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Umm Al-Qura University

College of Social Science

English Department

A Case Study of Anomia: Relations between Language Acquisition and Language Dissolution

By

Nawal Ali Alzahrani

Supervisor

Dr. Anas Abu-Mansour

Assistant professor of Linguistics

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خلاصة البحث

توضح هذه الدراسة كيف أن بعض إصابات الدماغ تؤثر سلبيا على اللغة والتي تتواجد غالبا في الجزء الأيسر من الدماغ. ركزت هذه الدراسة على حاله مصابه بفقدان التسمية حيث أن المريض يلجأ إلى الوصف لدلالة على الأشياء. يدرس البحث ماهية فقدان التسمية وأنواعها وأسبابها والعلاقة بين اكتساب اللغة وفقدان اللغة. استخدم في هذا البحث الأسلوب الوصفي والذي طبق نتائج الدراسات السابقة على مريض سعودي يتحدث لغتين . أستخدم الباحث اختبار صمم لقياس القدرة على التسمية .

دعمت نتائج تحليل تصرفات هذا المريض فرضية الارتداد والتي تنص على أ ن فقدان اللغة يكون في الاتجاه المعاكس لمراحل اكتسابها حيث أن هناك سمات مشتركه بين لغة هذا الشخص البالغ ولغة لطفل . وأيضا دعمت نتائج البحث قانون الأولوية في الترتيب حيث أن الشخص الذي يتحدث لغتين يسترجع اللغة التي اكتسبها أولا إذا فقد الشخص هاتين اللغتين نتيجة لبعض إصابات الدماغ.

نتائج البحث:

1 - إن بعض إصابات الدماغ تؤثر سلبيا على اللغة والتي تتواجد غالبا في الجزء الأيسر من الدماغ.

2 - فقدان اللغة يظهر في الاتجاه المعاكس لاكتسباها وهذه تسمى فرضية الارتداد.

3 - قانون الأولوية في الترتيب يطبق على قواعد اللغة وليس فقط اللغة بأكملها. فابالإضافه إلى استرجاع لغته المكتسبة أولا فإنه يسترجع القواعد الأولى التي أكتسبها.

4 - إن الأشخاص الذين يعانون من فقدان القدرة على التسمية يستخدمون بعض الأساليب الأ خرى للدلالة على الأشياء. بعض هذه الأساليب هي طريقة الوصف أو استبدال الكلمات المقصودة بكلمات أخرى قد تكون مشابهه لها أو مختلفة عنها.

5 - يوجد أنواع مختلفة لفقدان القدرة على التسمية.

6 - إن فقدان القدرة على التسمية يختلف عن صعوبة إيجاد كلمه معينه والتي تواجه الج ميع في الحياة اليومية ويختلف عن تلك التي تصاحب بعض إصابات الدماغ الأخرى.

7 - عندما يفقد الشخص القدرة على التسمية فهذا لا يعني انه فقد ذاكرته بأكملها بل يعني إن هناك صعوبة في الوصول إلى معجم الألفاظ الموجود في الدماغ.

8 - إن ارتقاء الألفاظ يمر بمراحل مختلفة والتي تحدث في وقت سريع جدا.

Abstract

This research shows how certain brain damages affect language, which is usually represented in the left hemisphere. It focuses on single subject of Anomia. It shows that Anomia can be of different types, which differ from one patient to another depending on the site and size of the lesion. The researcher uses the descriptive method to apply the findings of previous studies on a bilingual Saudi male. The behavior of the subject supports Regression Hypothesis which states that language dysfunction occurs in the reverse order of language acquisition. It also supports both Primacy Rule and Ribot's law which configure that the language acquired first, in a bilingual case, is the one recovers first after brain damage.

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1.0. Introduction

Naming is a very important aspect of language. A word-finding deficit, Anomia, is the most common symptom of language disorders occurring after brain damage. Anomia is a difficulty in word finding and naming. It can be a result of damage to the angular gyrus in the left hemisphere. According to Goodglass and Kaplan (1983), it can be localized with the least reliability of any of the aphasic syndromes. According to Keenan (1975), all patients with aphasia experience some problems with word finding. Besides its practical importance, the study of Anomia gives a fascinating view on the inner workings of language in the brain.

