... (ein Wirt)	2<ein [/{1WMann}/(SF)] oder...[+1Psapt Bier (SF)]>			1	
12. ein Sch... (ein Schirm)	0(ND)	3			
13. B... (Brot)	0(ND)	3			
14. ein St... (ein Stuhl)	1<ein Stuh[+1Ck]l>		2		
15. Fl.... (Fleisch)	0(ND)	3			
16. ein Sch.... (ein Schrank)	1<ein Schra/1CØ/k>		2		
17. ein Z... (ein Zelt)	0(ND)	3			
18. ein Pf... (ein Pferd)	0(ND)		2		
19. ein St..... (ein Strumpf)	2<ein St/1CØ//1Vo/mpf>			1	
20. W... (Wein)	0(ND)	3			
Sum of Errors & Evaluating Scale	12			48	

It must be taken into account that due to the fact that the Wernicke's aphasic substitutes and inserts phonemes and morphemes in word forms and sentence structures, re-testing in exercise 8 of table 143 is to focus, mainly, on the nature of these disorders. Examination will concentrate on how far the Wernicke's aphasic managed to recover from the impairments that occurred in the compound words, phrases and sentences. The examiner presents an image and the patient has to name it. The text of each task is partly submitted.

Table 143: Re-Testing of Wernicke's Aphasic's Naming of images of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.(Aktenordner)	1<{ 1MØ }ordner>		2		
2. der(Taschenrechner)	1<der T/ 1Vi /schenrechner>		2		
3. die(Bohrmaschine)	1<die ...Bohrer...{ 1MØ }		2		
4. der(Rasierapparat)	1<...der Rasier...{ 1MØ }		2		
5. die(Kaffeemaschine)	0(ND)	3			
6. der(Tischtennisschläger)	1<der { 1MØ }Tennisschläger>		2		
7. ein Kreis (weißer)	1<ein weiß{ 1MØ }Kreis		2		
8. ein Viereck (grünes)	0(ND)		2		
9. ein rotes (Dreieck)	0(ND)	3			
10. ein Kreis (blauer)	2<ein [/{ 1Wbunte }/(SS)] Kreis>			1	
11. ein gelbes (Viereck)	0(ND)	3			
12. ein Kreis (schwarzer)	0(ND)	3			
13. Der Mann (läuft)	0(ND)	3			
14. Der fliegt (Hubschrauber)	1<Der Hubsch/ 1Ct /auber fliegt>		2		
15. Die Frau (telefoniert)	0(ND)	3			
16. Der Junge ein Buch (liest)	0(ND)	3			
17. Die Oma einen (schreibt/ Brief)	1<Die Oma sch[1Cb]reit einen Brief>		2		
18. Der Mann ein (trinkt / Bier)	1<Der Mann tri/ 1Cf /kt ein Bier>		2		
19. Das Mädchenzu seiner (läuft / Mutter)	1<Das Mädchen läuft zu einer [/{ 1M Frau]/ (SF)>		2		
20. Der Junge s.....t Trompete (spielt)	0(ND)	3			
Sum of Errors & Evaluating Scale	12	48			

In naming the images of exercise 10 of table 144, the patient has to find the words which fit with the feminine and masculine gender of the articles. Re-testing will be carried out by the examiner with images of bi-syllabic and compound words.

Table 144: Re-Testing of Wernicke's Aphasic's Naming of images of bi-syllabic and compound words

Exercise 10 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.ein(Auto)	1<ein / 1VT /uto>		2		
2.ein(Affe)	0(ND)	3			
3.eine(Ente)	1<eine [/{ 1W Vogel}/(SF)]...o!nein Ente>		2		
4.eine(Hose)	0(ND)	3			
5.ein Stück.....(Seife)	1<ein Stück....Zer.. 1CZ /eife>		2		
6.ein(Apfel)	0(ND)	3			
7.ein(Mantel)	0(ND)	3			
8.ein(Gürtel)	0(ND)	3			
9.eine(Schnalle)	1<...eine Schna/ 1Ct /e>		2		
10.eine(Krone)	0(ND)	3			
11.eine(Bluse)	1<eine Buse[1Cl]>		2		
12.ein(Brötchen)	1<ein [/{ 1WBrot }/(SF)]>		2		
13.ein(Traktor)	0(ND)	3			
14.ein(Stempel)	2<ein S/ 1CØ /[1Cp]emel>			1	
15.ein(Flieger)	0<ein Fl--- Flieger>	3			

16.ein(Bleistift)	1<ein {1MØ}Stift>	2		
17.ein(Kühlschrank)	1<ein Kühl/2Ct/ank>	2		
18.ein(Hubschrauber)	1<ein Hubsch/1CØ/auber>	2		
19.ein(Blumenkohl)	1<ein {1MØ}Kohl>	2		
20.ein(ein Aktenordner)	1<ein ---Akt/1VCØ/ordner>	2		
Sum of Errors & Evaluating Scale	13	47		

Re-testing with the confrontation naming test in exercise11 of table145 is to reveal whether the rate of the disorders decreased in the lexical words that are not shown in the sentence structure. The words to be named are deleted from the sentences, but presented by the images. The patient should attempt to name the object of an image and neither reproduce nor repeat the same sentence.

Table 145: Re-Testing of Wernicke’s Aphasic’s Naming of images of words in the sentences

Exercise11 of LW Stimuli (Images & `Text`)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Der Wirt zapft (Bier)	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	1<Ich esse Kassler mit dicken Boh/1Cr/en>		2		
3. Der Bäcker backt frisches (Brot)	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	1<Eier esse ich mit Pfeffer und Sa/1Cm/z>		2		
5. Im Sommer schleckte ich gerne(Eis)	0(ND)	3			
6. Der Angler fängt einen(Fisch)	0(ND)	3			
7. Das Baby trinkt aus der(Flasche)	1<Das Baby trinkt aus der F/1Ct/asche>		2		
8. Ich trinke Saft aus dem(Glas)	0(ND)	3			
9. Ich trinke lieber Tee als(Kaffee)	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	1<Nachmittag gibt es Kaffee und /{1W orten }/>		2		
11. Suppe esse ich mit dem (Löffel)	1<Suppe esse ich mit dem /1CG/öffel>		2		
12. Ich schneide das Brot mit dem(Messer)	1(ND)	3			
13. Kaffee schmeckt mit Zucker und(Milch)	0(ND)	3			
14. Aus Apfelsinen presse ich frischen (Saft)	1<Aus Apfelsinen presse ich frischen Sa[+1Cn]ft >		2		
15. Im Glas perlt der (Wein)	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	0(ND)	3			
17. Ich trinke Kaffee aus der(Tasse)	1<Ich trinke Kaffee aus der Ta[+1Cf]sse>		2		
18. Anna trinkt schwarzen(Tee)	0(ND)	3			
19. Ich esse Suppe vom (Teller)	1<Ich esse Suppe vom T/1Co/ller>		2		
20. Die Suppe kocht im(Topf)	1<Die Suppe kocht im Topf[+1VCer]		2		
Sum of Errors & Evaluating Scale	10	50			

Re-testing in exercise13 of table146 will have the same form and way of administration as that of table145, even though their contents vary from one another. The Wernicke’s aphasic, Mr Fimm should attempt to name the images in which the conjugated verb is the focal constituent of re-testing. The patient has to name the verb that refers to the image. The noun phrases, direct and indirect objects will help him to perform this task.

Table 146: Re-Testing of Wernicke’s Aphasic’s Naming of images of verbs in the sentences

Exercise 13 of LW Stimuli (Images & `Text`)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Anna(lacht)	0(ND)	3			
2. Jürgen(raucht)	0(ND)	3			
3. Vater(kocht)	0(ND)	3			
4. Er(schläft)	1<Er schlä/1Cg/t>		2		
5. Vater und Sohn(baden)	1<Vater und Sohn ba/1Ck/en>		2		
6. Eva(kämmt) sich	1<Eva {+1Mbe}kämmt sich >		2		
7. Sie(schreibt) einen Brief	1<Sie schrei/1Ck/t einen Brief>		2		

8.Er(trinkt) ein Bier	0(ND)	3			
9.Der Junge.....(läuft) schnell weg	1<Der Junge [+1Csch]läuftschnell weg>		2		
10.Der Hubschrauber.....(fliegt) über den See	1<Der Hubschrauber f/1CVØ/egt über den See>		2		
11.Die Schülerin.....(lernt) für das Abitur	1<Die Schülerin [/{1Wliest}/(SF)] für das Abitur>		2		
12.Der Hund(bellt)	1<Der Hund be[+1C]tlt----.....>		2		
13.Tim(spielt) Fußball	1<Tim /{1Wspät}/ Fußball>		2		
14.Laura(singt) ein Lied	1<Laura s[+1Ve]ingt ein Lied>		2		
15.Die Frau(putzt) das Fenster	1<Die Frau putz[+1VCel]t das Fenster>		2		
16.Der Junge(springt) ins Wasser	2<Der Junge /1Csch//1CØ/ringt ins Wasser>			1	
17.Er(zeigt) auf die Karte	1<Er zei/1Cl/t auf die Karte>		2		
18.Hannibal(öffnet) die Tür	0(ND)	3			
19.Klaus(liest) ein Buch	1<Klaus lie[+1Ck]st ein Buch>		2		
20.Der Vater(arbeitet) im Garten	1<Der Vater /{1Wist}/ im Garten>		2		
Sum of Errors & Evaluating Scale	16			44	

Anomic Aphasic

Repetition Test

Re-Testing on Thu. 08, April 2004

Whether the anomic aphasic, Mrs Heinrich has recovered from the disturbances which were quite conspicuous in the phases of therapy is to be proved by the re-testing method in a period of 90 minutes. The re-testing procedures will be carried out through the same exercises with which the linguistic recovery of the Broca's and Wernicke's aphasics has been re-tested. The way of administering re-testing is going to be differed from the other patients because Mrs Heinrich's speech and language disorders have other features and were also trained otherwise during the first period of therapy.

In exercise 1 of table 147 Mrs Heinrich will be forwarded only with the initial phonemes of the lexical words and some indefinite articles. The image-stimuli are left out. She has to repeat the mono-syllabic words relying only on the voice of the examiner. This procedure will be applied in the whole exercises of her repetition test.

Table 147: Re-Testing of Anomic's Aphasic's Repetition of mono-syllabic words

Exercise 1 of LW Stimuli (Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. E.. (Eis)	0(ND)	3			
2. eine U.. (eine Uhr)	0(ND)	3			
3. T.. (Tee)	0(ND)	3			
4. eine K.. (eine Kuh)	0(ND)	3			
5. B... (Bier)	0(ND)	3			
6. ein B... (ein Bett)	0(ND)	3			
7. ein B... (ein Buch)	0(ND)	3			
8. M... (Mehl)	0(ND)	3			
9. Fi.... (Fisch)	0(ND)	3			
10. ein T... (ein Topf)	0(ND)	3			
11. ein W... (ein Wirt)	1<ein W/1Ce/rt>		2		
12. ein Sch... (ein Schirm)	0(ND)	3			
13. B... (Brot)	0(ND)	3			
14. ein St... (ein Stuhl)	0(ND)	3			
15. Fl.... (Fleisch)	0 (ND)	3			

16. ein Sch.... (ein Schrank)	0(ND)	3			
17. ein Z... (ein Zelt)	1<ein /ICS/elt>		2		
18. ein Pf... (ein Pferd)	0(ND)	3			
19. ein St.... (ein Strumpf)	0(ND)	3			
20. W... (Wein)	0(ND)	3			
Sum of Errors & Evaluating Scale	2				58

In exercise 8 of table 148 the tasks, that should be repeated, are presented to Mrs Heirinch only as sound stimuli that are accompanied with certain text cues. The examiner reads the text of a word, a phrase or a sentence, after that the patient has to repeat each time a compound word, a phrase and a simple sentence without any pictorial assistance.

Table 148: Re-Testing of Anomic Aphasic's Repetition of compound words, phrases and sentences

Exercise 8 of LW Stimuli (' Text ' & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.(Aktenordner)	0(ND)	3			
2. der(Taschenrechner)	0(ND)	3			
3. die(Bohrmaschine)	0(ND)	3			
4. der(Rasierapparat)	0(ND)	3			
5. die(Kaffeemaschine)	0(ND)	3			
6. der(Tischtennisschläger)	0(ND)	3			
7. ein Kreis (weißer)	0(ND)	3			
8. ein Viereck (grünes)	0(ND)	3			
9. ein rotes (Dreieck)	0(ND)	3			
10. ein Kreis (blauer)	0(ND)	3			
11. ein gelbes (Viereck)	0(ND)	3			
12. ein Kreis (schwarzer)	0(ND)	3			
13. Der Mann (läuft)	0(ND)	3			
14. Der fliegt (Hubschrauber)	0(ND)	3			
15. Die Frau (telefoniert)	0(ND)	3			
16. Der Junge ein Buch (liest)	0(ND)	3			
17. Die Oma einen (schreibt/ Brief)	1<Die Oma schreibt einen B[+1Ve]rief>		2		
18. Der Mann ein (trinkt / Bier)	0(ND)	3			
19. Das Mädchenzu seiner (läuft / Mutter)	1<Das Mädchen /{1W}lief}/ zu seiner Mutter>		2		
20. Der Junge s.....t Trompete (spielt)	0(ND)	3			
Sum of Errors & Evaluating Scale	2				58

Re-testing in exercise 10 of table 149 is to be carried out in the same way the examiner did in exercise 1 of table 147 and 8 of 148. The only difference between the texts of the previous exercises and the ones of table 149 is that the latter consists, mainly, of lexical words that are bi-syllabic and compound as well as sentences that are derived from exercise 8 of table 148. In the following exercise the patient, Mrs Heinrich has to hear the words being pronounced, visualize the articles and finally repeat the lexical words.

Table 149: Re-Testing of Anomic Aphasic's Repetition of bi-syllabic and compound words

Exercise 10 of LW Stimuli (' Text ' & ' Tone ')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. ein(Auto)	0(ND)	3			
2. ein(Affe)	0(ND)	3			
3. eine(Ente)	0(ND)	3			
4. eine(Hose)	0(ND)	3			
5. ein(Stück Seife)	0(ND)	3			
6. ein(Apfel)	0(ND)	3			
7. ein(Mantel)	0(ND)	3			
8. ein(Gürtel)	0(ND)	3			
9. eine(Schnalle)	0(ND)	3			

10.eine(Krone)	0(ND)	3			
11.eine(Bluse)	0(ND)	3			
12.ein(Brötchen)	0(ND)	3			
13.ein(Traktor)	0(ND)	3			
14.ein(Stempel)	0(ND)	3			
15.ein(Flieger)	0(ND)	3			
16.ein(Bleistift)	1<ein Bleis/1Ch/ift>		2		
17.ein(Kühlschrank)	1<ein Kühlschrank[+1Ve]>		2		
18.ein(Hubschrauber)	0(ND)	3			
19.ein(Blumenkohl)	1<ein Blumenk/1Vü/hl>		2		
20.ein(Aktenordner)	0(ND)	3			
Sum of Errors & Evaluating Scale	3			57	

In exercise 11 of table 150 Mrs Heinrich's repetition of the lexical words in the sentences will be re-tested with the text and tone of the tasks; that is, the examiner presents a sentence, in which there is a blank of a lexical word, and pronounces it. The patient has then to repeat the whole sentence. The involvement of pictorial stimuli in the re-testing of Mrs Heinrich is unnecessary because she is in a position to decipher from the written text and sound image of the sentences what she needs for the repetition of each sentence.

