Verbal and Phonetic Paraphasias in the Case of Expressive Aphasia (Broca's Aphasia) Patients: Study of Five Cases

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Abstract: Aphasia also known as Broca's aphasia is a neurological disorder that causes a loss of communication skills. This study was undertaken to investigate the nature of verbal and phonetic transformations among patients suffering from Broca's aphasia. The nature of the verbal transformations produced by Broca's aphasia involves replacement, deletion, and distortion.

The hypotheses of the study were as follows: Replacement is among the most frequently-used verbal transformations among Broca's aphasia, and to determine whether Verbal manifestations are identical in all cases. The study used a descriptive approach based on the case study methodology. The study is crucial insofar as it highlights the manifestations of verbal paraphasias among patients with Broca's Aphasia, and determines the predominance of verbal paraphasias among patients with Broca's Aphasia. The sample consisted of five cases that were selected in an intentional manner. The demonstration of the study hypothesis indicates the validity of the assumptions on which it was based.

Keywords: verbal paraphasias, substitution, Broca's aphasia.

التحولات الشفوية الصوتية عند المصاب بحبسة بروكا

-دراسة خمسة حالات-

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الملخص: إن فقدان القدرة على الكلام المعروف باسم حبسة بروكا هو اضطراب عصبي يسبب فقدان مهارات الاتصال. وقد أجريت هذه الدراسة للتحقيق في طبيعة التحولات اللفظية والصوتية بين المرضى

الذين يعانون من حبسة بروكا وطبيعة التحولات اللفظية التي تنتجها حبسة بروكا تتمثل في الابدال، الحذف، والتشويه. وتمثلت فرضيات الدراسة فيما يلي: هل الابدال هو من بين التحولات اللفظية الأكثر استخداما عند حبسي بروكا؟ وهل كانت المظاهر اللفظية متطابقة في جميع الحالات؟

استخدمت الدراسة المنهج الوصفي القائم على منهج دراسة الحالة. الدراسة بقدر ما تسلط الضوء على مظاهر التحول اللفظي بين المرضى الذين يعانون من حبسة بروكا، ويحدد هيمنة الابدال بين المرضى الذين يعانون من حبسة بروكا. وتكونت العينة من خمس حالات تم اختيارها بطريقة قصدية. ويدل تحقق فرضية الدراسة على صحة التصورات النظرية التي قامت عليها

الكلمات المفتاحية: التحولات الشفوية – الابدال –حبسة بروكا.

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Introduction:

Language is an essential means of communication between individuals, and is a gradually-acquired trait based on the development of a range of capacities that serve as a pillar of oral and written language.

The areas responsible for language are primarily located in the left cerebral hemisphere. For this reason, any injury in this area will affect an individual's language skills. This is often evidenced in the neurological disorder called Aphasia, which is a set of disorders related to the inability to produce or understand the meaning of spoken or written words and the inability to express oneself through speech.

Aphasia comes in many types, including Motor Aphasia and Broca's Aphasia, which are both caused by the injury of third superior left frontal gyrus (F3). Broca's Aphasia includes a partial or total loss of language abilities, and is one of the most common types of Aphasia evidenced in the clinical medium. Broca's Aphasia patients suffer from language disorders, especially disorders of oral language, which result in various levels of oral communication. Aphasia patients also suffer from verbal paraphasia, in which the patient replaces, deletes, or distorts words. Verbal paraphasia often becomes evident during the presentation of pictures to the patient, and on this basis this research will study the quality and nature of paraphasia through designation.

The problem:

Language communication is a fundamental characteristic of the human being, as humans have the unique ability to innovate through unlimited sentences that express thoughts, feelings, and desires. When an individual is exposed to certain injuries, especially those at the level of the central nervous system and the areas responsible for the production of verbal language, the individual may find it difficult to achieve this fundamental communication.

Jackson has described Broca's Aphasia according to psychological and neurological principles, connecting the concept of language with Aphasia and discussing the overall involvement of the nervous system in humans. Jackson describes two types of Aphasiological disorders. The first type is located in the override axis, in which the selection of units is difficult. The difficulty in this type of Aphasia lies in the assessment of the word. The second type is located in the axis of symmetry, in which the ability to express and order linguistic units is lost. The most important symptoms of Aphasia are loss of comprehension, perseveration, overlapping, and grammatical errors. The levels of language in Broca's Aphasia patients are affected by the disease. This includes the phonological level, which includes an important disturbance called verbal paraphasias. Verbal paraphasias is the subject of our study, which has been confirmed by Butter-Worth (1979) and Kolm and Smith (1994) as one of the phonological errors produced by Broca's Aphasia.

Alajouanine, Ombredame, and Durant argue that verbal paraphasias appear at a significantly increased rate in Broca's Aphasia's patients. On this basis, we propose the following questions: What is the nature of verbal paraphasias among Broca's Aphasia patients? Is replacement considered among the most frequently-used verbal paraphasias among Broca's Aphasia's patients? And are Broca's Aphasia patients identical in all cases?