We retrieve words from our mental lexicon in a very rapid way. Most often this happens in conversation where lexicon, syntax, and pragmatics interact in complicated ways. However, part of this is the act of naming. It is this basic aspect of language production that has received most attention in the study of lexical retrieval and its disorders. All models of word production assume that this process entails several stages. Given this, one would expect that even a word retrieval deficit comes in different forms. There are three major forms of Anomia (Laine and Martin, 2006): nominal anomia, the problem of recalling words or names; phonological anomia, problems in repetition, in oral reading and disturbance in the sound of words; and semantic anomia, impairment of the semantic system. Also, there are other

subcategories of anomia, in addition to these major ones: color anomia and averbia, finding exact verbs.

1.1. Stages of Selecting Words from the Lexicon and Lexical Theory

Selecting words from the lexicon is a fundamental operation in speech production, which happens very fast. It is stated (Levelt, W.J.M.1999) that people generate two or three lexical items per second in fluent conversation, and overtly naming a clear picture of an object can easily be initiated within 600 ms after picture onset. The underlying process, however, is exceedingly complex. Lexical theory analyzes this process in stages and as feeding forward. According to Willem J.M. Levelt (1989), the following stages are involved in the process of word's selection:

1.1.1. Conceptual Preparation

All open class words and most closed class words are meaningful. The intentional production of a meaningful word always involves the activation of its lexical concept. In everyday language use, a lexical concept is often activated as part of a larger message that captures the speaker's communicative intention (Levelt, 1989). The conceptual network's state of activation is also measurably sensitive to the speaker's auditory or visual word input (Levelt and Kelter, 1982).

1.1.2. Lexical Selection

Lexical selection is retrieving a word from the mental lexicon, given a lexical concept to be expressed. In normal speech, we retrieve two or three words per second from a lexicon that contains tens of thousands of items (Levelt, 1989). All forms for the same lexeme are represented in the lexicon. During the process of lexical selection, we choose a lemma, which is the abstract form that has been mentally selected for speech production but before any sounds have been attached to it, the bare form of the word (Caramazza, 1997).

1.1.3. Morpho-Phonological Encoding and Syllabification

After having selected the syntactic word or lemma, the speaker moves from the conceptual/syntactic domain to the phonological / articulatory domain. The task is to prepare the appropriate articulatory gestures for the selected word in its prosodic context, and the first step is to retrieve the word's phonological shape from the mental lexicon. According to lexical theory (Meyer, 1996), accessing the word form means activation of three kinds of information: the word's morphological make-up, its metrical shape and its segmental make-up. After retrieving the phonological form of the word from the lexicon, phonetic encoding follows to produce the word. This is an abstract representation of the articulatory gestures to be performed on different articulatory tiers: a glottal, a nasal, and an oral tier.

1.1.4. Articulation

The phonological word's gestural score is, finally, executed by the articulatory system. The functioning of the articulatory system is beyond the scope of this paper. The articulatory system is, of course, not just the muscular machinery that controls lungs, larynx and vocal tract. "It is also a computational neural system that controls the execution of abstract gestural scores by this highly complex motor system" (see Levelt, 1989, for a review of motor control theories of speech production, and Jeannerod, 1994, for a neural control theory of motor action).

1.1.4. Self-Monitoring

The last stage of selecting word from the lexicon is self monitoring. The person we listen to most is one's self. We can and do monitor our overt speech output. Just as we can detect trouble in our interlocutor's speech, we can discover errors, dysfluencies or other problems of delivery in our own overt speech (Meyer, 1996).

2.0. Literature Review

Speech disorders have been studied for a long time ago. The early contribution started in Greek medicine. Then, during the Roman period, researchers made significant progress. After that, in the Renaissance, the science of speech disorders started to develop, where they started applying the theoretical background that had been achieved before. They did this by doing

more experiments on patients. Then, in the seventeenth, eighteenth and nineteenth centuries, the focus shifted to aphasia and its different types.