Table 150: Re-Testing of Anomic Aphasic's Repetition of nouns in the sentences

Exercise 11 of LW Stimuli ('Text' & 'Tone')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Der Wirt zapft (Bier)	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	0(ND)	3			
3. Der Bäcker backt frisches (Brot)	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	0(ND)	3			
5. Im Sommer schlecke ich gerne (Eis)	0(ND)	3			
6. Der Angler fängt einen (Fisch)	0(ND)	3			
7. Das Baby trinkt aus der (Flasche)	0(ND)	3			
8. Ich trinke Saft aus dem (Glas)	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	1<Nachmittag gibt es Kaffee und Kuch/1Vi/n>		2		
11. Suppe esse ich mit dem (Löffel)	0(ND)	3			
12. Ich schneide das Brot mit dem (Messer)	1<Ich schneide das Brot mit dem Messe/1CØ/>		2		
13. Kaffee schmeckt mit Zucker und (Milch)	0(ND)	3			
14. Aus Apfelsinen presse ich frischen (Saft)	0(ND)		2		
15. Im Glas perlt der (Wein)	0(ND)	3			
16. Ich esse eine Wurst mit (Senf)	1<Ich esse eine Wurst mit S/1Va/nf>		2		
17. Ich trinke Kaffee aus der (Tasse)	0(ND)	3			
18. Anna trinkt schwarzen (Tee)	0(ND)	3			
19. Ich esse Suppe vom (Teller)	0(ND)	3			
20. Die Suppe kocht im (Topf)	0(ND)	3			
Sum of Errors & Evaluating Scale	3			57	

In exercise 13 of table 151 the verbs are to become the focal point in the re-testing process. The examiner reads the whole sentence including its verb, which is presented by a blank; the patient must repeat it without being given any pictorial assistance.

Table 151: Re-Testing of Anomic Aphasic's Repetition of verbs in the sentences

Exercise 13 of LW Stimuli ('Text' & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Anna (lacht)	0(ND)	3			
2. Jürgen (raucht)	0(ND)	3			
3. Vater (kocht)	0(ND)	3			
4. Er (schläft)	0(ND)	3			
5. Vater und Sohn (baden)	0(ND)	3			

6.Eva(kämmt) sich	0(ND)	3			
7.Sie(schreibt) einen Brief	0(ND)	3			
8.Er(trinkt) ein Bier	0(ND)	3			
9.Der Junge.....(läuft) schnell weg	0(ND)	3			
10.Der Hubschrauber.....(fliegt) über den See	1<Der Hubschrauber fl/IVØ/egt über denSee>		2		
11.Die Schülerin.....(lernt) für das Abitur	0(ND)	3			
12.Der Hund(bellt)	0(ND)	3			
13.Tim(spielt) Fußball	0(ND)	3			
14.Laura(singt) ein Lied	0(ND)	3			
15.Die Frau(putzt) das Fenster	0(ND)		2		
16.Der Junge(springt) ins Wasser	0(ND)	3			
17.Er(zeigt) auf die Karte	1<Er /1Cs/eigt auf die Karte>		2		
18.Hannibal(öffnet) die Tür	0(ND)	3			
19.Klaus(liest) ein Buch	0(ND)	3			
20.Der Vater(arbeitet) im Garten	0(ND)	3			
Sum of Errors & Evaluating Scale	2			58	

Confrontation Naming Test

Re-Testing on Thu. 08, April 2004

During the application of the examination with the Confrontation Naming Test, the exercises with which the anomic aphasic, Mrs Heinrich will be confronted, are the same as those that were submitted to the other patients. But the way how to administer and present the tasks is of a divers nature. This can be referred to the linguistic capacities of the patient and the impairment of her language that can be confined to word finding disturbances.

In exercise1 of table152 the anomic aphasic will be confronted with the images of mono-syllabic words and their phoneme initials. She is asked to label the lexical words that correspond to the images.

Table 152: Re-Testing of Anomic Aphasic's Naming of images of mono-syllabic words

Exercise 1 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. E.. (Eis)	0(ND)	3			
2. eine U.. (eine Uhr)	0(ND)	3			
3. T.. (Tee)	0(ND)	3			
4. eine K.. (eine Kuh)	1< eine K...fängt mit K., kein Pferd eine Kuh>		2		
5. B... (Bier)	0(ND)	3			
6. ein B... (ein Bett)	0(ND)	3			
7. ein B... (ein Buch)	0(ND)	3			
8. M... (Mehl)	0(ND)	3			
9. Fi.... (Fisch)	0(ND)	3			
10. ein T... (ein Topf)	0(ND)	3			
11. ein W... (ein Wirt)	1< ein [/{1W Mann}/(SF)], ja ein Wirt>		2		
12. ein Sch... (ein Schirm)	0(ND)	3			
13. B... (Brot)	0(ND)	3			
14. ein St... (ein Stuhl)	0(ND)	3			
15. Fl.... (Fleisch)	0 (ND)	3			
16. ein Sch... (ein Schrank)	0 (ND)	3			
17. ein Z... (ein Zelt)	1<ein [/{1WSchirm}/ (SF)],..nein das ist Zelt>		2		
18. ein Pf... (ein Pferd)	2<ein [/{1WTier}/(SS)], ja ein Pferd>			1	
19. ein St..... (ein Strumpf)	0(ND)	3			
20. W... (Wein)	0(ND)	3			
Sum of Errors & Evaluating Scale	5			55	

To re-test Mrs Heinrich in compound words, phrases and sentences, she is confronted only with the images of the following tasks without their spoken sounds. She has to name the images without any external assistant cues. This can be seen in exercise8 of table153 in which certain constituents are displayed together with the images.

Table 153: Re-Testing of Anomic Aphasic's Naming of images of compound words, phrases and sentences

Exercise 8 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.(Aktendordner)	0(ND)	3			
2. der(Taschenrechner)	0(ND)	3			
3. die(Bohrmaschine)	0(ND)	3			
4. der(Rasierapparat)	0(ND)	3			
5. die(Kaffeemaschine)	0(ND)	3			
6. der(Tischtennisschläger)	1<der {1MØ}Tennisschläger>		2		
7. ein Kreis (weißer)	0(ND)	3			
8. ein Viereck (grünes)	0(ND)	3			
9. ein rotes (Dreieck)	0(ND)	3			
10. ein Kreis (blauer)	0(ND)	3			
11. ein gelbes (Viereck)	0(ND)	3			
12. ein Kreis (schwarzer)	0(ND)	3			
13. Der Mann (läuft)	1<Der Mann [/{1Wrennt}]/(SF)]>		2		
14. Der fliegt (Hubschrauber)	1<Der [/{1WFlieger}]/(SF)] fliegt>		2		
15. Die Frau (telefoniert)	0(ND)	3			
16. Der Junge ein Buch (liest)	0(ND)	3			
17. Die Oma einen (schreibt/ Brief)	0(ND)	3			
18. Der Mann ein (trinkt / Bier)	1<Der Mann [/{1Wnimmt}]/(SF)] ein Bier>		2		
19. Das Mädchenzu seiner (läuft / Mutter)	1<Das Mädchen [/{geht}]/(SF)] zu seiner Mütter		2		
20. Der Junge s.....t Trompete (spielt)	0(ND)	3			
Sum of Errors & Evaluating Scale	5	55			

In the first exercise of table152 Mrs Heinrich was required to name only mono-syllabic words, but in exercise10 of table154 the examiner confronts her with images that must be labeled with bi-syllabic words. Similar to the above exercise the patient is assisted, during the naming of this type of words, only with the images and articles of the lexical words that ought to be named.

Table 154: Re-Testing of Anomic Aphasic's Naming of images of bi-syllabic and compound words

Exercise10 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.ein(Auto)	0(ND)	3			
2.ein(Affe)	0(ND)	3			
3.eine(Ente)	0(ND)	3			
4.eine(Hose)	0(ND)	3			
5.ein(Stück Seife)	0(ND)	3			
6.ein(Apfel)	0(ND)	3			
7.ein(Mantel)	0(ND)	3			
8.ein(Gürtel)	1<ein...[/{1Wschnalle}]/(SF)]... (pause)... nein Gürtel>		2		
9.eine(Schnalle)	0(ND)	3			
10.eine(Krone)	0(ND)	3			
11.eine(Bluse)	0(ND)	3			
12.ein(Brötchen)	1<ein [/{Brot}]/(SF)] Brötchen>		2		
13.ein(Traktor)	0(ND)	3			
14.ein(Stempel)	0(ND)	3			
15.ein(Flieger)	1<ein [/{Flugzeug}]/(SF)]>		2		
16.ein(Bleistift)	1<ein {1MØ}Stift>		2		

17.ein(Kühlschrank)	0(ND)	3			
18.ein(Hubschrauber)	0(ND)	3			
19.ein(Blumenkohl)	0(ND)	3			
20.ein(ein Aktenordner)	1<ein {1MØ}Ordner>		2		
Sum of Errors & Evaluating Scale	4				56

The insertion of lexical words in simple and complex sentences are the tasks in which Mrs Heinrich will be re-tested in exercise 11 of table 155. She has to name the lexical words that are omitted from the blanks of the sentences. The tone of the sentences is not submitted during re-testing but some constituents are written below the images so as to help the patient name the tasks.

Table 155: Re-Testing of Anomic Aphasic's Naming of images of nouns in the sentences

Exercise 11 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Der Wirt zapft (Bier)	0(ND)	3			
2. Ich esse Kasseler mit dicken (Bohnen)	0(ND)	3			
3. Der Bäcker backt frisches (Brot)	0(ND)	3			
4. Eier esse ich mit Pfeffer und (Salz)	0(ND)	3			
5. Im Sommer schlecke ich gerne (Eis)	0(ND)	3			
6. Der Angler fängt einen (Fisch)	0(ND)	3			
7. Das Baby trinkt aus der (Flasche)	0(ND)	3			
8. Ich trinke Saft aus dem (Glas)	0(ND)	3			
9. Ich trinke lieber Tee als (Kaffee)	0(ND)	3			
10. Nachmittag gibt es Kaffee und (Kuchen)	0(ND)	3			
11. Suppe esse ich mit dem (Löffel)	0(ND)	3			
12. Ich schneide das Brot mit dem (Messer)	0(ND)	3			
13. Kaffee schmeckt mit Zucker und (Milch)	1<Kaffee schmeckt mit Zucker und [/{1WSahne}]/(SF)]>		2		
14. Aus Apfelsinen presse ich frischen (Saft)	0(ND)	3			
15. Im Glas perlt der (Wein)	1<Im Glas perlt der [/{1WSekt}]/(SF)] oder Wein>		2		
16. Ich esse eine Wurst mit (Senf)	0(ND)	3			
17. Ich trinke Kaffee aus der (Tasse)	1<Ich trinke Kaffee aus der [/{1WVase}]/(SF)]>		2		
18. Anna trinkt schwarzen (Tee)	1<Anna trinkt schwarzen [/{1WKaffee}]/(SF)], oder...war es Tee....>		2		
19. Ich esse Suppe vom (Teller)	0(ND)		2		
20. Die Suppe kocht im (Topf)	0(ND)	3			
Sum of Errors & Evaluating Scale	4				56

The way of re-testing in exercise 13 of table 156 is similar to the one in table 155. Mrs Heinrich is confronted with an image, from whose sentence the verb is omitted, and then asked to name the verb that suits in the context. Errors in the other constituents of the sentence will not be taken into account.

Table 156: Re-Testing of Anomic Aphasic's Naming of images of verbs in the sentences

Exercise 13 of LW Stimuli (Images & 'Text')	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Anna (lacht)	0(ND)	3			
2. Jürgen (raucht)	0(ND)	3			
3. Vater (kocht)	0(ND)	3			
4. Er (schläft)	1<Er [/{1Wliegt}]/(SF)]>		2		
5. Vater und Sohn (baden)	0(ND)	3			
6. Eva (kämmt) sich	1<Eva [/{1Wwäscht}]/(SF)] sich>		2		
7. Sie (schreibt) einen Brief	0(ND)	3			
8. Er (trinkt) ein Bier	0(ND)	3			
9. Der Junge (läuft) schnell weg	0(ND)	3			

10. Der Hubschrauber.....(fliegt) über den See	0(ND)	3			
11. Die Schülerin.....(lernt) für das Abitur	1<Die Schülerin [/{1Wliest}/(SF)] für das Abitur>		2		
12. Der Hund(bellt)	0(ND)	3			
13. Tim(spielt) Fußball	0(ND)	3			
14. Laura(singt) ein Lied	0(ND)	3			
15. Die Frau(putzt) das Fenster	0(ND)	3			
16. Der Junge(springt) ins Wasser	0(ND)	3			
17. Er(zeigt) auf die Karte	1<Er [/{1Wschaut}/(SF)] auf die Karte>		2		
18. Hannibal(öffnet) die Tür	1<Hannibal [/{1Wschließt}/(SF)] die Tür>		2		
19. Klaus(liest) ein Buch	0(ND)	3			
20. Der Vater(arbeitet) im Garten	2<Der Vater [/{2M tut etwas}/(SS)] im Garten>			1	
Sum of Errors & Evaluating Scale	7			53	

7.2 - Re-Testing through the Exercises of *NeuroLing* Using the *Comprehension Test*

Broca's Aphasic

Comprehension Test

Re-Testing on Tu. 06, April 2004

Re-testing through the *Comprehension Test* will be carried out through five selected exercises of *NeuroLing*. It is a check-up of the patients' understanding and communicative ability. The aim of re-testing is to find how far this program helped the patients recover from the disorders that happened to occur in the semantic and mental representation of their language. Attempting to define the rate of recovery during the application of the comprehension test, the patients must respond to words that belong to different semantic fields, understand an SPO sentence and assign it to one of the four situations displayed by the images or vice versa, use the scattered phonemes to form a lexical word that suits to the image of the presented object, choose the correct verb and insert it in a sentence and finally construct meaningful sentences from various constituents of a sentence.