Hypotheses:

The nature of verbal paraphasias produced by Broca's Aphasia patients include replacement, deletion, and distortion. Replacement is one of the most widely-used verbal paraphasias among patients with Broca's Aphasia. Verbal paraphasias are not identical in all cases.

Concept identification:

Verbal paraphasias: Terminologically, verbal paraphasias involve confusions of words issued by patients at the phonological level, i.e., tracks that appear in the form of replacement, deletion, addition, and distortion (Eustache, 1993, p. 110). Procedurally, the ratio and quality of verbal paraphasias will be measured by showing a group of images to patients in the label item from the MTA test by Dr N. Zellal.

Broca's Aphasia: Broca's Aphasia is a linguistic disorder caused by injury to the third left superior frontal gyrus (F3), often resulting from cerebrovascular accident. This is characterized by a quantitative and qualitative reduction of the verbal language in the patient, and the course of speech is slow, characterized by stops and cuts. The patient also suffers from overlapping and structural grammatical errors and the inability to recall words. Words are offset by the signals, as we find sentences with the integrity of mental abilities and verbal and written understanding.

Labeling: Procedurally, labeling is the ability of the Broca's Aphasia patient to name the images presented in the MTA test (labeling item).

Results:

Four cases with Aphasia:

To compare the classification of Aphasia according to the results of cerebral examination by classifying the type of Aphasia according to the symptoms obtained from the MTA test based on the theoretical balance of each classification and varying approaches to Aphasia. After analysis and comparison, it was determined that the type of brain injury does not always evidence the same symptoms in patients with Aphasia, and that classification by type of brain injury is different from classification by symptoms.

To compare Agramatisme in Broca's Aphasia and conductive Aphasia in the Algerian neurological community, the results shows that the diagnostics symptoms of Agramatisme are similar to those of Broca's Aphasia and conductive Aphaisa, as both are characterized by hesitation in the selection of the correct answer, compensatory process, and deletions, both at the grammatical and morphological level. The study was based on grammatical, morphological, verbal, categorical, and interpretive analysis of the synergy and articulation movements through which this process of compensation emerges. The study demonstrates that patients with

Agramatisme used words such as nouns, verbs, and times, and distinguished nouns from verbs, but that usage showed an inability confirmed by speech disorders. The diagnostic characteristics identified by J. L. Nispolus, which are represented by deletion and compensation, have been confirmed in the patients with Agramatisme in this study.

Other case was studied to determine the extent to which an individual with Broca's Aphasia is able to construct an appropriate method to reach the correct solution to mathematical problems. The results showed that an individual with Broca's Aphasia can complete all the stages of the Problem Solving Moel (GPS), and can properly construct a perfect solution to a mathematical problem based on the data contained therein, despite he or she had successfully passed through the stages of the GPS.

Theoretical framework:

Aphasie is a Greek term that indicates a set of defects related to an individual's ability to project verbal or written expression, and the inability to understand the meaning of spoken words, names for certain objects, or grammatical considerations used in speech or writing (Lecours, 1979). Rondal et al defined it as the disorder or loss of oral language, written language, or both is caused by central nervous system injury (Barbizet, 1977). Alajouanine proposed that Aphasia is an imbalance in sensory and motor psychic mechanisms that interfere with the perception and transmission of the language found in a specific area of the dominant hemisphere (Pottier, 1995). Similarly, Pialoux proposed that Aphasia is a group of language-level disorders that affect both language comprehension and expression, resulting from a brain injury but independent of any damage to surrounding organs for execution and reception. According to the linguistic definition, Aphasia impedes speech and language in whole or in part as a result of damage to the left hemisphere of the cerebral cortex or the hemisphere of the cerebral hemisphere (Pialoux, 1975).

Causes of Broca's Aphasia:

The causes of Broca's Aphasia include both permanent and temporary causes, as well as development causes, which are as follows:

Permanent causes:

Cerebrovascular Accident:

This is one of the most common causes of Aphasia in adults, and affects the linguistic behavior of the affected individual. The vascular accident refers to a change in the case of cerebral blood vessels that feed the brain because of a barrier or node in the arteries that prevents the proper passage of blood, and that may lead to shrinkage or decay of neurons. This symptom may lead to death or language and comprehension disorders, and may also lead to paralysis and difficulty in movement, as well as Aphasia in all its various clinical forms depending on the extent of the injury (L'Hermitte, 1979). Among the cerebrovascular diseases, we find: brain embolism, blood thrombosis, and vascular hemorrhagic accidents are leading causes.

Brain embolism is caused by a sudden blockage of the feeding artery of the brain through a foreign body in the blood circulation. In most cases, embolism is caused by a partial thrombosis of blood within the heart, which passes through the circulation of the bloodstream, reaches the brain arteries, and produces a brain clot that hampers the blood flow and hardens the walls of the vessels (Lecours, 1979).