2.1. Historical References to Aphasia

The science of aphasia goes back to the distant past. It was found in the earliest medical writings, for example, in the Edwin Smith Surgical Papyrus, an Egyptian manuscript that dates back to 1700 B.C. and that is believed to be a copy of a still older manuscript (Breasted, 1930). Researchers related aphasia with traumatic head injury.

2.1.1. Greek Medicine

The main focus was to distinguish aphasia from dysarthria, muteness, and aphonia (Benton and Anderson, 1998). A passage in the Coan Prognosis (Chadwick-Mann 1950) associates speechlessness following convulsions "with paralysis of the tongue, or of the arm and right side of the body" (248). Another passage in the Coan Prognosis (Chadwick-Mann, 1950) states that "an incised wound in one temple produces a spasm in the opposite side of the body" (263). Taken in combination, the two observations provide a basis for relating a speech disorder to injury of the left hemisphere.

2.1.2. Roman Period

After the Greeks, the Romans also made a great contribution in this area. The Latin author Valerius Maximus (ca. A.D. 30), described the first case of traumatic alexia (Benton and Joynt, 1960). Soranus of Ephesus and other medical writers of the Roman period distinguished the loss of speech

due to paralysis of the tongue from that resulting from other causes (Creutz, 1934). Also, during this period physicians and philosophers began to localize specific cognitive functions in different regions of the brain.

2.1.3. Renaissance Period

During the Renaissance period, physicians started applying the schema of the size and the site of lesion and treatment for that lesion (Benton and Anderson, 1998). Antonio Guainerio, a fifteenth-century physician, mentioned two aphasic patients: one could say only a few words and the other showed paraphasic misnaming. Reasoning deductively, he ascribed their condition to an excessive accumulation of phlegm in the fourth ventricle, with consequent impairment of "the organ of memory" (Benton and Joynt, 1960).

The following statement by Johann Schenck von Grafenberg (Benton and Anderson, 1998) indicates that at least some physicians of the time understood that brain disease could cause a non-paralytic type of speech disorder: “I have observed in many cases of apoplexy, lethargy and similar major diseases of the brain that, although the tongue was not paralyzed, the patient could not speak because, the faculty of memory being abolished, the words were not produced" (Benton and Joynt, 1960: 209). Later writers reached the same point. For example, in 1742, Gerard Van Swieten wrote that he had seen "many patients whose cerebral functions were quite sound after recovery from apoplexy, except for this one deficit in designating objects, they could not find the correct names for them" (Benton and Joynt,

1960: 211). These observations formed the basis for the classification of motoric and amnesic types of aphasic disorder that was made in the early nineteenth century.

2.1.4. Seventeenth Century

Physicians of the seventeenth century also made significant contributions. During this period of time, many cases of aphasia were studied. One of those cases was a patient who suffered from a paraphasic expressive speech disorder after a stroke (Schmidt, 1676). He recovered oral speech but he was alexic. The other one was a patient with a non-fluent expressive speech disorder and an equally severe incapacity for repetition, even of short phrases (Rommel, 1683).

2.1.5. Eighteenth Century

During the eighteenth century, many types of aphasia were studied, such as jargon aphasia and jargon agraphia (Benton, and Anderson, 1998). In discussing jargon aphasia, Gesner (Benton, 1965) insisted that it did not signify a dementia but only a specific type of forgetting. At that time, Gesner (1770) emphasized that word-finding difficulties and paraphasic speech reflect not a loss of memory in general but a specific type of memory loss, namely, speech amnesia. Finally, and perhaps most importantly, Gesner (1770) was the first to advance a theory of the nature of aphasic disorders in terms of "speech amnesia."