To re-test the comprehension ability of the Broca's aphasic, the examiner asks her to select from four items, in which two images are visually similar but semantically different, the one which does not belong to this semantic field. The form and the content of these re-testing procedures can be seen in exercise2 of table157. There is no text assistance in the following exercise of re-testing.

Table 157: Re-Testing of Broca's Aphasic's ability of Recognition and Selection

Exercise 2 of NL Stimuli (Image & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1) - der Hut - der Zylinder - der Helm - <i>die Torte</i>	0(ND)	3			
2) - der Drachen - der Luftballon - <i>der Apfel</i> - die Puppe	1<die Puppe>		2		
3) - die Zigarre - die Zigarette - <i>der Bleistift</i> - die Pfeife	0(ND)	3			
4) - die Kartoffel - die Buchse - <i>der Becher</i> - das Kassler	0(ND)	3			
5) - <i>das Paket</i> - die Handtasche - der Schulranzen - der Aktenkoffer	1<der Aktenkoffer>		2		
6) - der Sessel - <i>die Toilette</i> - der Stuhl - der Hocker	0(ND)	3			
7) - der Deckenstrahler - die Tischlampe - <i>der Regenschirm</i> - die Hängelampe	0(ND)	3			
8) - der Walkman - das Kofferradio - <i>der Toaster</i> - der CD-Spieler	0(ND)	3			
9) - <i>das Mikrophon</i> - das Waffeleis - die Flasche Sekt - das Fastfood	0(ND)	3			
10) - der Kuli - der Bleistift - der Füller - <i>der Pinsel</i>	0(ND)	3			
11) - die Sonnenbrille - <i>das Fernglas</i> - die Brille - die Brille	0(ND)	3			
12) - die Ananas - der Apfel - die Apfelsine - <i>der Wirsing</i>	0(ND)	3			
13) - <i>die Banane</i> - der Kopfsalat - die Olive - die Peperoni	1< die Peperoni>		2		
14) - <i>die Torte</i> - die Brötchen - der Pizzaboden - das Brot	0(ND)	3			

15)	- <i>der Eimer</i> - die Karaffe - das Faß - die Tasse	1< die Tasse>		2		
Sum of Errors & Evaluating Scale		4	41			

During the re-examination of Mrs Müller's comprehension ability of sentences she will be successively confronted with four images among which there is a sentence. The latter will be shifted the moment the patient clicks on the correct situation, just then another sentence appears on the screen. This process goes on until the four correct sentences are assigned to the corresponding situation. The target of re-testing in exercise7 of table158 is to re-examine the patient's ability of understanding a concrete sentence and its assignment to a situation. It is worth to compare this re-testing context with the results of table91 of therapy.

Table 158: Re-Testing of Broca's Aphasic's Understanding of concrete sentences at the Reception Level

Exercise 7 of NL Stimuli/Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.Die Frau wischt Staub	0(ND)	3			
2.Die Frau liest Akten	0(ND)	3			
3.Die Frau schreibt Briefe	0(ND)	3			
4.Die Frau spült Geschirr	0(ND)	3			
5.Der Mann spielt Billiard	0(ND)	3			
6.Der Mann spielt Golf	0(ND)	3			
7.Der Mann fährt Boot	0(ND)	3			
8.Der Mann fliegt Drachen	0(ND)	3			
9.Der Mann erklärt Formeln	0(ND)	3			
10.Der Mann hebt Gewichte	0(ND)	3			
11.Der Mann macht Judo	1<Der Mann hebt Gewichte>		2		
12.Der Mann entwirft Pläne	0(ND)	3			
13.Die Frau gießt Blumen	0(ND)	3			
14.Die Frau macht Gymnastik	1<Die Frau misst Kraft>		2		
15.Die Frau schneidet Gras	0(ND)	3			
16.Die Fau misst Kraft	0(ND)	3			
17.Das Mädchen pflückt Äpfel	0(ND)	3			
18.Das Mädchen spielt Tennis	0(ND)	3			
19.Das Mädchen pflegt Blumen	0(ND)	3			
20.Das Mädchen spielt Volleyball	1<Das Mädchen spielt Tennis>		2		
Sum of Errors & Evaluating Scale	3	57			

The demand to make on Mrs Müller in exercise10 of table159 is to combine the phonemes in the right order and make a word form that should be inserted in a sentence to complete its meaning. The aim of re-testing is to find out whether she is in a position to understand a sentence at the end of which there is a lexical word which is presented to her in the form of scattered vowels and consonants, with which the submitted images should be labelled.

Table 159: Re-Testing of Broca's Aphasic's Word Formation at the Production Level

Exercise 10 of NL Anagramme Stimuli/Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Ich schlage den Nagel in die Wand mit einem H..... (a-e-m-r-m)	1<Ham/1MØ/er>		2		
2. Du lebst am Rand der Stadt in einem schönen, großen H..... (u-a-s)	0(ND)	3			
3. Ich habe Durst. Gibst du mir bitte ein Glas Orangen S.... (f-a-t)	0(ND)	3			
4. Man schneidet das Brot mit einem großen, scharfen M..... (s-e-r-e-s)	0(ND)	3			
5. Sie trägt eine kostbare Perlen K..... (e-e-t-t)	0(ND)	3			
6. Eine Schüssel Milch bekommt die K..... (t-e-z-a)	0(ND)	3			
7. Nimm doch ein Stück von dem selbstgebackenen K..... (c-n-u-e-h)	0(ND)	3			
8. Am Abend gucke ich die Tagesschau im F..... (s-r-e-n-h-e-e)	1<Fernseh/1VØ/n>		2		
9. Ich putze mir die Zähne mit der Z..... (b-r-n-ü-h-a-e-s-t)	2<Zahnbü/2CØ/te>			1	
10. Man wäscht sich die Hände mit S..... (e-e-f-i)	0(ND)	3			
11. Ältere Männer haben auf dem Kopf oft wenig H..... (r-a-e-a)	0(ND)	3			
12. Wir essen viel Brot, und die Chinesen essen viel R..... (i-s-e)	0(ND)	3			
13. Wir haben ein eigenes Haus mit einem schönen G..... (e-r-n-a-t)	0(ND)	3			
14. Einen feuerspeienden Berg nennt man V..... (n-a-k-l-u)	2<Vu/1CØ/kn[1C a]>			1	
15. Der Kellner serviert das bestellte E..... (s-e-s-n)	0(ND)	3			
16. Wenn ich müde bin, brauche ich einen starken K..... (e-f-e-a-f)	0(ND)	3			
17. Wir bezahlen die Ware mit G..... (l-d-e)	0(ND)	3			
18. Unsere Familie liegt im Urlaub gern am sandigen S..... (a-r-t-n-d)	0(ND)	3			
19. Viele Leute fahren nicht ans Meer, sondern in die B..... (r-e-e-g)	0(ND)	3			
20. Wenn ich auf Reisen gehe, packe ich meinen K..... (f-o-f-e-r)	1<Koffir[1Ve]>		2		
Sum of Errors & Evaluating Scale	7	53			

In exercise 14 of table 160 Mrs Müller will be re-tested through the assignment of conjugated verbs to sentences. First of all she has to understand a sentence, which is being pronounced, and insert in it the correct conjugated verb that must suit to the gender and number of the sentence. In this re-testing context the sentences are not coupled with images.

Table 160: Re-Testing of Broca's Aphasic's verb insertion in the sentences at the Production Level

Exercise14 of NL Stimuli (Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Annafrüh am Morgen auf (stehe – steht – stehst – stehen)	0(ND)	3			
2. Sieunter die Dusche (springt – springen – springe – springst)	0(ND)	3			
3. Rolfdas Frühstück (machen – macht – machst – mache)	0(ND)	3			
4. Anna sich inzwischen die Haare (fönt – föne – fönen – fönst)	0(ND)	3			
5. Sie sich Hose, Pulli und Strumpfe an (ziehen – ziehst – zieht – ziehe)	1<ziehe>		2		
6. Rolf und Anna.....gemeinsam (frühstückst – frühstücken – frühstücke – frühstückt)	0(ND)	3			
7. Die beiden.....Kaffee mit Milch und Zucker (trinkt – trinke – trinken – trinkst)	0(ND)	3			
8. Das EhepaarBrötchen mit Käse und Schinken (essen – isst – esse – esst)	1<essen>		2		
9. Nach dem FrühstückRolf die Zeitung (lesen – lest – lese – liest)	1<lest>		2		
10. Anna sagt: "Rolf, bitteden Tisch ab!" (räumst – räumen – räumt – räume)	1<räumst>		2		
11. Rolf meint: "Ichnoch den Sportteil zu Ende lesen." (möchte – möchtest – möchten – möchtest)	0(ND)	3			
12. Anna antwortet: "Aber ichjetzt los zur Arbeit." (müssen – musst – muß – müsst)	0(ND)	3			
13. Rolf erwidert: "Ja, ichdas jetzt gleich fertig." (machen – mache – machst – macht)	0(ND)	3			
14. Rolfheute zu Hause bleiben. (können – könnt – kannst – kann)	1<könnt>		2		
15. Annasich von Rolf und fährt zur Arbeit. (verabschieden – verabschiedest – verabschiedet – verabschiede)	1<verabschiede>		2		
16. Erheute einen Urlaubstag. (habe – haben – hast – hat – habst)	0(ND)	3			
17. Annamit dem Bus zum Büro. (fährt – fährst – fahre – fahren – fahrt)	0(ND)	3			
18. Der Buspünktlich um 7:30 (komme – kommst – kommen – kommt)	0(ND)	3			
19. Im BusAnna die Fahrkarte. (löse – löst – lösen)	0(ND)	3			
20. Annakeinen Sitzplatz, weil der Bus voll ist. (findest – finde – findet – finden)	1<finde>		2		
Sum of Errors & Evaluating Scale	7	53			

If re-testing in exercise14 of table160 was confined to the insertion of a verb in a sentence, in exercise17 of table161 re-testing will concentrate on Mrs Müller's attempting to combine grammatical and lexical words to make meaningful sentences. Both the text, of the displaced constituents and the images, to which the sentence should be assigned, are offered to her.

Table 161: Re-Testing of Broca's Aphasic's Sentence Formation at the Production Level

Exercise 17 of NL Stimuli(Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. lacht – Kind – Das	0(ND)	3			
2. Volleyball – Sie – spielt	0(ND)	3			
3. macht – Clown – Spaß – Der	0(ND)	3			
4. Junge – lächelt – Die – Dame	0(ND)	3			
5. umarmen – beiden – Die – sich	0(ND)	3			
6. Getränke – Die – Bedienung – serviert	0(ND)	3			
7. Der – Geschäftsmann – freundlich – lächelt	1<Der Geschäftsmann lächelt {1WØ}>		2		
8. Ist – Seine – Kaffeebraun – Hautfarbe	1<Seine Hautfarbe {1WØ} Kaffeebraun>		2		
9. telefoniert – Die – Frau – schwangere	1<Die {1WØ} Frau telefoniert>		2		
10. Schlägertyp – Er – ein – ist	0(ND)	3			
11. trinkt – Kaffee – Die – Frau	0(ND)	3			
12. Familie – Die – geht – spazieren	1<{1WØ} Familie geht spazieren>		2		

13.gegeneinander – Die – Sportler – kämpfen	1<Die Sportler [{1W}gegeneinander]] kämpfen>		2		
14.Mädchen – Ballet – tanzt – Das – klassisches	1<Das Mädchen tanzt {1WØ} Ballet>		2		
15.sieht – Braut – Die – festlich – aus	1<Die Braut sieht [{1W}aus]] festlich>		2		
16.aus – ruht – Mann – sich – Der	0(ND)	3			
17.Frau – ist – Die – altmodisch – gekleidet	2<{1WØ}Frau {1WØ}gekleidet altmodisch			1	
18.junge – Der – Inline-Skating – Mann – macht	1<Der {1WØ}Mann macht Inline-Skating>		2		
19.dem – Sie – Handy – mit – telefoniert	1<Sie telefoniert mit {1MØ} Handy>		2		
20.Akten – Schreibtisch – überhäufen – die – den	1<Die Akten überhäufen {1MØ}Schreibtisch>		2		
Sum of Errors & Evaluating Scale	12			48	

Wernicke's Aphasic

Comprehension Test

Re-Testing on Wed. 07, April 2004

The Wernicke's aphasic, Mr Fimm will be confronted with the same exercises with which the Broca's aphasic was re-tested. The form and the content of these exercises will not be altered. But during the administration of re-testing, the way how the examiner submits the tasks to the patients may vary from one exercise to the other due to the linguistic impairment the patient still suffers from. During the course of re-testing Mr Fimm's comprehension ability, the patient is asked to select an item from four images. The item is visually similar to the others but semantically different from them. The aphasic patient does not get the texts of the items, that assisted him, to a large extent, during the session of therapy. The re-testing focuses on whether his capacity of discriminating between similar items has improved. Exercise2 of table162 might unfold these features of improvement.

Table 162: Re-Testing of Wernicke's Aphasic's Ability of Recognition and Selection

Exercise 2 of NL Stimuli/Images & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1) - der Hut - der Zylinder - der Helm - die Torte	0(ND)	3			
2) - der Drachen - der Luftballon - der Apfel - die Puppe	0(ND)	3			
3) - die Zigarre - die Zigarette - der Bleistift - die Pfeife	0(ND)	3			
4) - die Kartoffel - die Buchse - der Becher - das Kassler	0(ND)	3			
5) - das Paket - die Handtasche - der Schulranzen - der Aktenkoffer	0(ND)	3			

6)	- der Sessel - <i>die Toilette</i> - der Stuhl - der Hocker	0(ND)	3				
7)	- der Deckenstrahler - die Tischlampe - <i>der Regenschirm</i> - die Hängelampe	1<die Hängelampe>		2			
8)	- der Walkman - das Kofferradio - <i>der Toaster</i> - der CD-Spieler	1<der Walkman>		2			
9)	- <i>das Mikrophon</i> - das Waffeleis - die Flasche Sekt - das Fastfood	0(ND)	3				
10)	- der Kuli - der Bleistift - der Füller - <i>der Pinsel</i>	0(ND)	3				
11)	- die Sonnenbrille - <i>das Fernglas</i> - die Brille - die Brille	1<die Sonnenbrille>		2			
12)	- die Ananas - der Apfel - die Apfelsine - <i>der Wirsing</i>	1<die Ananas>		2			
13)	- <i>die Banane</i> - der Kopfsalat - die Olive - die Pepperoni	1<die Olive>		2			
14)	- <i>die Torte</i> - die Brötchen - der Pizzaboden - das Brot	1<der Pizzaboden>		2			
15)	- <i>der Eimer</i> - die Karaffe - das Faß - die Tasse	1<die Karaffe>		2			
Sum of Errors & Evaluating Scale		7		37			

Re-testing with the seventh exercise7 of table163 is necessary in this context because it shows whether the amelioration of the patient's comprehension ability has also taken place at the sentence level. It is a shift from a re-testing of word recognition to sentence understanding. The patient is required to assign a sentence to an image presented as a context in four situations, in which there are two situations that may deceive the patient visually as far as their meaning is concerned.