Blood thrombosis is defined as a blockage at the level of the feeding artery of the brain. This may lead to a nervous contraction due to hardening of the neck arteries. Hypertension and diabetes are important factors in the hardening or expansion of arterial walls. Blood thrombosis is more prevalent in men than in women, and is also associated with age. The main neurological and psychological symptoms associated with this disease are visual blindness (Agnosia) and Apraxia and language disorders, in addition to behavioral perseveration symptoms (L'Hermitte, 1979, p. 321).

Vascular haemorrhagic accidents is often caused by arterial rupture of blood vessels due to high blood pressure. Cerebral hemorrhage is variable in the clinical table of Aphasia according to the work of the lobes, and as it often exceeds the boundaries of the lobes, the location of the injury may be the temporal lobe, or more specifically the left temporal lobe for right-handed persons resulting from injury that causes Wernicke's Area Aphasia. However, if the site of the injury is in the frontal lobe, which is in the dominant right hemisphere (especially Thalamus injury), the injury is secondary and its site is cerebral hemorrhagic in other cortical sites, which may lead to language disorders (Pottier, 1995).

There are other causes of cerebral hemorrhage, such as congenital defects in the arteries of the brain, leukemia, or toxic substances. Brain hemorrhage can be fatal, and usually occurs during hours of awakening, perhaps because the individual experiences high blood pressure at these times (Al-Sanyat, 2007).

Brain trauma:

Brain trauma is often caused by traffic accidents and accidents of daily life, and is a common cause of the emergence of Aphasia. However, it is difficult to determine the nature and degree of brain injury, and it is therefore difficult to predict the complications that can occur. Brain trauma may be accompanied by fracture of the skull, and usually accompanied by cerebral contusion. This type of brain injury may lead to the emergence of Aphasia in its different clinical forms, depending on the degree of cerebral contusion (Lecours, 1979).

Brain tumors:

A tumor is an uncontrolled mass of cells. This growth is physiologically useless, and brain tumors grow not from neurons, but from glial cells and supporting cells. Tumors destroy or damage brain tissues in two ways: initially, the compression of the tumor on the brain causes dysfunction or damage in some tissues. This occurs because the size of the inner skull is determined. Therefore, any increase in size due to the tumor causes pressure to the brain. This pressure may also cause a blockage in the cerebrospinal fluid cycle of the brain, causing hydrocephalus. Second, the tumor spreads or infiltrates through the brain, and this may destroy some cells or replace brain cells, and thus alter brain function. In the case of Aphasia, this proliferates the non-random spread of brain cells whose growth leads to pressure, and may case Aphasia if the tumor is in the linguistic areas (Al-Shuqayrat, 2005).

Temporary causes:

Local Transient Anemia:

This produces language disorders and begins to decline in a few minutes or hours.

Partial Epileptic Seizure:

Seizure is a sudden increase in neuron activity, and repeated seizures may occur. The discovery of EGG (electroencephalogram) helped to better identify the causes of seizures. The causes of some seizures are known and identified as accidental seizures in which the cause of

the brain injury is inflammation, cerebral contusions, chemical toxins, fever, or other diseases in the nervous system. In other seizures, the causes are unknown or ambiguous. Individuals who experience seizures are not homogeneous, as there are differences in symptoms and causes. Seizures are clinically distinguished in that the symptoms do not persist. The break between seizures may be minutes, hours, weeks, or even years.

There are three symptoms common to most seizures: an alert feeling precedes the seizure and announces its initiation, the patient experiences loss of consciousness usually loss of memory, and the patient experiences movement, whether trembling or involuntary. However, it is necessary to distinguish between partial seizures and general seizures, as well as simple and complex seizures. Nevertheless, what concerns this study is the partial epileptic seizure, in which abnormal electrical activity occurs in a specific part of the brain, possibly because of contusion in the brain caused by an old injury.

The duration of the Aphasia lasts for minutes, and this disorder may occur alone or accompanied by a variety of clinical symptoms. This depends on the type of epilepsy, as some seizures involve a simple cessation of language, stammering, or repetition of a syllable, a word, or a short sentence, while others involve the production of verbal paraphasias. In the case of a partial temporal left epileptic seizure, the injury is prolonged and variable, and may last from hours to weeks.

Headache:

Migraines are a disorder associated with the vascular structure of the brain. This disorder affects about 5% of the population. It involves pain at the head level, and is usually preceded by visual impairment in a specific area of the visual field. The migraine begins with severe pain on one side of the head that spreads, and sometimes can spread to the other side of the head. In severe migraine attacks, nausea and vomiting can occur, and can last for hours or even days. Migraines can range from once a week to perhaps once in a lifetime. Migraines usually appear in childhood or adolescence, and appear as a temporary disorder. The symptoms of Aphasia associated with migraines are disturbances in expression and understanding that affect both oral and written language. These symptoms persist for 25 to 30 minutes, and then begin to disappear with the decline of the migraines (Kroch, 2001).