2.1.6. Nineteenth Century

During the first decades of the nineteenth century, many contributions were made along all lines: clinical knowledge, theoretical formulation, and neuropathology. The cases and the clinical studies helped physicians to discover more types and features of aphasia. Osborne (1833) studied a case of a highly educated patient with severe jargon aphasia, whose writing was mildly affected, yet he understood oral speech, and he read very well, even foreign languages. After that, Lordat (1843) studied language loss in a polyglot. Also, Bouillaud (1825a) described involuntary echolalia in aphasic patients and called attention to the extreme verbosity of some patients. He also divided the act of speech into two stages: creating words and producing them. Bouillaud (1825b) distinguished between the two causes of speech disorders: one by destroying the organ of memory of words, and the other by an impairment in the nervous principle which directs the movement of speech. He classified aphasia disorders into two basic types: articulatory and amnesic. After that Marce (1856) showed that the severity of writing impairment varies from one patient to another, and in the same patient from one time to another. Ogle (1876), used the term Agraphia to refer to writing impairment.

During this time, Paul Broca (1863) located the site of the lesion in patients who have problems in producing speech, and Carl Wernicke (1874) located the site of the lesion in patients who have problems in comprehension. And hence, these types of aphasia are called by their names.

2.2. Types of Aphasia

Aphasia can be categorized into different types. This depends on the site of the lesion, and on the linguistic disorder. One type of aphasia is Anomia, which is the focus of this study, where patients have difficulty in finding exact words to refer to an object, event, or an abstract term (Goodglass and Wingfield, 2006). The inability of naming does not mean that those names or words are lost from the lexicon, but rather the patients can not access their lexicon.

2.3. Strategies Used by Anomic Patients

Some anomic patients have difficulty in accessing certain categories of words, but not others. Others have difficulty in accessing the whole lexicon; that is, in finding any word at all. Others have difficulty in finding abstract terms (Laine and Martin, 2006). Anomic patients resort to different strategies to compensate for the lack of vocabulary. When the patient fails to find the exact word, s/he either omits the word and keeps talking, or substitutes any alternative word for the intended word. This alternative word can be similar to the intended one, or from the same semantic field. In this case, it is called semantic paraphasia (Goodglass and Wingfield, 1997). If the word is completely different, this is called verbal or global paraphasia (Goodglass and Wingfield, 1997). This later process is probably the central sign of aphasia (Goodglass and Wingfield, 1997). The strategy that is used by all anomic patients in general is circumlocution, which is a significant feature of anomia

(Laine and Martin, 2006). Circumlocution is using roundabout ways to describe objects.

2.4. Different Opinions About Anomia

There are different opinions regarding the different terms that are used for Anomia. Investigators distinguish between these terms. To them, each one is used in specific context, and it can not be used interchangeably with the term Anomia (Goodglass and Wingfield, 1997). However, other authors, such as Laine and Martin (2006), use some of these terms interchangeably.

2.4.1. Pure Anomia Versus Anomia as Sign of Aphasia

It is important to distinguish pure Anomia from Anomia as a sign of aphasia, which is present in all aphasias (Goodglass and Wingfield, 1997). Damasio (1992), stated that "Anomic aphasia is characterized by a pervasive impairment of word finding, which contrasts with intact repetition and speech that is fluent, well articulated, and grammatically correct." For example, patients with Broca's aphasia produce telegraphic speech, which means that their utterances are short and laborious (Goodglass and Wingfield, 1997). This shows that they have limited vocabulary. Also, patients who have Wernicke's aphasia suffer in finding exact words. It is true that their speech is fluent, yet it does not make sense (Carl Wernicke, 1874). The wrong choice of words is a good reason to explain why their speech does not make sense. These two examples show how Anomia is different from anomic aphasia, or nominal aphasia, where patients can not access their lexicon

completely; they have a pure disorder of word retrieval (Goodglass and Wingfield, 1997).

2.4.2. Anomia Versus Word-Finding Difficulty

The term Anomia and word-finding difficulty are sometimes used synonymously, yet each one may have a restricted meaning. Both of them refer to the inability to retrieve words from the lexicon. However, there is a difference between them. Anomia reflects a primary language disorder, where patients can not access their lexicon. It occurs after brain injury. Patients used circumlocution to describe these names or terms (Laine and Martin, 2006). However, word-finding difficulty could be a problem of other non-linguistic cognitive deficits. Also, it might be encountered in any normal person, where s/he can not find the right word during conversation. In this case, it could be a result of physical factors such as being tired, busy, or overwhelmed with many things in mind. The word will usually come automatically after some time. This explains the difference between normal and abnormal word finding difficulty. Researchers (Tranel, Damasios and Brandt, 1995) distinguished between these two types of word-retrieval. Normal word finding difficulty is a normal state that any person may experience, where people know what they want to say, but they can not find a word to express it. This phenomenon is called the TOT state, tip of the tongue (Laine and Martin, 2006). Harley, (1995) characterizes this state as an extreme version of pauses that precede words of low predictability (Laine and Martin, 2006). And this is the same as