Table 163: Re-Testing of Wernicke's Aphasic's Understanding of concrete sentences at the Reception Level

Exercise 7 of NL Stimuli/Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1.Die Frau wischt Staub	0(ND)	3			
2.Die Frau liest Akten	0(ND)	3			
3.Die Frau schreibt Briefe	0(ND)	3			
4.Die Frau spült Geschirr	0(ND)	3			

5. Der Mann spielt Billiarde	1<Der Mann spielt Golf>		2		
6. Der Mann spielt Golf	0(ND)	3			
7. Der Mann fährt Boot	0(ND)	3			
8. Der Mann fliegt Drachen	0(ND)	3			
9. Der Mann erklärt Formeln	0(ND)	3			
10. Der Mann hebt Gewichte	0(ND)	3			
11. Der Mann macht Judo	0(ND)	3			
12. Der Mann entwirft Pläne	1<Der Mann erklärt Formeln>		2		
13. Die Frau gießt Blumen	1<Die Frau schneidet Gras>		2		
14. Die Frau macht Gymnastik	0(ND)	3			
15. Die Frau schneidet Gras	0(ND)	3			
16. Die Frau misst Kraft	0(ND)	3			
17. Das Mädchen pflückt Äpfel	1<Das Mädchen pflegt Blumen>		2		
18. Das Mädchen spielt Tennis	0(ND)	3			
19. Das Mädchen pflegt Blumen	0(ND)	3			
20. Das Mädchen spielt Volleyball	1<Das Mädchen spielt Tennis>		2		
Sum of Errors & Evaluating Scale	5			55	

It is to be expected that exercise 10 of table 164 will be very difficult to the Wernicke's aphasic due to its form and way of presentation. During re-testing the patient should rely on the meaning of each sentence and the image of the object whose lexical words appear in the form of scattered phonemes so as to form a meaningful word that fits in the context.

Table 164: Re-Testing of Wernicke's Aphasic's Word Formation at the Production Level

Exercise 10 of NL Anagramme Stimuli (Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Ich schlage den Nagel in die Wand mit einem H..... (a - e - m - r - m)	2<H[IVe]mm[IVa]r			1	
2. Du lebst am Rand der Stadt in einem schönen, großen H..... (u - a - s)	0(ND)	3			
3. Ich habe Durst. Gibst du mir bitte ein Glas Orangen S.... (f - a - t)	0(ND)	3			
4. Man schneidet das Brot mit einem großen, scharfen M..... (s - e - r - e - s)	1<Mes/ICØ/er>		2		
5. Sie trägt eine kostbare Perlen K..... (e - e - t - t)	1<Ke/ICØ/te>		2		
6. Eine Schüssel Milch bekommt die K..... (t - e - z - a)	0(ND)	3			
7. Nimm doch ein Stück von dem selbstgebackenen K..... (c - n - u - e - h)	1<Kuchn[IVe]>		2		
8. Am Abend gucke ich die Tagesschau im F..... (s - r - e - n - h - e - e)	1<Fernsehn[IVe]>		2		
9. Ich putze mir die Zähne mit der Z..... (b - r - n - ü - h - a - e - s - t)	2<Zahnbr[IVü]t[ICs]e>			1	
10. Man wäscht sich die Hände mit S..... (e - e - f - i)	0(ND)	3			
11. Ältere Männer haben auf dem Kopf oft wenig H..... (r - a - e - a)	0(ND)	3			

12. Wir essen viel Brot, und die Chinesen essen viel R..... (i - s - e)	0(ND)	3			
13. Wir haben ein eigenes Haus mit einem schönen G..... (e - r - n - a - t)	1<Gartn[IVe]>		2		
14. Einen feuerspeienden Berg nennt man V..... (n - a - k - l - u)	1<Vuk[IC]an>		2		
15. Der Kellner serviert das bestellte E..... (s - e - s - n)	0(ND)	3			
16. Wenn ich müde bin, brauche ich einen starken K..... (e - f - e - a - f)	1<Kaffe[ICØ]>		2		
17. Wir bezahlen die Ware mit G..... (l - d - e)	0(ND)	3			
18. Unsere Familie liegt im Urlaub gern am sandigen S..... (a - r - t - n - d)	1<Sta[ICr]nd>		2		
19. Viele Leute fahren nicht ans Meer, sondern in die B..... (r - e - e - g)	0(ND)	3			
20. Wenn ich auf Reisen gehe, packe ich meinen K..... (f - o - f - e - r)	1<Koffr[IVe]>		2		
Sum of Errors & Evaluating Scale	14		46		

In exercise 14 of table 165 the examiner will re-test how the the Wernicke's aphasic, Mr Fimm will deal with the conjugated verbs as he assigns each of them to an appropriate meaningful context. The assigned verb must fit with the gender and number of the sentence. Re-testing in this exercise will be carried out through a text and its tone without any image.

Table 165: Re-Testing of Wernicke's Aphasic's verb insertion in the sentences at the Production Level

Exercise 14 of NL Stimuli (Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Annafrüh am Morgen auf (stehe - steht - stehst - stehen)	0(ND)	3			
2. Sieunter die Dusche (springt - springen - sprünge - springt)	0(ND)	3			
3. Rolfdas Frühstück (machen - macht - machst - mache)	0(ND)	3			
4. Anna sich inzwischen die Haare (fönt - föne - fönen - fönst)	0(ND)	3			
5. Sie sich Hose, Pulli und Strumpfe an (ziehen - ziehst - zieht - ziehe)	1<ziehen>		2		
6. Rolf und Anna.....gemeinsam (frühstückst - frühstücken - frühstücke - frühstückt)	0(ND)	3			
7. Die beiden.....Kaffee mit Milch und Zucker (trinkt - trinke - trinken - trinkst)	1<trinkt>		2		
8. Das EhepaarBrötchen mit Käse und Schinken (essen - isst - esse - esst)	1<esst>		2		
9. Nach dem FrühstückRolf die Zeitung (lesen - lest - lese - liest)	0(ND)	3			
10. Anna sagt: "Rolf, bitteden Tisch ab!" (räumst - räumen - räumt - räume)	1<räumst>		2		
11. Rolf meint: "Ichnoch den Sportteil zu Ende lesen." (möchte - möchtest - möchten - möchtest)	0(ND)	3			
12. Anna antwortet: "Aber ichjetzt los zur Arbeit." (müssen - musst - muß - müsst)	0(ND)	3			
13. Rolf erwidert: "Ja, ichdas jetzt gleichfertig." (machen - mache - machst - macht)	0(ND)	3			
14. Rolfheute zu Hause bleiben. (können - könnt - kannst - kann)	0(ND)	3			

15. Annasich von Rolf und fährt zur Arbeit. (verabschieden – verabschiedest – verabschiedet – verabschiede)	1<verabschiede>		2		
16. Erheute einen Urlaubstag. (habe – haben – hast – hat)	0(ND)	3			
17. Annamit dem Bus zum Büro. (fährt – fährt – fahre – fahren)	0(ND)	3			
18. Der Buspünktlich um 7:30 (komme – kommst – kommen – kommt)	1<komme>		2		
19. Im BusAnna die Fahrkarte. (löse – löst – lösen)	1<löse>		2		
20. Annakeinen Sitzplatz, weil der Bus voll ist. (findest – finde – findet – finden)	0(ND)	3			
Sum of Errors & Evaluating Scale	7		53		

In exercise 17 of table 166 the words are displaced from their syntactic structure and semantic context. The patient, involved in re-testing, will attempt to construct a meaningful sentence. The image that corresponds to each sentence is offered to him as a cue that should assist him in binding the constituents in the correct order of the situation they refer to.

Table 166: Re-Testing of Wernicke's Aphasic's Sentence Formation at the Production Level

Exercise 17 of NL Stimuli (Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. lacht – Kind – Das	0(ND)	3			
2. Volleyball – Sie – spielt	0(ND)	3			
3. macht – Clown – Spaß – Der	0(ND)	3			
4. Junge – lächelt – Die – Dame	0(ND)	3			
5. umarmen – beiden – Die – sich	0(ND)	3			
6. Getränke – Die – Bedienung – serviert	0(ND)	3			
7. Der – Geschäftsmann – freundlich – lächelt	1<Der Geschäftsmann [{1W freundlich}] lächelt>		2		
8. Ist – Seine – Kaffeebraun – Hautfarbe	0(ND)	3			
9. telefoniert – Die – Frau – schwangere	1<Die schwangere {1WØ} telefoniert>		2		
10. Schlägertyp – Er – ein – ist	1<Er ist {1WØ} Schlägertyp>		2		
11. trinkt – Kaffee – Die – Frau	0(ND)	3			
12. Familie – Die – geht – spazieren	1<Die Familie [{1W spazieren}] geht>		2		
13. gegeneinander – Die – Sportler – kämpfen	1<Die Sportler [{1W gegeneinander}] kämpfen>		2		
14. Mädchen – Ballet – tanzt – Das – klassisches	0(ND)	3			
15. sieht – Braut – Die – festlich – aus	1<Die {1WØ} sieht festlich aus>		2		
16. aus – ruht – Mann – sich – Der	1<Der {1WØ} Ruht sich aus>		2		
17. Frau – ist – Die – altmodisch – gekleidet	1<Die Frau ist {1WØ} gekleidet>		2		
18. junge – Der – Inline-Skating – Mann – macht	1<Der {1WØ} macht Inline-skating>		2		
19. dem – Sie – Handy – mit – telefoniert	2< [{1Whandy}] [{1Wtelefoniert}] Sie mit dem>			1	
20. Akten – Schreibtisch – überhäufen – die – den	2<[{1W Schreibtisch}] [{1W Akten}] die überhäufen den >			1	
Sum of Error & Evaluating Scale	13		47		

Anomic Aphasic

Comprehension Test

Re-Testing on Thu. 08. April 2004

To complement this circle of re-testing, Mrs Heinrich should not be excluded from the comprehension test. Her re-testing will offer the examiner an insight into her comprehension ability. The focus will be on her understanding of individual words, sentences, combination of lexical words and their insertion in context to make meaningful sentences. The improvement of her comprehension ability is to be derived from the achievements she attains in these exercises. In exercise2 of table167 the examiner asks her to find the lexical word whose meaning does not fit with the others, even though the objects of the images have a similar form.

Table 167: Re-Testing of Anomic's Aphasic's Ability of Recognition and Selection

Exercise 2 of NL Stimuli (Images & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1) - der Hut - der Zylinder - der Helm - <i>die Torte</i>	0(ND)	3			
2) - der Drachen - der Luftballon - <i>der Apfel</i> - die Puppe	0(ND)	3			
3) - die Zigarre - die Zigarette - <i>der Bleistift</i> - die Pfeife	0(ND)	3			
4) - die Kartoffel - die Buchse - <i>der Becher</i> - das Kassler	0(ND)	3			
5) - <i>das Paket</i> - die Handtasche - der Schulranzen - der Aktenkoffer	0(ND)	3			
6) - der Sessel - <i>die Toilette</i> - der Stuhl - der Hocker	0(ND)	3			
7) - der Deckenstrahler - die Tischlampe - <i>der Regenschirm</i> - die Hängelampe	0(ND)	3			
8) - der Walkman - das Kofferradio - <i>der Toaster</i> - der CD-Spieler	0(ND)	3			

9)	- <i>das Mikrophon</i> - das Waffeleis - die Flasche Sekt - das Fastfood	0(ND)	3				
10)	- der Kuli - der Bleistift - der Füller - <i>der Pinsel</i>	0(ND)	3				
11)	- die Sonnenbrille - <i>das Fernglas</i> - die Brille - die Brille	0(ND)	3				
12)	- die Ananas - der Apfel - die Apfelsine - <i>der Wirsing</i>	0(ND)	3				
13)	- <i>die Banane</i> - der Kopfsalat - die Olive - die Pepperoni	0(ND)	3				
14)	- <i>die Torte</i> - die Brötchen - der Pizzaboden - das Brot	0(ND)	3				
15)	- <i>der Eimer</i> - die Karaffe - das Faß - die Tasse	2<das Faß, die Tasse,>				1	
Sum of Errors & Evaluating Scale		2	43				

The anomic aphasic, who will be re-tested in exercise 7 of table 168, will get only the images without their sentences. The examiner will check whether the patient is able to assign a spoken sentence to situations in which two contexts appear to be visually similar but semantically different.

Table 168: Re-Testing of Anomic's Aphasic's Understanding of concrete sentences at the Reception Level

Exercise 7 of NL Stimuli (Images & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Die Frau wischt Staub	0(ND)	3			
2. Die Frau liest Akten	0(ND)	3			
3. Die Frau schreibt Briefe	0(ND)	3			
4. Die Frau spült Geschirr	0(ND)	3			
5. Der Mann spielt Billiard	0(ND)	3			
6. Der Mann spielt Golf	0(ND)	3			
7. Der Mann fährt Boot	0(ND)	3			
8. Der Mann fliegt Drachen	0(ND)	3			
9. Der Mann erklärt Formeln	0(ND)	3			
10. Der Mann hebt Gewichte	0(ND)	3			
11. Der Mann macht Judo	0(ND)	3			
12. Der Mann entwirft Pläne	0(ND)	3			
13. Die Frau gießt Blumen	0(ND)	3			
14. Die Frau macht Gymnastik	1<Die Frau misst Kraft>		2		
15. Die Frau schneidet Gras	0(ND)	3			
16. Die Frau misst Kraft	0(ND)	3			
17. Das Mädchen pflückt Äpfel	0(ND)	3			

18.Das Mädchen spielt Tennis	0(ND)	3			
19.Das Mädchen pflegt Blumen	1<Das Mädchen pflückt Apfel>		2		
20.Das Mädchen spielt Volleyball	0(ND)	3			
Sum of Errors & Evaluating Scale	2			58	

In exercise 10 of table 169 Mrs Heinrich is to be re-tested otherwise. Each sentence is presented to her in a tone, from which the target word to be found, was left out during its pronunciation, but presented by an image. The task of the patient is to combine the phonemes of the lexical word that corresponds to the image and assign it (word) to the sentence blank which is not pronounced.