Development causes:

Degenerative diseases:

These disorders lead to the progressive death of nerve cells, resulting in progressive damage to mental functions (attention, memory, judgment, etc.). There are several types of degeneration among adults, who may experience symptoms that fall within the clinical schedule of Type 2 Wernicke's Area Aphasia. These symptoms are accompanied by language disorders and other neurological psychological symptoms such as amnesia, as well as the perseveration that appears in the behaviors of the injured (L'Hermitte, 1979).

Alzheimer's disease:

Alzheimer's disease is caused by the loss of neurons that produce acetylcholine in the basal nucleus, and studies indicate that this disease affects about 5% of the population over 65 years of age. Alzheimer's disease is characterized by deficits in memory, language, and cognition, as well as depression. As the disease progresses, the patient becomes disoriented, then incapacitated, and then dies. The first symptoms are the lack of speech and verbal fluidity. Other symptoms similar to those of Aphasia appear above the sensory cortex.

Parkinson disease:

Parkinson disease is caused by a lack of secretion of dopamine, and symptoms include the lack of verbal liquidity accompanied by speech disorders (Al-Shuqayrat, 2005).

Furthermore, evolutionary diseases can lead to disturbances in cognitive functions such as attention, memory, and language, as well as the inability to recognize words, and disturbances both in oral and written language (Pottier, 1995).

Infectious Diseases:

These diseases may cause Aphasia. An abscess in the temporal lobe of bacterial origin may lead to a concentrated brain injury, or a rot, which can be activated according to the length of its development and is usually accompanied by neurodevelopment and high blood pressure inside the skull. Surgical treatment removes the causative agent, as do antibiotics. However, Aphasia may appear in all its manifestations.

Metabolic and Toxic Diseases:

These diseases do not necessarily lead to Aphasia, but if the spread of the incidence of brain diseases causes local brain injury, this may lead to the emergence of aphasia if it occurs in the left cerebral hemisphere (Lecours, 1979).

Symptoms of Broca's Aphasia:

The symptoms observed in Aphasia are rich and varied, and therefore must be identified accurately both at the quantitative and qualitative levels. Here, we find the symptoms related to the reduction of the capacity for verbal and written expression as well as oral and written understanding. These symptoms are known as special symptoms in oral language.

The reduction of language:

This is evidenced in the total lack of expression language, both quantitative and qualitative, and this reduction can appear in the case of recovery. After several days or weeks, it appears in the form of stereotype (Pialoux, 1975).

Stereotype:

The stereotype is a single word or short sentence echoed by patients with Aphasia in any speech situation. This practice can disappear in a few weeks or months, or may last for several years, such as the famous case of Broca's Aphasia who has repeated the word "tant" for 21 years. There are two types of stereotypes: stereotypes with keywords and stereotypes with non-functional words. There are those who have demonstrated that the word that the patient retained is the word that he/she uttered during the shock that caused the Aphasia (Pialoux, 1975).

Muteness:

Muteness often appears at the beginning of infection. Where we observe the complete absence of language, the case may use signals to communicate and may retain understanding. Usually the muteness is temporary, and this symptom begins to improve when the period of re-education has expanded (Pialoux, 1975).

Lack of words:

This is one of the most common symptoms in patients with Aphasia in both oral and written language. It is difficult to recall words in a voluntary manner, as words usually appear in

spontaneous language and are accompanied by various actions such as hesitation and confusion. The lack of words can be detected by the application of labeling tests, definitions, and description of images (Pialoux, 1975), and can be assisted by verbal facilitation of the first syllables (Bibiriarie moloine, n.d., p. 10).

Preservation:

Perseveration is the repetition of a word or part of a word, and is used by the patient as an expressive method to compensate for other words. Perseveration appears through the voluntary repetition of a linguistic unit. Perseveration can develop into a stereotype if not treated (Pialoux, 1975). Perseveration may appear at all levels of language (letters, word, sentence), and repeats letters, words or phrases that have already been pronounced (Barbizet, 1977).

Dysprosodie:

Monrad Krohn described dysprosodie as "distortion of the voice," which is a disturbance in the tone of the language due to the activity of the brain. The tone of the patient is strange, and one may note the increase in the severity of words and sentences, as well as slow speech and cross syllables. It is difficult to observe the properties of phoneme disturbances in rhythm, but Monrad Krohn believes that this symptom is related to anarthria disorder (Biliriarie moloine, n.d., p. 9).

Paraphasias:

These are errors at the level of the audio syllables that constitute the word that the patient desired to speak, and can be exposed to omission, addition, or substitution. For example: testinatiare to destinataire (substitution), and piapier to papier (addition).

Verbal paraphasias:

These constitute the replacement of one word with another. Among the verbal paraphasias, one may find semantic paraphasias in which the intended word is replaced by another with similar significance, e.g., a fork instead of a spoon, as well as morphological paraphasias in which the intended word is replaced by similar words, e.g., a rat instead of a mat (فار تصبح نار). These paraphasias appear clearly in the labeling test, as can be shown in spontaneous language. Paraphasias may create the neologism of new words (Pialoux, 1975).