word-finding difficulty. Whereas, abnormal word finding difficulty is a common symptom of language disorders occurring after brain damage (Goodglass and Wingfield, 1997), and it is the same as pure Anomia.

2.5. Example of the Speech of an Anomic Patients

Goodglass and Wingfield (1997) illustrated the concept of Anomia by providing examples, which are similar to the ones which were observed during the interview. Here is an example of the speech of anomic patients.

(1) Examiner: Can you tell me about your illness?

Patient: I had a …… I had a ……..one or two three….. there is one…..I had a…… a…… I know part of it .

Examiner: You are pointing to the operation on your chest.

Patient: Yes, I had a vaw…….. a lord……aw……..it was replaced. It came back….I….

Examiner: A valve?

Patient: Right…… of the ower……the…..the…..there are three or four things they could have in mind.

Examiner: Was it the aortic valve?

Patient: Exactly.

Examiner : And it was after the operation?

Patient : Right, it was a day later, while I was under the watchamacall……..

Examiner : Anesthesia ?

Patient : No, under where they put you , just two or three people , and you stay in there for a couple of days .

Examiner : In the intensive care ?

Patient : Right . at that time I got the stroke.

The pervious example shows that this patient with Anomia has difficulty in finding exact words. This difficulty arises from the inability of accessing the lexicon (Goodglass and Wingfield, 1997).

2.6. Forms of Anomia

The inability of naming can be due to difficulty in finding the articulatory position of the word, the production of an un-intended word, or the production of a word from the same semantic field as the intended word (Laine and Martin, 2006). There are some paradoxical observations regarding this issue. Some patients can not name colors, others can not name abstract terms, others can not name events, others can name objects described to them, but not objects shown to them, other patients can not name numbers (Goodglass and Wingfield (1997). Laine and Martin (2006), categorized Anomia into different types; nominal Anomia, phonological Anomia, semantic Anomia, color Anomia and averbia.

Barry Gordon (1997), stated that the cognitive processing stages involved in naming are few. These stages are well-defined. Naming is related to basic abilities, such as face recognition, word production, and word reading.

Investigators (Goodglass and Wingfield, 1997) found that not all names are located in one area of the brain, but rather they are in different areas, each

one controlling a specific class of names, and there are different neural systems for recalling different classes of words. This explains why some patients have difficulty only with one specific class of nouns but not others. One study stated that brain-damaged patients have greater impairment in animate and natural names more than artifactual names, non-living or human-made names (Hillis and Caramazza, 1991).

2.7. Tests for Word-Retrieval

Investigators designed some tests for word-retrieval. Some of these tests are the Boston Naming Test (Kaplan, Goodglass, and Weintraub, 2001), Nickels' Naming Test (Nickels and Howard, 1994), Snodgrass Pictures (Snodgrass and Vanderwart, 1980), where subjects are presented with drawings of an object and then they are asked to name it and the vocal naming is recoded, the Graded Naming Test (McKenna and Warrington, 1983), and the Philadelphia naming test. These tests assess word retrieval depending on certain factors such as frequency of words, familiarity, concreteness, age of acquisition, letter length and number of syllables in the words.

2.8. Proper Nouns Retrieval Versus Common Nouns Retrieval

Many studies (Mill, 1843; Frege, 1892; Wittgenstein, 1922; Kripke, 1980, Searle, 1969; Russell, 1950; Cohen and Burke, 1993: Valentine, Brennen and Bredart, 1996) were done which distinguish proper noun retrieval from common noun retrieval. According to many researchers, including Cohen (1994), it was more difficult to retrieve proper names than

common nouns. Mill, (1843), mentioned that this difficulty comes from the fact that proper names are not connotative, and they have reference yet they do not have sense. This implies that each one has a separate structure. Damasio et al. (1993) showed some evidence that indicates that the left temporal polar cortex is important for the retrieval of proper names but not for common ones.