Table 169: Re-Testing of Anomic's Aphasic's Word Formation at the Production Level

Exercise 10 of LW Anagramme Stimuli (Images & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Ich schlage den Nagel in die Wand mit einem H..... (a-e-m-r-m)	0(ND)	3			
2. Du lebst am Rand der Stadt in einem schönen, großen H..... (u-a-s)	0(ND)	3			
3. Ich habe Durst. Gibst du mir bitte ein Glas Orangen S.... (f-a-t)	0(ND)	3			
4. Man schneidet das Brot mit einem großen, scharfen M..... (s-e-r-e-s)	0(ND)	3			
5. Sie trägt eine kostbare Perlen K..... (e-e-t-t)	0(ND)	3			
6. Eine Schüssel Milch bekommt die K..... (t-e-z-a)	0(ND)	3			
7. Nimm doch ein Stück von dem selbstgebackenen K..... (c-n-u-e-h)	0(ND)	3			
8. Am Abend gucke ich die Tagesschau im F..... (s-r-e-n-h-e-e)	1<Fernseh/n/e>		2		
9. Ich putze mir die Zähne mit der Z..... (b-r-n-ü-h-a-e-s-t)	1<Zahnbü/s/rte>		2		
10. Man wäscht sich die Hände mit S..... (e-e-f-i)	0(ND)	3			
11. Ältere Männer haben auf dem Kopf oft wenig H..... (r-a-e-a)	0(ND)	3			
12. Wir essen viel Brot, und die Chinesen essen viel R..... (i-s-e)	0(ND)	3			
13. Wir haben ein eigenes Haus mit einem schönen G..... (e-r-n-a-t)	1<Gartn/e>		2		
14. Einen feuerspeienden Berg nennt man V..... (n-a-k-l-u)	0(ND)	3			
15. Der Kellner serviert das bestellte E..... (s-e-s-n)	0(ND)	3			
16. Wenn ich müde bin, brauche ich einen starken K..... (e-f-e-a-f)	0(ND)	3			
17. Wir bezahlen die Ware mit G..... (l-d-e)	0(ND)	3			
18. Unsere Familie liegt im Urlaub gern am sandigen S..... (a-r-t-n-d)	1<Strn/a/d>		2		

19.Viele Leute fahren nicht ans Meer, sondern in die B..... (r – e – e – g)	0(ND)	3			
20.Wenn ich auf Reisen gehe, packe ich meinen K..... (f – o – f – e – r)	0(ND)	3			
Sum of Errors & Evaluating Scale	4	56			

In exercise 14 of table 170 Mrs Heinrich is to assign the correct conjugated verb to the blank of each sentence. Re-testing will follow the same steps with which the examiner re-tested the Broca's and Wernicke's aphasics in the previous sessions of therapy. The only difference in the application of the comprehension test to Mrs Heinrich is that her examination will be carried out only with the use of a text without any tone or images.

Table 170: Re-Testing of Anomic's Aphasic's Verb Insertion in the sentences at the Production Level

Exercise 14 of NL Stimuli (Text)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. Annafrüh am Morgen auf (stehe – steht – stehst – stehen)	0(ND)	3			
2. Sieunter die Dusche (springt – springen – springe – springt)	0(ND)	3			
3. Rolfdas Frühstück (machen – macht – machst – mache)	0(ND)	3			
4. Anna sich inzwischen die Haare (fönt – föne – fönen – fönst)	0(ND)	3			
5. Sie sich Hose, Pulli und Strumpfe an (ziehen – ziehst – zieht – ziehe)	0(ND)	3			
6. Rolf und Anna.....gemeinsam (frühstückst – frühstückten – frühstücke – frühstückt)	0(ND)	3			
7. Die beiden.....Kaffee mit Milch und Zucker (trinkt – trinke – trinken – trinkst)	0(ND)	3			
8. Das EhepaarBrötchen mit Käse und Schinken (essen – isst – esse – esst)	0(ND)	3			
9. Nach dem FrühstückRolf die Zeitung (lesen – lest – lese – liest)	0(ND)	3			
10. Anna sagt: "Rolf, bitteden Tisch ab!" (räumst – räumen – räumt – räume)	0(ND)	3			
11. Rolf meint: "Ichnoch den Sportteil zu Ende lesen." (möchte – möchtest – möchten – möchtest)	0(ND)	3			
12. Anna antwortet: "Aber ichjetzt los zur Arbeit." (müssen – musst – muß – müsst)	0(ND)	3			
13. Rolf erwidert: "Ja, ichdas jetzt gleichfertig." (machen – mache – machst – macht)	0(ND)	3			
14. Rolfheute zu Hause bleiben. (können – könnt – kannst – kann)	0(ND)	3			
15. Annasich von Rolf und fährt zur Arbeit. (verabschieden – verabschiedest – verabschiedet – verabschiede)	1<verabschiede>		2		
16. Erheute einen Urlaubstag. (habe – haben – hast – hat – habst)	0(ND)	3			

17. Annamit dem Bus zum Büro. (fährt – fährst – fahre – fahren – fahrt)	0(ND)	3			
18. Der Buspünktlich um 7:30 (komme – kommst – kommen – kommt)	0(ND)	3			
19. Im BusAnna die Fahrkarte. (löse – löst – lösen)	0(ND)	3			
20. Annakeinen Sitzplatz, weil der Bus voll ist. (findest – finde – findet – finden)	0(ND)	3			
Sum of Errors & Evaluating Scale	1		59		

Finding the correct word order of the following constituents, that should form a meaningful sentence, is the task in which Mrs Heinrich will be involved in exercise 17 of table 171. She will be re-tested without being offered any pictorial or tone cues, because she does not suffer from any reading disorders or semantic impairment that could hamper her in her attempt to solve the tasks. The difficulties, she will certainly face, lie in the word retrieval.

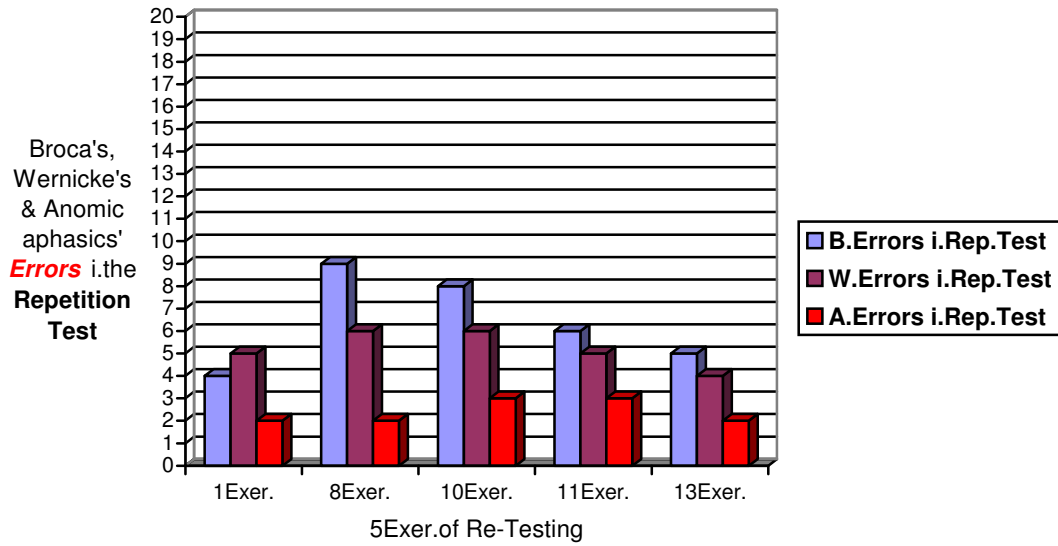
Table 171: Re-Testing of Anomic's Aphasic's Sentence Formation at the Production Level

Exercise 17 of NL Stimuli (Text)	Responses with Errors	Evaluating Scale			
		3	2	1	0
1. lacht – Kind – Das	0(ND)	3			
2. Volleyball – Sie – spielt	0(ND)	3			
3. macht – Clown – Spaß – Der	0(ND)	3			
4. Junge – lächelt – Die – Dame	0(ND)	3			
5. umarmen – beiden – Die – sich	0(ND)	3			
6. Getränke – Die – Bedienung – serviert	0(ND)	3			
7. Der – Geschäftsmann – freundlich – lächelt	0(ND)	3			
8. Ist – Seine – Kaffeebraun – Hautfarbe	0(ND)	3			
9. telefoniert – Die – Frau – schwangere	1<Die schwangere {1WØ} telefoniert>		2		
10. Schlägertyp – Er – ein – ist	0(ND)	3			
11. trinkt – Kaffee – Die – Frau	0(ND)	3			
12. Familie – Die – geht – spazieren	0(ND)	3			
13. gegeneinander – Die – Sportler – kämpfen	0(ND)	3			
14. Mädchen – Ballet – tanzt – Das – klassisches	1<Das Mädchen tanzt Ballet [{1W klassisches}]>		2		
15. sieht – Braut – Die – festlich – aus	1<Die Braut [{1W festlich}] sieht aus>		2		
16. aus – ruht – Mann – sich – Der	0(ND)	3			
17. Frau – ist – Die – altmodisch – gekleidet	0(ND)	3			
18. junge – Der – Inline-Skating – Mann – macht	0(ND)		2		
19. dem – Sie – Handy – mit – telefoniert	0(ND)	3			
20. Akten – Schreibtisch – überhäufen – die – den	0(ND)	3			
Sum of Errors & Evaluating Scale	3		57		

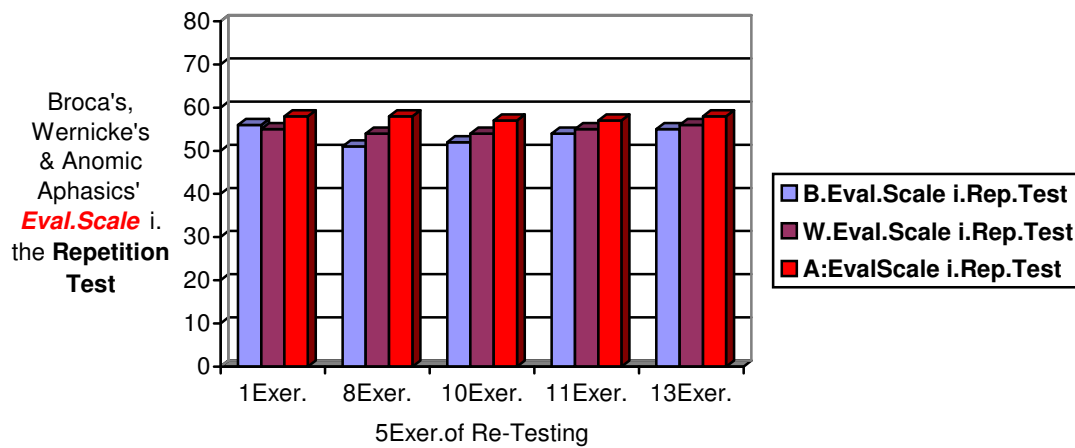
The inferences which can be drawn from the above exercises of re-testing will be presented in the following diagrams. The latter illustrate the rate of the errors and the evaluating scale the patients attained in the exercises through which their words, sentences and mental lexicon were trained in the sessions of therapy. This rate of recovery has been foregrounded and illustrated by the Repetition, Confrontation Naming and Comprehension Tests that will be unfolded in the following diagrams. In general, these tests also show the rate of language reacquisition that has been triggered by a programmed and planned aphasia therapy in which LingWare and NeuroLing were involved.

7.3 - Schematic Representation of Re-Testing with the Selected Exercises of LW and NL

Repetition Test



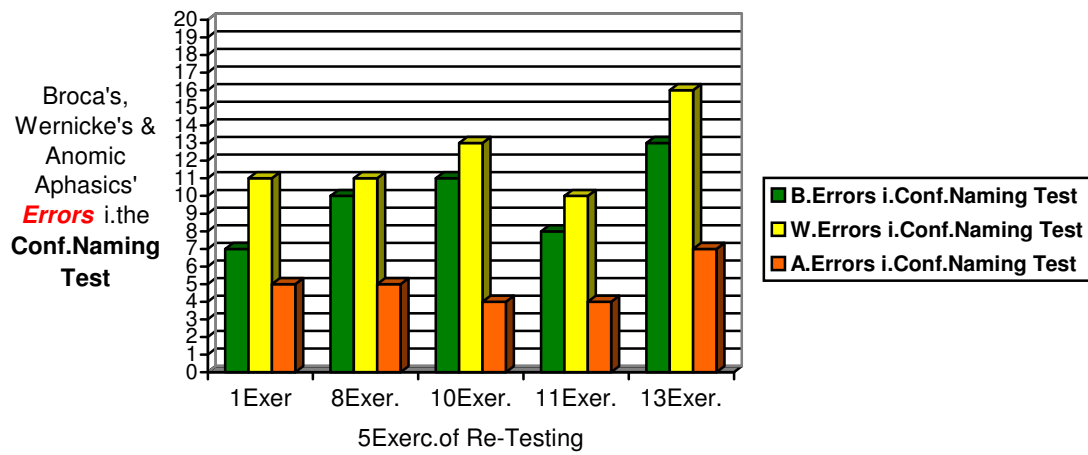
(a)



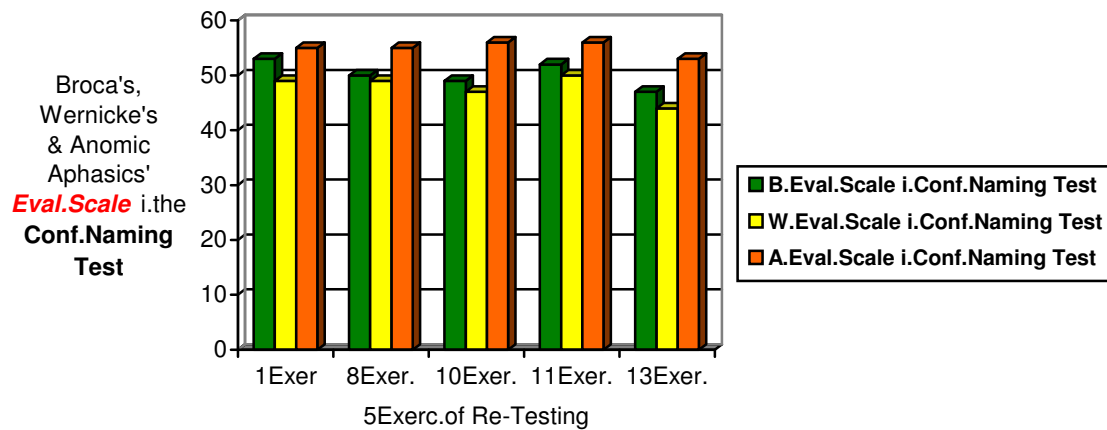
(b)

Fig.29. The (a) and (b) bar-diagrams show the patients' errors and evaluating scales in the Repetition Test.