Neologism:

In neologism, each syllable is pronounced as though it were a recognizable word, although the word does not appear in the verbal language recognized by the lingual lexicon (Rondal, 1989).

Automatic volitional disintegration:

Jackson has noted the loss of voluntary speech and the survival of involuntary speech, such as words repeated by the patient during an emotional outburst or narration, or his attempt to read a Quranic verse (Pialoux, 1975).

Anarthria:

This is a disorder that affects pronunciation without affecting verbal understanding or reading. It appears in several forms, such as substitution, implication, and deletion, and can reach the degree of verbal disintegration. Phonemes obtained by the case are present in the linguistic system, but are not the phonemes intended by the patient (Duizabo, 1977).

Symptoms of written language:

Grammatical mistakes:

The language is poor, characterized by contrast and reduction in formal and structural composition. Written language may appear simple, and there are errors in conjugated verbs and the use of conjunctions. Telegraphic style and grammatical deficits generally appear in Broca's Aphasia. Additionally, there is regression of development.

Dyslexia:

The examinee is often unaware of the grammatical disorder, and dyslexia is only notable in the course of extensive speech (Pialoux, 1975).

Agraphia:

Agraphia denotes a lack of writing due to the injury of the writing center in the brain. Agraphia is a form of apraxia, or motor blindness (Brin, 1997). Patients with Aphasic Agraphia evidence writing jargons and dyslexia (Pialoux, 1977). Apraxic Agraphia is a disturbance in the handwriting motion that can reduce writing to illegible scribbling (Biliriarie, n.d., p. 13).

Alexia (Loss of Reading)

Alexia has two components: Aphasic Alexia and Paralexia. Aphasic Alexia is the total loss of reading letters, syllables, and words; and in case of Paralexia certain letters may be read, and writing is similarly reduced. The understanding of some text remains, while reading some letters is not possible, and spelling is difficult (Pialoux, 1975).

Mathematical disorders:

In these disorders, the patient finds it difficult to calculate and to organize his daily activities and to conduct such activities as organizing his time, and also finds it difficult to read and write numbers (Roger, 1996). Patients with Aphasia have a precise calculation mechanism, but the correspondent knowledge is completely missing (Anny, 2004).

Understanding;

A patient with Broca's Aphasia retains normal levels of verbal and written understanding (Roger, 1996).

Language and Verbal Paraphasias:

Verbal Paraphasias:

This a developmental symptom of Aphasia in which the patient with Aphasia pronounces one voice instead of another.

Verbal Phonetic Paraphasias:

These involve the production of some inappropriate qualities among phonemes. These paraphasias are the result of a deficit in the mobility of the pronunciation organs. This may involve deformities found in the deletion of the phonemes, and the change of one phoneme with another. These paraphasias are often associated with other disorders, such as facial lingual Apraxia among Broca's Aphasia patients (Rondal, 1999).

This disorder is also associated with disorders of the oral phonetic system muscle, partial paralysis, motor disorders, and dyspraxia. This verbal version is also present in rhinolalia.

Verbal morphological paraphasias:

These involve changes or replacements of one word with another word that is similar to the first in form, and which leads to neologism (Brin, 1997).

Substitution

Substitution is the most common disorder occurring at the level of pronouncement performance. These substitutions take different forms, most of which occur between words that share distinguishing features and pronunciation positions in which the substituted phoneme is often relevant to the target phoneme. Gayard and his colleagues argued that the replacement of one phoneme with another is more common than other errors, and this substitution usually occurs among phonemes that are similar in their vocal features. Further substitutions take four forms:

Substitutions according to vocal articulations and qualities, anticipation substitutions, preservation substitutions, and maintain rhythms substitutions.

Substitutions according to articulations, which in turn split into two parts: substitutions share all qualities with the target phoneme, but differ from the articulations.

[- ثلج: ħaldʒ] The sound thaa'<, which is represented in English with the symbol th, is substituted by haa'<, which is represented in English with the symbol ħ. They are both voiceless pharyngeal fricatives.The th sound is dental, whereas the /h/ sound is glottal.

[-حمامة hama:ma] The sound haa'< is a voiceless pharyngeal fricative, and is represented in English with the symbol ħ.

ħama:ma: The initial sound /ħ, حا/ is (mis)pronounced /h, ها/.

Both sounds are voiceless fricatives. The /ħ/ sound is pharyngeal, whereas the /h/ sound is glottal.

Substitutions that share the target phoneme in one or more characteristics, and differ in articulation, such as the following:

[-ع إصبع i θbaع] The sound saad, which is represented in English with the symbol [sˁ], is substituted by thaa'<, which is represented in English with the symbol th.

They are voiceless. The [sˁ] sound is an emphatic voiceless alveolar fricative from the teeth and gums, whereas the th sound is dental.

[-أسود 3aswad] The hamza is substituted by ayn, which is represented in English with the symbol [ʕ]. They are voiced fricatives. The Hamza is a glottal plosive voice, and ayn is pharyngeal.