2.9. Word-Class Impairment

Word-Class has been a significant issue in regard to Anomia because different classes of words can be selectively impaired. For example, some patients have difficulty in finding nouns; others have difficulty in finding nouns and verbs. The first clinical observations were in the middle of the 18 th century (Denes and Dalla Barba, 1998; Ostberg, 2003). Black and Chiat (2003) suggested that nouns and verbs differ syntactically, semantically, and phonologically.

Martin and Laine (2006), suggested that the right hemisphere is involved in the process of word-retrieval. Split-brain studies show the linguistic capabilities of the right hemisphere (Damasio and Damasio, 1992). It has been stated in (Baynes, 1990, Chiarello, 1991, and Harder et al., 1991) that the right hemisphere has semantic capabilities and vocabulary limited to concrete and common nouns. Rabcsak and his colleagues (Damasio and Damasio, 1992) stated that the right hemisphere participates in the naming of facial expressions.

2.10. Factors in Assessing Anomic Patients

There are some factors that should be taken into consideration when assessing the naming abilities of Anomic patients. These factors include age, education, overall health status, and language and culture background (Laine and Martine, 2206).

2.11. Causes of Anomia

There are many neurological disorders that may cause anomia. Some common ones are cerebrovascular disease, Alzheimer's disease, dementia, traumatic brain injury, and frontal and temporal lobar degeneration (Laine and Martin, 2006).

2.12. The Role of Cognitive Models in Anomia Assessment

Cognitive models play a significant role in the clinical assessment of Anomia (Berndt, 1987). Clinicians apply these cognitive models to the diagnosis of naming disorders. An experiment (Martin and Saffran, 1997) was done on two anomic patients, Both achieved similar scores on the Philadelphia Naming test (Roach, Schwartz, Martin, Grewal, and Brecher, 1996); however, naming impairment did not arise from the same underlying word-processing difficulty. For one of the two, the naming difficulty was related to a breakdown of phonological encoding, and for the other, it was due to problems in mapping the semantic representation to the corresponding word form.