Confrontation Naming Test



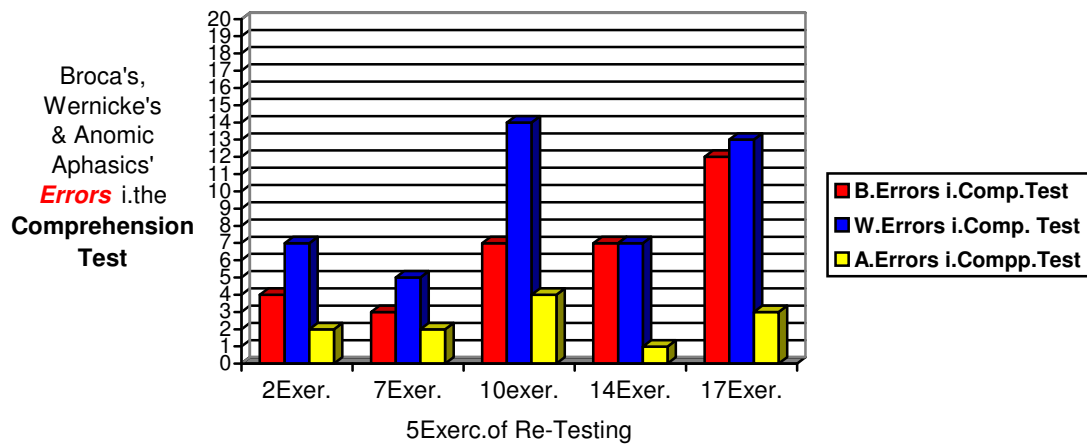
(c)



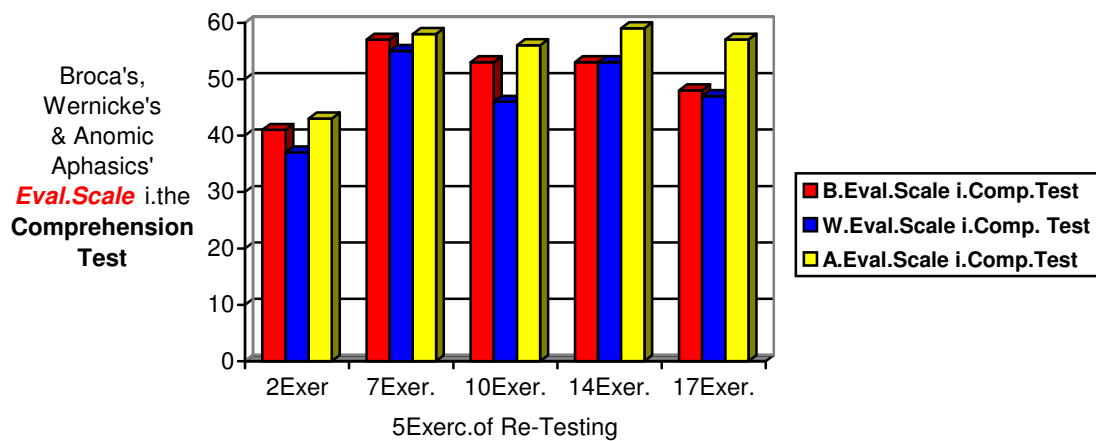
(d)

Fig.30. The (c) and (d) bar-diagrams show the patients' errors and evaluating scales in the Confrontation Naming Test.

Comprehension Test



(e)



(f)

Fig.31. The (e) and (f) bar-diagrams show the patients' errors and evaluating scales in the Comprehension Test.

7.4 – A Comparison between the Results of Therapy and Re-Testing

Exercise 1, 8, 10, 11 and 13 of the first phase, which were used in the Repetition and Confrontation Naming Tests to re-test the level of the aphasics' recovery, show a substantial increase in the scores of the evaluating scales and a considerable decrease in the rate of the errors. This can be best inferred from a comparison between the results of the tables of the Repetition, Confrontation Naming Tests of Re-Testing and those of the selected exercises of the first phase of therapy. The level of recovery can be substantiated by the results of the above (a), (b), (c) and (d) bar-diagrams.

Re-Testing with the Comprehension Test, which consists of exercise 2, 7, 10, 14 and 17 of the second phase of therapy with NeuroLing, depicts also satisfactory results about the rate of recovery of the three aphasic patients. One can deduce from the tables of re-testing that the score of the evaluating scales arose and that of errors diminished. This can be confirmed by comparing the results obtained by each aphasic during the second phase of therapy and the scores achieved during re-testing. The results of (e) and (f) bar-diagrams illustrate the scale of recovery in the comprehension test.

All in all, there is a lucid improvement of repetition, naming of objects and comprehension of words, sentences, contexts and syntactic structures in which semantics was involved. The patients' vocabulary enlarged quite considerably. There is also a significant improvement in phrase length. The patients not only learned to produce words and sentences but they also gained some ability to recombine their units, constituents and components. Therefore if particular units or parts of language (letters, words, phrases, utterances) are re-trained in a context, improvement can be generalized to other untrained parts of speech.

The following tables illustrate and substantiate in a detailed way the comparison between the results of the two phases of therapy and those of re-testing.

Table 72: The results of the selected tables of the first and second phase of therapy

Broca	<i>LingWare/ 1stphase</i>	T.	E.	E.S.		Broca	<i>NeuroLing/ 2ndPhase</i>	T.	E.	E.S.
<i>1exer.</i>	Table 1	41	21	39		<i>2exer.</i>	Table 74	28	13	32
<i>8exer.</i>	Table 20	49	29	31		<i>7exer.</i>	Table 91	29	9	51
<i>10exer.</i>	Table 28	37	17	43		<i>10exer.</i>	Table 98	46	26	34
<i>11exer.</i>	Table 29	35	15	45		<i>14exer.</i>	Table 110	44	24	36
<i>13exer.</i>	Table 37	44	24	36		<i>17exer.</i>	Table 121	51	31	29
Wernicke	<i>LingWare/ 1stphase</i>	T.	E.	E.S.		Wernicke	<i>NeuroLing/ 2ndPhase</i>	T.	E.	E.S.
<i>1exer.</i>	Table 4	38	18	42		<i>2exer.</i>	Table 76	38	23	22
<i>8exer.</i>	Table 23	51	31	29		<i>7exer.</i>	Table 93	37	17	43
<i>10exer.</i>	Table 31	40	20	40		<i>10exer.</i>	Table 100	61	41	19

11exer.	Table 32	31	11	51		14exer.	Table 112	38	18	42
13exer.	Table 40	43	23	37		17exer.	Table 123	47	27	33
Anomic	<i>LingWare/ 1stPhase</i>	T.	E.	E.S.		Anomic	<i>NeuroLing/ 2ndPhase</i>	T.	E.	E.S.
1exer.	Table 7	33	13	47		2exer.	Table 78	22	7	38
8exer.	Table 26	29	9	51		7exer.	Table 95	23	3	57
10exer.	Table 34	30	10	50		10exer.	Table 102	29	9	51
11exer.	Table 35	31	11	49		14exer.	Table 114	26	6	54
13exer.	Table 43	31	11	49		17exer.	Table 125	28	8	52

Table 73: The Results of Re-Testing through the selected tables of therapy

Broca	<i>LingWare Repetition Test</i>	E.	E.S		Broca	<i>LingWare Conf.Naming Test</i>	E.	E.S		Broca	<i>NeuroLing Comp.Test</i>	E.	E.S
1exer.	Table 127	4	56		1exer.	Table 132	7	53		2exer.	Table 157	4	41
8exer.	Table 128	9	51		8exer.	Table 133	10	50		7exer.	Table 158	3	57
10exer.	Table 129	8	52		10exer.	Table 134	11	49		10exer.	Table 159	7	53
11exer.	Table 130	6	54		11exer.	Table 135	8	52		14exer.	Table 160	7	53
13exer.	Table 131	5	55		13exer.	Table 136	13	47		17exer.	Table 161	12	48
Wernicke	<i>LingWare Repetition Test</i>	E.	E.S		Wernicke	<i>LingWare Confrontation Naming Test</i>	E.	E.S		Wernicke	<i>NeuroLing Comp.Test</i>	E.	E.S
1exer.	Table 137	5	55		1exer.	Table 142	11	49		2exer.	Table 162	7	37
8exer.	Table 138	6	54		8exer.	Table 143	11	49		7exer.	Table 163	5	55
10exer.	Table 139	6	54		10exer.	Table 144	13	47		10exer.	Table 164	14	46
11exer.	Table 140	5	55		11exer.	Table 145	10	50		14exer.	Table 165	7	53
13exer.	Table 141	4	56		13exer.	Table 146	16	44		17exer.	Table 166	13	47
Anomic	<i>LingWare Repetition Test</i>	E.	E.S		Anomic	<i>LingWare Confrontation Naming Test</i>	E.	E.S		Anomic	<i>NeuroLing Comp.Test</i>	E.	E.S
1exer.	Table 147	4	56		1exer.	Table 152	5	55		2exer.	Table 167	2	43
8exer.	Table 148	5	55		8exer.	Table 153	5	55		7exer.	Table 168	2	58
10exer.	Table 149	3	57		10exer.	Table 154	4	56		10exer.	Table 169	4	56
11exer.	Table 150	3	57		11exer.	Table 155	4	56		14exer.	Table 170	1	59
13exer.	Table 151	2	58		13exer.	Table 156	7	53		17exer.	Table 171	3	57

Re-testing proves that the programs, LingWare and NeuroLing have had a positive impact on the language of each patient. These programs, which were controlled and administered by the therapist, managed to foreground and improve, as it was unfolded by the period of re-testing, the linguistic disorders of the aphasic patients, even though the period devoted to the sessions of therapy was too short to eradicate all the disturbances. It is quite conspicuous and it can not be denied that the disorders still have their traces in the word formation and sentence construction of the three patients.

It must be account for that a therapy of any speech and language disorders requires patience, plenty of time and a diversity in the therapy planning of any exercises. The time that was devoted to the patients in the first and second phase of treatment was limited because of the limitations and constraints that were set by the nursing staff and the relatives who took care of

the three aphasic patients. The following account can be also of great importance to the process of diagnosis, therapy and re-testing.

As I met the patients again, several months had already elapsed. Mrs Heinrich returned to work in her husband's factory. She has now a high degree of language proficiency. Her recovery has been steady and consistent with no serious limitations.

Mr Fimm, once a competent sales manager, obtained a position in a large factory as a quality examiner of the products. This is an indication of a good effective functional recovery. However, it does not necessarily prove and indicate complete recovery. He could not return to the sales department of his previous job and talk to customers who called him from all over the world because he experienced a recovery of language that does not enable him to utilize his previous skills effectively. His aspiration was to be financially independent and establish new social contacts.

Mrs Müller's phone talks with her daughters, small dialogues with the neighbours, doctors and nursing staff tended to improve. In many communicative situations she became very intelligible. She still has some mild reduction of verbal expressions; however, her language modalities have improved in a way that answers to her needs and wishes; in her case she has no occupation that places high demand upon proficiency and accuracy. The improvement of her disorders has been slow and hard with serious limitations, but with tangible amelioration. It must be noted that her recovery and that of Mr Fimm are not complete. There is a tendency for occasional errors that persisted in their speech and language. A normal fluency may not be regained, but their achievements were considerable.

Occupation, family and social contacts give the aphasic patients confidence in their ability to function independently within their limitations. Sometimes because of the altered conditions of the patients, the case of Mrs Müller, the treatment should be designed to help the family as well as the patient. Social participation of aged patients, of course, within their limitations is the best safeguards against depression and a way to improvement. Consequently, the patients managed to re-establish contact and communication, and thus reduced the tendency of falling in depression and withdrawing from social, familiar and occupational activities.

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Concluding Part

8 - Achievements and Position of the CST among other Forms of Therapy

Computer programs that support aphasia therapy offer additional and intensive exercises, which can be supported by conventional methods in which a series of cards were used in treatment and re-training. Another characteristic of the MPCs is their equipment with sound cards that record the speech and couple it with the written language or an image. The whole constituents of the program are then presented on a screen. These new work-processes can not be fulfilled by a tape recorder or a conventional therapy.

8.1 - Expectations from the Use of a PC in Aphasia Therapy

The experiences and the observations, I made as far as the syndromes of aphasia are concerned, confirm that the computer supported speech therapy programs are used either in the clinics, aphasic centres or at home. The aphasics must learn to practise and continue their training independent of any clinical and therapeutic assistance. A multi-media PC (MPC) bridges thus the way between a systematized controlled therapy plan in the clinic and a spontaneous individual therapy at home. Franz J. Stachowiak (1990) emphasized the positive impact of a computer therapy training on the speech and language disturbances: *“An intensive aphasia therapy, which is carried out at least three times in a week, has a provable influence independent from the age of the affected. Additional computer supported training gives rise to additional language amelioration”* (Stachowiak, 1990).

Moreover the multi-media PC makes communication with the outside world simpler. For instance a patient, who is not in a position to express himself or herself linguistically, if a PC is made available, may immediately type just with one finger on a keyboard what he/she wishes to say. This leads us to raise the question how can a computer be used so as to deal with the disturbances that are caused by the different syndromes of aphasia?

The use of a computer as a therapeutic instrument must be considered in its relation to the social aspect of language which requires concrete variables and contextually bound tasks. This strategy facilitates the integration of any therapy plans in social and communicative contexts.

The argument for the use of the MPC in Speech and Language therapy is the possibility of combining different programs that can be targeted towards various modalities of language. The MPC made it possible for neuropsychologists, speech-language therapists and ergo-therapists to talk and agree with one another about the type of therapy each patient needs.

Specialists concerned with the phenomenon of aphasia are convinced that the idea of working together to challenge the disorders becomes necessary if the brain impairment affected attention, memory, face fields and articulatory organs. Thus, the use of specially developed PC programs to rehabilitate the patients suffering from the syndrome of aphasia makes a good sense only if it is coupled with other forms of therapy such as physio-, ergo-, music therapy and health care.

Exercises trained at a PC screen change the therapeutic interaction between the patient and the therapist. Particular strategic ways are worked out together with the patient to solve an exercise in the best manner. An instance in this context is a patient with whom I made a small memory test with Memogym I & II. In the first phase I used only word cards, but in the second one I trained with him the tasks of Memogym at a PC screen. To my surprise the patient could keep more words using the PC programs than using only word cards. Another instance that supports this fact is the re-testing method in which I used both the exercises of LingWare and NeuroLing. Re-testing proves that the number of disturbances decreased in the exercises that were trained at a PC in the first and second phase of therapy.

The use of a computer increases attention and behavioral reactions of the patient. The patients, who are too slow, find the use of a computer very effective because the speed of training can be defined by the feedback which is made available by the structures of the programs. This method is also superior to the conventional situational tasks because of the rich complexity of the multi-modular stimuli allowed by the multi-media PC.