Substitutions according to the qualities where the target substituted phoneme is similar to the target phoneme but differs in character, which in turn is divided into two parts:

Substitutions with the same articulation that differ in one character, for example:

[-بطة batta] The sound taa'<, which is represented in English with the symbol [ˈt], is substituted by taa'<, which is represented in English with the symbol [t]. They are voiceless dental plosives. [ˈt] is emphatic, while [t] is alveolar.

[-سكر zokkar] This sound, which is represented in English with the symbol [s], is substituted by zayn, which is represented in English with the symbol [z]. They have the same articulation, which is teeth and gums and alveolar fricatives, but seen is voiceless while zayn is voiced.

Substitutions with the same articulation that differ in two characters, including:

[-بيض be:t] the sound daad, which is represented in English with the symbol [ˈd], is substituted by taa'<, which is represented in English with the symbol [t]. They have the same articulation, which is teeth and gums. They are plosives. Daad is an emphatic voiced alveolar plosive, while taa'< is a voiceless dental plosive.

[-بنزين ma:nzin] The sound baa'<, which is represented in English with the symbol [b], is substituted by meem, which is represented in English with the symbol [m]. They have the same articulation. They are plosives, but meem is bilabial nasal, while baa'<is a voiced bilabial plosive.

Anticipation substitutions is second type of substitutions, here the voice changes because of the patient's anticipation of the pronunciation that follows, which may lead to a proactive resemblance to any reaction. This case has many examples among patients with Aphasia:

[-كتاب titab], Kaaf, which is represented in English with the symbol [k], is substituted by taa'<, which is represented in English with the symbol [t], because of anticipation, in which the pronouns are configured to pronounce the sound taa'<.

[-دراجة dʒarra:dʒa] Daal, which is represented in English with the symbol [d], is substituted by jeem, which is represented in English with the symbol [dʒ], because of anticipation, in which the pronouns are configured to pronounce the sound jeem.

Perseveration substitutions is a third type of substitutions, these are type of tongue perseveration in which patients substitute a linguistic element, such as a word or part of a word,

instead of another linguistic element, followed by the previous element. Some examples are as follows:

[-صاروخ: saso:x]

Raa'<, which is represented in English with the symbol [r], is substituted by saad, which is represented in English with the symbol [sˁ], because of perseveration to pronounce the first sound.

[-مريض: mari:r] The sound daad, which is represented in English with the symbol [dˁ], is substituted by raa'<, which is represented in English with the symbol [r], because of perseveration to pronounce the second sound.

In maintain rhythms substitutions, which is a fourth type of substitutions, there are many phonetic substitutions that occur to two or more phonemes at the acoustic aphasic level, including substitutions in which rhythms are preserved although the new words differ in meaning. These words may not carry any meaning except in the mind of its speaker. Some examples are as follows:

[-فلفل θurθur] Substitutions alter all sounds of the word while maintaining the rhythms of the target words. Faa'< is substituted by thaa'<, and laam is substituted by raa'<.

[-ليمون manšu:r] Laam, which is represented in English with the symbol [l], is substituted by meem, which is represented in English with the symbol [m]. Meem is substituted by sheen, which is represented in English with the symbol [ʃ], and noon, which is represented in English with the symbol [n], is substituted by raa'< (Trost, 1968, p. 63).

Overlapping:

Overlapping changes, the position of the linguistic unit in the sequence of the sound, section, or word.

[-رقبة rabaqa] Overlapping baa'</ [b] with qaaf/ [q] and qaaf/ [q] with baa'<.

[-تليفون latàfo:n] Overlapping laam, which is represented in English with the symbol [l], with taa'<, which is represented in English with the symbol [tˁ], and vice versa.

Distortion:

Distortion is a defect exposed to linguistic aphasic sound, and is defined as the pronunciation of the sound in an incorrect manner in which the sound loses one of its

characteristics or more. The substituted word may be close to the target word, but the pronunciation of the word is abnormal. Distortion is not distinctive for the audio features of the system of audio language, and it is difficult to distinguish or match it with the target sound. Distortion differs from substitution despite that both involve the replacement of the desired sound in its pronunciation.

[-نخلة nahxsia] Pronunciation of the sound noon, which is represented in English with the symbol [n], with great psychic energy. The sound haa'< seems to be clear, and the sound seen was then added, and was pronounced with khaa'< so that the two sounds seemed to be one sound.

[-بطل barrr] Repeated raa'<, which is represented in English with the symbol [r]. The word was pronounced instead of taa'< l (Blumstein, 1964, p.138).

Study approach:

We used a descriptive approach based on a case study, and analyzed the results of each case on the basis of field observations.

Study Group:

The study group consists of five cases that were deliberately selected by the researchers. The groups were characterized by the following specifications and conditions that all cases suffer from Broca's Aphasia; subjects are adults without age determination; no cases suffer from visual problems; and no importance was given to the cultural, educational, economic and social level of patients.