3.0. Anatomy of the Brain

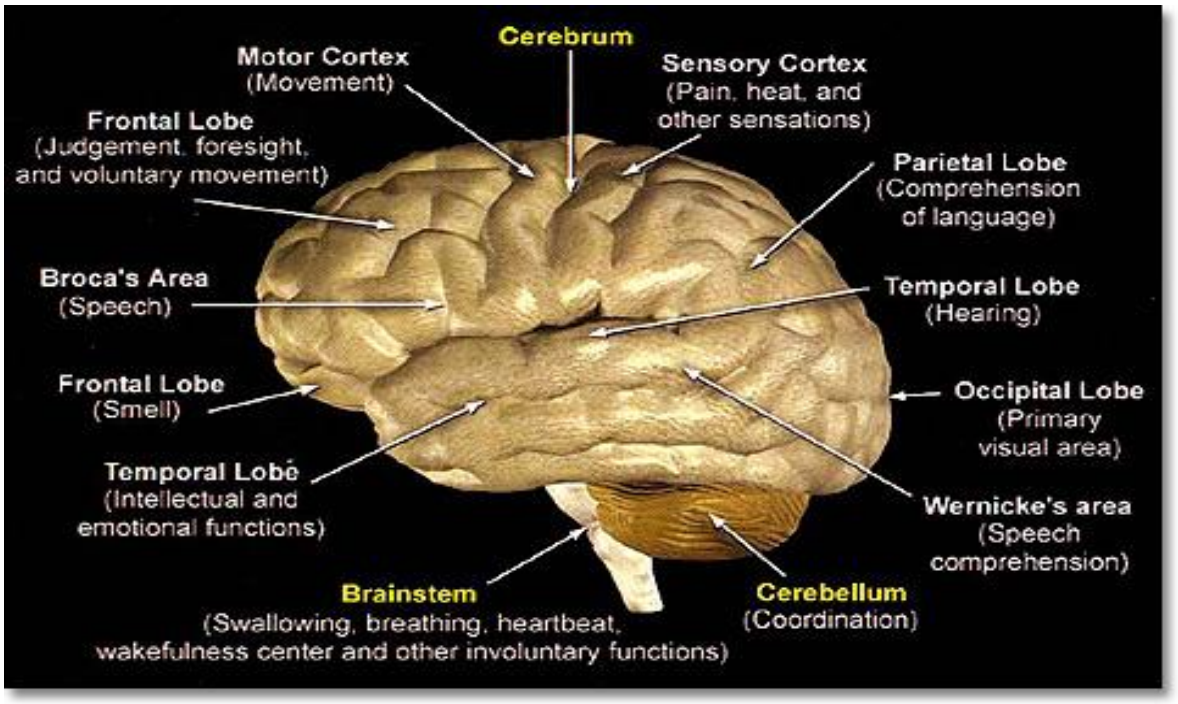


Figure 3.0.1. Anatomy of the Brain (University of Medicine and Dentistry of New Jersey, www.theuniversityhospital.com/stroke/anatomy.htm)

The cerebral cortex is the part of the brain that is most heavily involved in language processing (Damasio, 1995). The brain is divided into two hemispheres: the left hemisphere and the right hemisphere. The two hemispheres are linked via the corpus callosum. Each hemisphere is specialized for certain functions. The left hemisphere is the dominant one, where language is represented (Damasio and Damasio, 1992). Each hemisphere is divided into four lobes, which are described as follows (Damasio and Damasio, 1992):

3.1. Frontal lobe: The frontal lobe has the primary motor cortex and a language area, Broca's area, which is responsible for language production.

3.2. Parietal lobe: The parietal lobe has the primary somesthetic cortex, and the angular gyrus that lies at the juncture of the parietal, temporal, and occipital lobes and associates information from the these three lobes.

3.3. Temporal lobe: The temporal lobe has the primary auditory cortex and Wernick's area, another language area, which is thought to store and interpret auditory speech.

3.4. Occipital lobe: The occipital lobe has the primary visual cortex, which processes visual information.

"Each primary cortex is linked to its association area, where higher orders and complex information is thought to be interpreted and integrated in light of past experience" (Damasio and Damasio,1992). Each association area is linked to other association areas by long fibers (Damasio and Damasio, 1992). Each hemisphere is specialized for specific functions (Damasio and Damasio, 1992). The left hemisphere is specialized for language functions, and the right for non-verbal functions besides some linguistic functions (Damasio and Damasio, 1992).

The lower extension of the brain is called the brainstem and connects the two hemispheres to the spinal cord. The functions in the brainstem include breathing, digestion, heart rate, blood pressure, and the ability of being awake and alert. The brainstem is the pathway for all fiber tracts passing up and down from the peripheral nerves and the spinal cord to the highest parts of the brain (Wikipedia, 2002).

Another part of the brain is the cerebrum which is at the front of the brain. The functions that this area controls include initiation of movement, coordination of movement, temperature, touch, vision, hearing, judgment, reasoning, problem solving, emotions, and learning (Wikipedia, 2002).

"The cerebellum is at the back of the brain. Its function is to coordinate voluntary muscle movements and to maintain posture, balance, and equilibrium" (Wikipedia, 2002).

4.0. Approaches and Methodology

4.1. Case-Study Approach

The nature of the present study is descriptive. It is a case study applying some of the findings of previous studies on Anomia and brain disorders to a Saudi bilingual anomic patient. Researchers have used the case study approach in conducting studies. The focus can be on a group of subjects or a single subject. A case study is used to understand a certain issue or to investigate a phenomenon. It involves collecting observations of individuals' behaviors. This is also supported and well-formulated in Lamnek (2005): "The case study is a research approach, situated between concrete data taking techniques and methodological paradigms."