Since their accident many patients think that they will never learn again a single word or that no one will attempt or be in a position to understand their language. They live in a fear of attempting to interact in their native language. But the involvement of the MPC - as an instrument that produces and displays language - made the patients gain confidence and have a conviction that despite the impairment of their language, they still have other capacities. They can deal with a computer program that supports the process of therapy.

The question whether conventional therapy is more effective than the MPC therapy remains until today without a concrete answer because computer programs involved in speech and language therapy have their supporters and opponents. But the point is not only to use MPC but also to have its usage being controlled by a therapist who variegates the form and the content of the tasks of each exercise to make them train what has been affected by the syndromes of aphasia. The first and second the phase of therapy show that the conduction of therapy should be coupled with a constant alteration of the tasks of the programs. Each patient

should be trained in a different manner due to the nature of the aphasic syndrome he/she suffers from.

Writing any programs to support speech and language therapy requires that those who compile them should work together with the therapist or be equipped with a basic knowledge about the acquisition of speech and language, the type of syndromes from which a patient may suffer and the components of linguistics. LingWare and NeuroLing should be cited in this context as they are two programs of so many that fulfil these requirements. The selected exercises of these programs, that trained certain modalities of language in which the assessment of the errors confirmed the existence of the disturbances, ameliorated, to some extent, many parts of speech and language. The general deduction depicted that the assessment of the patients' articulatory speech, word formation, meaningful formulation and word finding were clearly improved by this new technique of aphasia therapy.

Studies of Katz and Wertz (1992) confirm that after a series of therapeutic sessions with certain computer programs that support the therapy of speech-language disorders, the patients can read and understand the tasks, in which they have been trained, better than previously. To this confirmation we can add the attitude of Stachowiak in German speaking countries. He is famous since 1987 for the use of computer programs that support the therapy of language, whose primary aim is the amelioration of the disorders of the aphasics by training them to learn step by step the modalities of language.

An important idea about learning goes back to the postulation of Luria (1969) about the compensation strategies, which meant that amelioration is not only to be achieved by drills but also by learning good strategies of remembering the processing of the stimulus which can be either a sound, a text or an image.

It must not be taken for granted that this is only an idea of learning. If this happens to be the case, the matter will be then quite easy to solve. The patient can be sent to a German course for foreigners and thus the problems of syntax, semantics and phonetics will be solved. Unfortunately, this is not the right way to deal with the disturbances of the syndromes of aphasia because the patients' nervous system, mainly, where the regions of language lie, might have undergone changes that ought to have been caused by a disease, a heart attack or an accident. This requires a systematic guided therapy in which both conventional methods and computer programs that support this type therapy can be combined.

Consequently, drilling, learning of new strategies and training through programs of therapy can lead, in one way or another, to an amelioration of the disturbances. A reality that is thoroughly justified by the two phases of therapy that were elaborated in the previous sections

of aphasia therapy (see Experimental Part, Section: 6.6). Moreover healthy mental functions and intact modalities should be used to support the disturbed functions. The case of the Broca's aphasic whose articulatory and syntactic disturbances were often trained through certain text, sound cues and the image to which they refer. It is an acoustic-visual-textual training. The same cues or only two of them were given as a support to the Wernicke's aphasic during the administration of training so as to make meaningful words and sentences. However, the anomic aphasic was trained in many exercises only through images because her reading and comprehension abilities were not affected. She was asked to find content words and formulate sentences. In many exercises she responded to tasks of training relying only on pictorial assistance.

It is not satisfactorily convincing to make therapy control tests just before the beginning and after the end of a therapy period. An effective method of testing was introduced in the sixth section of aphasia therapy. It runs in the following way: the forms and the contents of the tables in the first and second phase of therapy are structured in a way to control the increase and decrease of the number of trials, occurrence of the errors and submission of the evaluating scales of the individual patients' performance and competence. It is a way that gives the therapist an insight into the effect of a therapy training and an idea about how to plan or restructure the procedures of therapy as well as the forms and the contents of the stimuli in the future sessions of therapy. This means that the diagnostic process takes place all along the procedures of therapy through a registration of trials and errors and a control of performance through the use of an evaluating scale.

The course of therapy reveals notwithstanding the progression or regression of speech and language, other still functioning neural abilities that must be taken into account during the administration of therapy. For instance, a reading disorder of the Wernicke's aphasic may entail from a reading comprehension of words and sentences. This requires from the therapist a change in the therapy plan, in which the reading comprehension must be trained to ameliorate the patient's reading disorders.

The following is an observation that must be taken into account. It is possible that patient, who has a lesion in the areas of Broca or Wernicke, if left alone without any therapy plan, will try different ways to find a solution to a task. In vain he/she can not succeed in all his/her attempts to get to the target answer. In this context the patient needs external assistance which is provided by the therapist, who sketches and controls an adequate therapy plan that suits to the syndrome of the patient. The patient may memorize faulty patterns without the therapist's assistance and control of therapy. The possibility of avoiding the occurrence of this mistake is

available. The therapist must describe to each patient the rules to be followed during training either at home or in a therapy session. Therefore it is not recommended to send any patient at home with the expectation and conviction that some computer programs, that support aphasia therapy, will ameliorate the disturbances of his/her speech and language without any prior instructions. The therapist submits these instructions about the form and the content of the exercises, the number of the tasks that should be dealt with in a particular period of time and the manner of administration.

LingWare and NeuroLing as it was delineated in the first and second phase of training are marked with the following aspects: a flexibility to fit with the development of therapy through an increase of the speech/language cues; a complexity of the variable patterns and a feedback of the programs that are accompanied with the registration of performance and reinforcement of communication. These were supported by the form, the content and the function of the exercises that are related to one another in their progress. The whole exercises have their particular characteristics. They are directed to the auditory and visual perception of the patient. He/she should simply follow the plan of therapy and instructions of administration, expecting to get to the solution of the exercises. The instructions help him/her perceive and memorize divers segments, constituents and structures that are faulty or missing from his/her language. The patients are assisted with cues (indications/ instructions) because of the difficulties that might be inherent in the exercises of training.

The programs of therapy are equipped with a system that links the movement from the exercise of a unit to another one. If a patient faces certain difficulties in trying to solve a task, the program of therapy recognizes the cause of the mistake and reacts with an acoustic speech feedback, the submission of a solution or a task that ought to be solved.

Words, sentences and images of the tasks that are used in this therapy are closely related to the needs and the events which the patient encounters in every day life. In this type of therapy certain goals must be set. On the one hand computer supported therapy must be flexible, related to situations of use; that is, adapted to the needs and impairments of the individual patients. On the other hand the examiner and the therapist, who make use of it, must be equipped with the theories or at least with the basics of learning and language acquisition.

Therefore, the use of computer programs that support aphasia therapy should be considered as a continual development of the traditional and conventional methods of aphasia therapy to which a therapist must allude if he/she is faced with a serious form of aphasia, such as global aphasia. In this context the MPC plays the role of a medium that assists in the presentation of

the materials of training, comprehension of new meanings, communication of other tasks and structuring of a therapy plan.

During the administration of therapy the aphasic patient not only learns to utter the signs and chain of symbols but also use them in situations that might occur in communicative contexts which he/she experiences in public or in the family. Therefore aphasia therapy becomes successful if it has a tight binding with the aphasics' social activities. It turns into a communicative and effective therapy the moment it starts to relate certain aspects that belong to the conventional and modern methods of therapy. Conventional therapy consists of two domains: firstly, the use of the materials that consists of objects, images and pieces of writing which are relevant to communication; secondly, the involvement of phonemes, syllables, morphemes, words, sentences and texts in the procedures of training; and other means of understanding such as gestures, drawings, sounds etc. in communication. Modern therapy methods are made of patterns of shared knowledge, communicative acting, meaningful sequences, thematic relations, concrete and abstract texts, goals of the interlocutor and strategies with which the participants can communicate successfully. The approaches of speech and language therapy, that are applied nowadays, combine both conventional and modern methods of therapy (Davis & Wilcox, 1985; Pulvermüller & Roth, 1991).

For more than one hundred years the aphasiologists have used in their clinics methods of therapy that are similar to games. These games of training consisted of naming, repetition, pointing to an image, writing a dictation, reading or completing utterances and sentences (See Aphasia Therapy, Sections: 6.2 & 6.3).

The game-like language was used only for diagnostic purposes (Lichtheim, 1885), but later on it was involved in therapy (Schuell, 1974). Pizzamiglio and Robertt (1967) recognized that this game-like speech/language can be transferred to a machine, for instance, a multi-media PC. To a certain extent this machine will perform some of the tasks that were carried out only by the therapist. For instance the patient sits in front of this machine and carries out the tasks of naming, repetition or completing of sentences, but in this context we can not do without the role of a therapist. The latter makes the machine work, explains how to use it, plans and controls the exercises that were presented by the programs that are installed in it.

This research of involving machines in speech and language therapy that started in the sixties in America is now taking place in German speaking countries. F. J. Stachowiak & Co (1990) were involved in the development of computer programs that support aphasia therapy. Geilfuß, Helgeson, Lobin, Schädler, Seggewies and Willeke (1990) contributed to this research and the development of certain therapy programs. The first programs were known as

STACH I & II (SprachTherapie für Aphasiker mit Computer Hilfe) which consist of a great number of programmed exercises; similar to those used by the therapist in the conventional therapy of aphasia. For instance naming exercises on a computer screen that are presented by these programs can be alike to those of game-like naming that were used conventionally; in this context of therapy the therapist's presentation of the tasks of therapy has also certain similarity to a computer programmed therapy. In computer programs that support aphasia therapy the computer gives instructions and the patient has to select with a click on an image a word or a sentence, what is required from him/her or fill in the blanks. The therapist controls the artificial interaction between a patient and a computer, the number of the exercises that should be used in a training session and the whole procedures of therapy administration (Roth & Pulvermüller, 1990; Roth & Schönle, 1992).

Many specialists using conventional methods find it irrelevant to therapy that a computer takes over certain exercises that were previously accomplished by a therapist. This fear has no scientific justification and founded clarification because a computer is only an instrument that helps in organizing and submitting the materials of training due to the technical possibilities it offers. Hereupon we can cite the case of an aphasic patient. If he/she re-trains certain exercises at home, especially those that were trained in a therapy set, he/she can slow or speed the process of his/her training according to his/her state of being. He/she is assisted in this process by the therapy programs that control the sequence of training.

If a patient runs a program, a number of exercises will run continually or gradually one after the other; mainly, from the simple tasks to the complex ones. The patient concentrates only on trying to solve the tasks, of course, if he/she is required to do so. If the patient does not know the nature of the tasks in particular and the program in general, the therapist gives him/her an overview about how to work with it. LingWare and NeuroLing can be taken as instances in these contexts.

Computer programs that support the therapy of aphasia can not do without a therapist, who has the role of an instructor, a leader and a mediator. The training between a computer and a patient will lose its therapeutic and communicative aspects if it is not assisted by a therapist. Undoubtedly, it will not benefit the patient because such a form of training has no target, orientation or effect.

The therapist makes a decision about the selection of the exercises of training that can be either a personal selected therapy program or a training that follows the way a computer program has been structured. The aim of this therapy is to facilitate the access to the systematized language of the programs and simplify the difficulties of training that occur in a

conventional therapy. This shift from conventional to computerized forms of therapy may make the aphasics develop new ways of communication in common social situations.

The computer provides structured information which must be perceived, processed and, perhaps, stored by the patient. The PMC therapy programs have no access to the patients' intelligence or understanding. It only provides tasks (images, texts and tones), statistic values, signs and chains of symbols that are submitted by the patients as solutions. It is not an ideal communicative partner, who understands and feels the psychological and the social aspects of language, hence the importance of the therapist in the sequential controlling of the exercises and in the constant interacting of a patient with a computer. But if we accept a computer in the domain of speech and language therapy, this will immediately lead us to raise the question, what is the main role of a computer if it is assigned a function in communication? It prepares and offers the materials that can be the object of communication. It is also an assistant medium that helps the aphasics find words and sentences; their sounds or images, which are always stored in the memory of a PC. It also contributes to the structuring of the stimulus-response constellation using visual and acoustic signals. The answer to a stimulus is often related to a previous stimulation. The patient knows through an acoustic feedback whether his/her response is correct or faulty.

Speech and language therapy at a computer screen makes training very easier as the programs provide the necessary materials the therapist needs so as to train a patient. The material of training stored in a computer makes it possible for a therapist and a patient to have access to it any time and use it in a quick way as its sound effect, form and content remain unaltered and stored. The patient who manages to deal with this type of therapy gains self-confidence and a conviction that he/she still has the abilities to get at least involved in an artificial communication. The use of a joystick, a mouse to click or a keyboard is for many patients, who have a right or a left hand handicap easier and effective than the use of a pen and paper so as to convert speech sounds into a written language.

In his/her job a therapist may involve in the process of therapy programs of training such as LingWare and NeuroLing that support aphasia therapy. In this context the therapist's experience and role have their own uniqueness. They can not be compared with the role of the MPC which is artificial, mechanical, structurally patterned and passive. The therapist, who is active, can intervene in every situation of training which is conducted at a computer screen. He/she can adapt the exercises of the programs to every therapy setting, alter and develop them to suit to the linguistic ability of each aphasic patient. These aspects are quite tangible in the first and second phase of therapy. The intensive use of the exercises of LingWare and

NeuroLing, which stimulate the speech and language ability of the aphasics not only contribute to the amelioration of language but also to the general performance of the patient, who can be trained either in a therapy centre or at home.

The recording of trials, errors and evaluating scale open the way to a new therapy plan that can intensify the stimuli in the exercises to be trained in the sections to come. The protocol of performance provides an important overview about the efficiency of therapy. It can be considered as a starting point to the way the programs can be controlled and administered in a future efficient therapy, of course, taking also into account how intensively the aphasics' speech and language is to be cared for.

8.2 - The Basic Concepts of the Programs

It must be emphasized that the involvement of any computer program in speech therapy should not be considered as a substitution but rather a completion to the *conventional therapy*. The aim is to support therapy and advance the *rehabilitation* process through additional speech stimulus in every day communicative contexts. Particularly, any program makes it possible for a therapist to intensify in a substantial way the speech therapy care of the aphasics, within a given time, mainly, in its contents, forms and purposes. This does not mean that the patients are to be pushed off to a computer and left alone. It is not the right method that assures the success of therapy. The best way recommended so as to proceed and achieve satisfactory results in this type of therapy consists of certain steps: the therapist must have gathered enough experience about the programs that support the therapy of aphasia; he/she should control the programs and guide the patients; he/she has to provide the patients with enough instructions about how to manipulate and operate the programs so as to work later on without the supervision of a therapist.