Table 1. Details of sample specification

Case	Gender	Age	Date of Injury	Cause of Injury	Start Date of Orthophonic Examination
First case	Female	60 years	July 2016	Cerebrovascular accident	September 2017
Second case	Male	28 years	September 2015	Car accident	January 2016

Third case	Male	73 years	November 2016	Cerebrovascular accident for the fifth time	January 2017
Fourth case	Male	64 years	October 2016	Car accident	January 2017
Fifth case	Female	65 years	December 2016	Cerebrovascular accident	March 2017

Study tools:

In the context of our search, the researchers used battery item (MTA 2000), and our concern was limited to the items of labeling images.

The MTA Test is the Arabic version of the original Montreal-Toulouse Test (1986), prepared in French by a Canadian-French multidisciplinary team consisting of specialists in neurology, psychology, linguistics, and pediatrics, and is a linguistic test for patients with Aphasia. The MTA 2000 Test was adapted and modified by the researcher (N. Zellal) and her research team on a sample of 460 persons of both genders aged between 20 and 70 years in different linguistic settings (33 Linguistic Appearance). Patients were monolingual, bilingual, or multilingual, and spoke slang Arabic or classical Arabic.

After applying all the test items in five or six cases, results were obtained and exceeded 85% success. Hence, the effect of MTA 2000 Test on Arab linguistic, social, and cultural reality was proven to be honest and reliable.

The test consists of 22 parts divided into three sets of tests: oral and written language, practical application, and the gnosis. The components of the test MTA 2000 are as under:

- Directed corresponding and labeling;
- Repeating and reading aloud;
- Transportation and spelling;
- Oral understanding of words and sentences;
- Written understanding of words and sentences;
- Oral narration (on the image);
- Written narration (on the image);

- Written questionnaire;
- Specification of body parts (oral and written);
- Reading aloud and understanding the text;
- Social psychological questionnaire;
- Automatic speech; and
- Lexical paradigmatic availability.

Further, each subject was provided a picture of the situation, and asked to name it. Instructions were given such as "tell me what you see in the picture" in a local language.

Case results:

After the application of the MTA test and the completion of the labeling item by the five cases, we observed that the rates of verbal paraphasias varied from one case to another. Substitution was estimated in the first case at 32%; the second, 12%; the third, 24%; the fourth, 8%; and the fifth, 20%. Deletion was estimated in the first and third cases at 8%; the second case, 12%; the fourth case, 4%; and the fifth case 0%. Addition was estimated at 4% in the first case, and 0% in the rest of the cases, while distortion was estimated in the first case at 16%; the second and fifth cases, 4%; and the third and fourth cases, 0%. In terms of overlapping cases, the rate of the first case was 0%; the second case, 12%; and 0% in the other cases.

Table 2. Percentage of verbal paraphasias ratio of the study sample

Cases	Substitution ratio	Deletion ratio	Addition ratio	Distortion ratio	Overlapping ratio
Case(1)	32%	8%	4%	16%	0%
Case(2)	12%	12%	0%	4%	12%
Case(3)	24%	8%	0%	0%	4%
Case(4)	8%	4%	0%	0%	4%
Case(5)	20%	0%	0%	4%	4%

Discussion

The first hypothesis:

The first hypothesis of our research was that the nature of verbal paraphasias in adult patients with Broca's Aphasia includes substitution, deletion, distortion, overlapping, and

addition. Through our application of the MTA test, and specifically the labeling item, we found that most cases produced various verbal paraphasias of substitution, deletion, addition, and overlapping of the phonemes. The rate of substitution was estimated at 32% in the first case. The second case was 12%. The third case was 24%. The fourth case was 8%. The fifth case was 20%. The rate of deletion was 8% for the first and third cases, 12% for the second case, 4% for the fourth case, and the fifth case did not evidence deletion. As for addition, the first case was 4%, and was 0% for the rest of the cases. The rate of distortion at the first case was 16%, and 4% for the second and fifth cases. The second and fourth cases didn't evidence distortion. As for overlapping, the rate was 0% for the first case, 12% for the second case, and 4% for the rest of the cases. Through the results presented above, we can confidently state that these results confirm what Butter-Worth (1979) and Kolm and Smith (1994) argued. However, these phenomena are among the phonological errors produced by patients with Broca's Aphasia, and on this basis, our hypothesis has been demonstrated.

The second hypothesis:

The second hypothesis was that substitution is one of the most common verbal paraphasias used by patients with Broca's Aphasia. By applying the image labeling item to the five cases, we noted that most cases have a higher rate of substitution than other features (deletion, addition, distortion, and overlapping). The level of substitution in the first case was estimated at 32%; the second, 12%; the third, 24%; the fourth, 8%; and the fifth, 20%. On this basis, such researchers as Blumstein (1973) confirmed that substitution features occurred more frequently than other features, especially overlapping, and therefore the second hypothesis of our research has been demonstrated.

The third hypothesis:

The third hypothesis was that verbal paraphasias are not identical in all cases. In our application of the image labeling item, we noted that the rates of verbal paraphasias in the five cases differed somewhat from one case to another. However, in some cases, such as the third and fourth cases, results were similar, and we see this convergence in the following aspects: addition, distortion, and overlapping. As we have seen in most cases during the application of the test, patients experience difficulty arranging the linguistic units in the word. This is what

Jacobson argued when he explained that there are two distinct types of physiological disorders. The first type is located in the omission axis. The patient finds difficulty in selecting units while speaking. The second type is located in the axis of symmetry, which causes the loss of the ability to express and order linguistic units. This creates psychological and social suffering, as the patient is unable to communicate with those around him, which has been clearly confirmed by Wadh Fulla in the study of the patient with Broca's Aphasia in the Algerian social community. We can confidently state that verbal paraphasias are not identical in all cases as a result of the above factors, and therefore, our hypothesis has been demonstrated.

The study of language in patients with Broca's Aphasia has been considered by several researchers. Each researcher has considered one specific aspect of the language. This study is unique in its assessment of the verbal paraphasias produced by patients with Broca's Aphasia. Similar issues have been addressed by other researchers, such as Alajouanine, Jacobson, Naseer Zalal, Blanche Ducarne, and Xavier Seron. This research is complementary to these studies, and we have conducted a qualitative study of the verbal paraphasias of substitution, deletion, distortion, addition, and overlapping, which are considered the phonological errors produced by the adult with Broca's Aphasia and have been addressed by Omberdame, Durant, and Alajouanine. This study of Broca's Aphasia supported the results of the studies of the previous researchers. By applying the MTA test, specifically a label item on five cases suffering from Broca's Aphasia, we concluded that those with Broca's Aphasia experience various verbal paraphasias in which the replacement ratios were higher for substitution than for other features.

Conclusion:

We have had the opportunity, through dealing with the subject of Broca's Aphasia, to consider much data that has previously been published regarding this disorder. We have observed patients in hospitals for rehabilitation and motor conditioning in several provinces of the Kingdom in which the proportion of the patients with Aphasia is increasing, especially patients with Broca's Aphasia. This is the reason for which many researchers are interested in Aphasia. The evaluation of the verbal paraphasias of adults with Broca's Aphasia through the labeling of images is the focus of our research, especially cases suffering from Broca's Aphasia

that make a variety of verbal errors including substitution, deletion, distortion, addition, and overlapping of voices.

Our study concluded that the manifestations of substitution were most prevalent in the five cases, and that all aspects were somewhat different among cases. Therefore, from this study we concluded that Broca's Aphasia leads to linguistic disorders, which affect several aspects of the patients' lives, especially the linguistic aspect. Hence, we suggest the following further studies: the study of verbal paraphasias in all types of motor Aphasia, the effect of verbal paraphasias on verbal fluency in patients with Broca's Aphasia, and the establishment of a therapeutic protocol that deals with verbal paraphasias in these categories.

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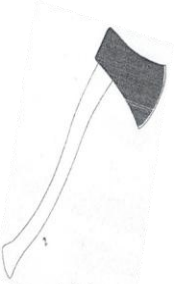
Supplementary

Appendix I: Lamp

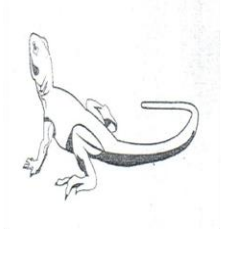
Appendix I: Lamp

Appendix II: Ladder

Annex III: Umbrella



Annex IV: Axe

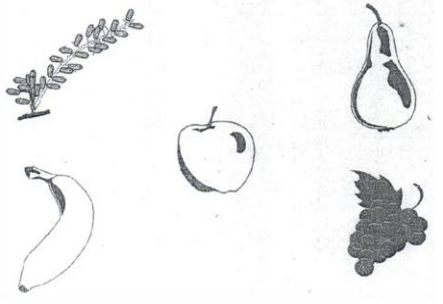


Annex V: Lizard

Annex VI: Thermometer

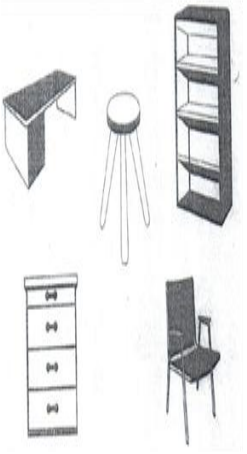
Annex VI: Cradle

Annex VII: Coat



Annex IX: Fruits: Date, Banana, Apple, Grapes, Pear

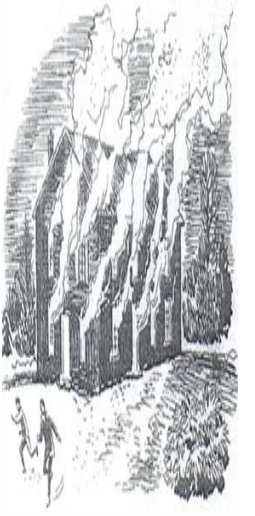
Annex X: Furniture



Annex VI: Tools

Annex VI: Village

Annex VI: Mountain



Annex VI: Fire