LingWare and NeuroLing are outlined in a way that the materials of training can be controlled and modified during the administration of therapy. The use of these programs intends to help the aphasic patients to overcome the disturbances caused by the different syndromes of aphasia. Basically, the patient is required to solve a task which is presented by a computer. In this situation the therapist has the role of a helper and a guide. The exercises consist of a spoken or written text that can be a word, a sentence or an image that must be recognized, understood and, on demand, answered by the patient. The purpose is not only to make the patient hear, read, write and understand so as to supply a correct answer but rather to make him/her through the speech and the visual stimuli develop a successful strategy so as to be communicative in every day life context (See Aphasia Therapy, Section: 6.2 & 6.3).

The aim of this type of therapy is to offer a support to the aphasic patients. For instance, they should be trained to learn through repetition, naming, understanding of words and sentences as well as pictorial situations. The learning process should not only be achieved by the exercises of the programs of training but also by other exercises, that can be *transferred* to paper sheets, whose form and content can be modified and otherwise structured. Speech therapy has to establish a general effect. This means that a therapy becomes successful as the communicative ability of the patients shows amelioration during his/her interaction with a direct surrounding that may consist of his/her family, friends and public contexts.

The *situative contexts* enrich and simplify communication because a communicative act does not take place in a sterile area. The contexts offer to the patients additional information that have a visual or an acoustic nature. These features of communication are also involved in the two programs, LingWare and NeuroLing. They are structured in a way that the images, the sounds and the texts help the patients get to the target in question. Visual and acoustic assistance offered by the programs reduce the patient's problems as he/she attempts to solve a task which is directed to the training of a particular modality.

Moreover, it can not be denied that aphasia not only disturbs the social surrounding of the patients but also that of their families. Families and also friends must find ways of how to deal with the physical handicaps and the psychological changes of the patients. The selected programs of therapy take into account these aspects in a way that learning to speak and to understand language is related to actions, situations and contexts that are very close to the patients' every day speech acts that stand for social acts (Gerold Ungeheuer & Roth, 1982 & 1998). This interaction with a computer during training, over which the patient has a certain control, paves the way to each patient towards the involvement in social communication.

Many therapists organize a training session in a way that every patient has to benefit from it. At the end of a therapy hour the new patients are recommended to sit together with those who are advanced in therapy so as to be introduced to the way a computer, programs of treatment and aphasia therapy function. The new patient learns at the beginning through observation and then takes part in training in which the therapist participates. For example, a therapist can give the following command to a small group of patients: one can move the mouse, the second can type a word or a sentence and the other may provide a solution to a task. It is a *communicative situation* in which the patients, who suffer from different syndromes of aphasia, participate with the linguistic ability they still possess. The meeting in such a small group is an occasion so as to observe the responses each patient supplies to one stimulus, for instance, how does each aphasic patient behave as he/she is confronted with the following stimuli? *Tisch*,

Drehstuhl, Anna lacht, Hans brät eine Wurst. One can infer from these aphasic meetings what computer programs that support aphasia therapy intend to achieve. This can be substantiated by a number of observations to other patients and a better understanding of the tasks the computer programs present to the linguistically impaired persons.

This type of therapy has been integrated in many clinics, but others still intend to introduce it in their programs of speech and language therapy. However, its introduction has been quickened by the following factor: to reduce the costs of a therapeutic hospitalization, a decision was met in certain clinics that after the expiry of the physical rehabilitation and the amelioration of the patients' health the latter must return home. The treatment through computer supported speech/language therapy programs will be continued at home by a *mobile therapist* who visits them many times in a week. Thus, the patient is placed in his previous, habitual and familiar communicative environment. The family must be informed about the procedures of this type of therapy as well as the functions and the role it has in the therapy processes that are supported by computer training programs. Certain clinics intend to widen the range of therapy by involving the use of *Tele-Therapy* with which they want to create a setting in which many patients, who sit at home, have to take part. However, this type of therapy is still in a planning stage due to the nature of aphasia, individuality of each patient and inability of the therapist to have a direct influence on the responses of each patient even though they suffer from the same syndrome of aphasia. Up to now *mobile therapy* has been successful in its use other than *tele-therapy* which has been approached with so much skepticism by the family members of the aphasics.

Romero (1998 & 1999), who introduced in the treatment of language an excellent method of therapy and dealt with the dementia of the Alzheimer type that causes aphasia, emphasized the importance of the *sources of the materials* that are used to train the aphasic patients. She ventured to divide this span of time and field in four periods: boyhood, youth, manhood, and contemporary time. The experiences, which the patients made in these phases, and the life of each of them are primordial in the structuring of the therapy tasks and the speeding of the rate of recovery. The focus has been, mainly, on the principle of making the patient remember the knowledge he/she has lost through the disease.

Certain patients, who have been used to the key board and mouse of a computer, may still possess the ability of controlling the relationship that binds the objects on the screen. A computer and its installed therapy programs can help them, in many tasks, to establish this relationship between the images and the objects. They assist them in learning vocabulary and

establishing new *pathways* to old knowledge if the access to it has been blocked by a stroke or an accident.

Each symbol in the programs has a relationship to the contexts, from which it gets its meaning, where the grammar of a language plays also an important role. Even though investigators of aphasia found that the aphasic's access to the symbols of a context is impaired by the syndromes of aphasia, therapy programs intend to create a *binding* between the *inherent linguistic ability* and the objects as they are seen in the real world, because each object has its own social context. This relationship to the context must be constructed during the progress of therapy. The therapist starts with the mediation of simple things such as *essen, trinken, Körperteile, einkaufen* etc. and moves to a therapeutic training of interacting situations that stimulate a natural communication. These contexts are inherent and presented by the exercises of the programs that support aphasia therapy.

Images, texts and sounds help the patients recall the contexts involved in each exercise. They awake a certain *curiosity* and *motivation* that are a basis to learning. One simple and clear picture offers the possibility of assigning a word to an image in the easiest manner as the intensity of ambiguity is reduced to its minimum. The images assist the therapist in placing the elements of a language in meaningful contexts. This linking, between the abstract and the concrete, creates the meaning. Individual elements of a text that are not related to an image or a context are memorized with so much difficulty. A list, which consists only of words without a context, is not easily remembered in comparison with a list of words that has been structured in *categories* and *illustrated* with images.

All in all, therapy methods should take into account the pathways of the brain during the construction, formulation and filing of any linguistic instruments of therapy, even though it is obvious that these ways are not well known and clearly localized. The reality of a concept or a symbol is built through *associations* that take place among the different areas of the brain. It is a rational system of construction in which there are rational and irrational systems of associations. These systems are conscious and unconscious parts that contribute to the *formation of associations* between the elements of a text and the *creation of new neural pathways* which activate and increase the process of learning. The old pathways that have been damaged by an accident, a stroke or a disease should be trained to become active and maybe create new neural ramifications in the nervous system. (See Theoretical Part, Sections: 2 & 3.2; Experimental Part, Sections: 6.1, 6.2 & 6.3).

In many cases the patients' linguistics ability will never be the same as it had been before, but a new linguistic system may raise in the neural network. This system will have a very limited

capability to communicate because new pathways can not be created in the brain - as it is the case in the early days of each person - so as to store the contents of language and its complex structures.

In this context an example should be cited. The word “Apfel” raises physical features such as yellow, red and green in one concept; that is, a word contains more than what it tells or presents. It needs a context so as to be retained, memorized and recalled; these are processes in which certain cortical and sub-cortical areas of the brain are involved during the storage of a concept that has a very complex network of meanings.

8.3 - The Role of Computers in Training Language Abilities

Due to the nature of the impairment of their brains, each aphasic patient, who was dealt with in the diagnostic and therapeutic sections, has lost the control over particular modalities that were acquired in the early years. The role of any program of training, where a computer can be involved, is to attempt to find out and activate what remained of this capacity. This loss is different from one patient to the other and it does not affect every modality. The aim then is to make the patient express himself in the non-affected and inherent modality. This has been a basic prerequisite that was taken into account as the different parts of the programs were set together. The latter are built in a way to exploit and relate the patients’ inherent linguistic competence with the blocked modality. Thus, the establishment of a setting of training that suits to the linguistic capacities of the patient, the needs aspired for and the wishes of those who support him/her constantly in his/her training (See Experimental Part, Section 6.4).

A frequent and a directed training of the linguistic abilities, in which the modalities alternate and the computer therapy programs participate, shows a better and a successful rehabilitation, in comparison with a conventional therapy. This is a basic reason and a contemporary threshold of research in aphasiology that has led to the use of computer programs in the rehabilitation of the aphasics (Roth & Katz, 1998).

The aspirations of the pioneers of a computerized therapy will not substitute the therapist but rather integrate the PC in the processes of therapy both in the clinics and at home. Undoubtedly, this therapy is different from the conventional one due to the involvement of the multi-modal possibilities of the MPC (multi-media PC) in which hearing, reading, writing and visualizing have become possible.

If the therapist does not control the therapy steps, there will raise the danger of developing a wrong behavioral pattern of learning that can be acquired by the bad strategies the patients use during the running of a computer program that supports aphasia treatment. Moreover a

therapist must pay attention that the exercises of training should not lose their essence through simplification and wrong administration. The experience, made with the programs of therapy, *LingWare* and *NeuroLing*, proves that even a slight amelioration of the disturbances needs particular periods of time, adequate materials, structured and targeted training sessions. A qualitative computer program - that supports aphasia therapy (controlled by the therapist) and social interaction (supported by the relatives), as it is involved in training - adapts to the needs and motivations of the patients, without a waste of time.

Computer programs that support aphasia therapy follow certain procedures, mainly stimulation (through tones, images and texts), drilling (of sounds/ words/ sentences and semantic/ syntactic structures) and transfer (transfer of the trained material to daily communicative situation). However, there are also important factors that contribute to the success, delay or failure of the MPC-role in training. These can be summed up in age, general state of health, embedding of training in a social network, discipline in therapy, starting training in an early phase, place and size of the lesion, intensity and duration of aphasia and also in concomitant neuro-psychological disturbances.

Until today there have been studies in the USA which prove that PC programs, involved in speech/language therapy, have become efficient and can contribute to the amelioration of communication (Weinrich, 1995). Many aphasic patients, who have reading and writing problems, have been observed during the use of computer programs that support speech/ language therapy. The conclusion drawn from these observations was the positive effect the programs have on the individual patients.

Therapy programs do not intend to burden the therapist with difficult and complex tasks but rather relieve him/her with simplified exercises so that more time can be devoted to therapy. Thus, therapy turns to be time-saving and effective. Consequently, this will lead to an amelioration in the intensity of the disturbances, but this needs a span of time, a regularity in training and a controlled therapy. Recovery, which was achieved by programs of therapy, is a fact that many studies have confirmed until now (Colby, 1981).

In aphasiology the essential things, next to the medical and the already mentioned prerequisites for a successful therapy, are the therapist and a team who plan, create and carry out the whole rehabilitation program. Each program, that supports aphasia therapy, has to be prepared individually and must be open to certain alterations so as to fit with the linguistic ability of each patient.

Aphasics can improve substantially when treated, especially after their limited spontaneous recovery, but there is no doubt that a method of aphasia therapy can be effective for few or

some patients and not for the others. The results of studies unfolding the improvement of a single patient can not be generalized to the whole population of aphasics as the aphasics do not form a homogeneous population. Up to now there are no definitively clear-cut answers to the questions about the rate of recovery after the acquisition of a form of aphasia and the role aphasia therapy should play in increasing recovery because any form of therapy for aphasia is not incontestable.

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Diagnostic, Therapy & Re-Testing Forms

The following tables are the forms that were used to test and re-test the aphasics' words and sentences through Repetition, Confrontation Naming and Comprehension Tests

Diagnostic guide sheet

Name : _____ Date : _____
 Aphasic Syndrome : _____ Time : from _____ to _____
 Type of Tests : _____ Period of Testing : _____

Type of Test: <i>Repetition Test of Words</i>	FW & CW					
Stimuli (Text & Tone)	Responses	C & V Errors	Evaluating Scale			
			0	1	2	3
<u>1Syl</u>						
<u>2syl</u>						
<u>3syl+</u>						
Sum of Responses, Errors & Evaluating Scale						

Type of Test: <i>Confrontation Naming</i> <i>Test of Words</i>	Responses			
Stimuli (Images & Text)	Evaluating Scale			
	3(ND)	2(SF)	1(SS)	0(D)
<u><i>1syl</i></u>				
<u><i>2syl</i></u>				
<u><i>3syl+</i></u>				
Sum of the Evaluating Scale				

Type of Test: <i>Auditive Comprehension</i> <i>Test of Words</i>	Responses			
Stimuli (Images, Text & Tone)	Evaluating Scale			
	3(ND)	2(SF)	1(SS)	0(D)
<i>1syl</i> <u>One similarity</u>				
<i>2syl</i> <u>Two similarities</u>				
<i>3Syl+</i> <u>Three similarities</u>				
Sum of the Evaluating Scale				

Type of Test: <i>Repetition Test of Sentences</i>	Responses	CW & FW Errors	Evaluating Scale			
Stimuli (Images, Text & Tone)			3	2	1	0
<u>Simple</u>						
<u>Compound</u>						
<u>Complex</u>						
Sum of Responses, Errors & Evaluating Scale						

Type of Test : <i>Confrontation Naming Test of Sentences</i>	Responses	Evaluating Scale			
Stimuli (Image & Text)		3	2	1	0
<u>Simple</u>					
<u>Compound</u>					
<u>Complex</u>					
Sum of Errors & Evaluating Scale					

Type of Test : <i>Auditive Comprehension Test of Sentences</i>	(S)	Responses & Evaluating Scale			
Stimuli (Images, Text & Tone)		3(ND)	2(SF)	1(SS)	0(D)
<u>One situational similarity</u>					
<u>Two situational similarities</u>					
<u>Three situational similarities</u>					
Sum of the Evaluating Scale					

Therapy guide sheet of LingWare & NeuroLing

Name : _____ **Date :** _____

Aphasic Syndrome : _____ **Time : from** _____ **to** _____

Type of Therapy: _____ **Week & Hour of Training :** _____

Exercise of LW / NL Stimuli (Images, Text & Tone)	Trials	Responses with Errors	Evaluating Scale			
			3	2	1	0
Sum of Trials, Errors & Evaluating Scale						

Re-Testing guide sheet of LingWare /NeuroLing

Name : _____	Date : _____
Aphasic Syndrome : _____	Time : from _____ to _____
Type of Re-Testing : _____	Period of Re-Testing: _____

Exercise 1 of LW / NL Stimuli (Images, Text & Tone)	Responses with Errors	Evaluating Scale			
		3	2	1	0
Sum of Errors & Evaluating Scale					

Image Appendix

(See the CD inserted in the written work or PDF in the Online published version of this PhD research under the publication site of www.uni-wuppertal.de)