In such an approach, the first step is to choose subjects, then to record the behaviors of the subjects. This is followed by analysis of the observations, and finally a report of the result. Case studies may generate or test hypotheses.

This research focused on a single subject. The technique used in this research was an interview in which a test was used, in a shape of slide show, which was designed by the examiner to assess the patient's naming abilities. The duration of the test was an hour and forty five minutes. The examiner had four sessions with the patient after the first one. The performance of the patient was the same ,without any improvement, in all sessions. The first session was in the hospital with the attendance of the neurologist and the patient's wife. The other four sessions were in the house of the patient with the attendance of his wife and his daughter. The test was divided into three parts; each part designed to assess a specific type of Anomia. The first part tested nominal anomia. This part has subparts which vary depending on the familiarity, concreteness, and uniqueness of objects. The second part assessed color Anomia which varies from basic to non-basic colors. The last part assesses phonological anomia. This part consists of two subparts. The first one is a very short passage which the subject had to read aloud. The second part tested the ability of repetition.

Another part was added which has three subparts. One consists of individual letters which the subject had to read. The objective was to assess the patient's ability to name individual letters and to determine the reasons for the naming difficulty. The reason could be in accessing the phoneme or in accessing the free morphemes or the whole word. The second part required the subject to find the right word for a given description or a definition of an

abstract concept. The goal for this part was to see if the subject could find words using description or circumlocution so that he could compensate for the lack of vocabulary. The third part has two subdivisions, both assess comprehension. The first subdivision required the patient to point to picture which refers to the word that the examiner utters, and the second subdivision required pointing to the picture that tells the story that the examiner tells.

4.2. Data

The patient is a 60 year old Saudi bilingual male Kh.G. The following history was related by his wife. He underwent cataract surgery a year ago. The operation had been done twice but after the second one he got trauma.

Initially, his family thought that Aphasia was due to the shock of their son's death because after that time Kh.G. changed dramatically.

The gentleman could not remember the things that happened in the past and even the things that he used to do habitually. His wife kept trying enlightening him. Kh.G. uses circumlocution to describe objects, and he pauses a lot. He was hesitant and he kept asking his wife to remind him of the words.

This patient has difficulty in naming non-basic colors, such as, pink, light red and dark green. However, he named the basic ones correctly such as white, black, red, blue, even so he took sometime to do that, and could not name them quickly.

Kh.G. sometimes resorts to alternative words instead of the exact ones. For example, instead of saying *book,* he said *Quraan,* and instead of saying *cell-phone,* he said *telephone*. He could not access the root of the words. He was shown a picture of the flag, he smiled and said, "Yes, I know it. This is " *la ellaha ella Allah*" (NO God except for Allah)". He could not say the word *flag*. Then, he asked his wife to say it and she said it. However, he could not repeat the word "*3alam*" flag. He was saying "*qalam*" (pen) instead.

It was also observed that he has difficulty in forming questions. When he asked about the reason for choosing him, the formation of the question was not correct and resembles that produced by children. He said "Why me?" meaning "Why did you choose me?"

(2) Laysh ana?

Why me?

When he was shown a picture of *Saddam Hussain*, a well known figure, he said, "Yes, this man is bad. They took him away." He was asked, "Is he still alive?" He said, "No, they took him away." He could not say that they executed him. His wife said, "Saddam Hussain was the king of Iraq." Kh G was trying to repeat what his wife was telling him and said "*forag*" instead of *Iraq*.

This patient also has difficulty in naming individual letters. When he was shown the slide that contains the letter Alif in Arabic, he said, "It is the

first letter. It is zero." When he saw the letter kh in Arabic, he recognized it, and he said, "It is the first letter of my name."

One section of the slides required him to point to the correct picture. There were two subdivisions; the first subdivision contains individual objects, and the second contains pictures that tell stories. The patient did very well in the first part. However, he could not point to any picture that described the story which was told to him. His wife mentioned that it is difficult for him to understand descriptions.

In another section, he was given descriptions of abstract notions, such as honesty, beauty, and unfaithfulness. He could not give the abstract terms for these descriptions, but rather he used circumlocution to describe those notions.

The patient has writing and reading impairment too. He was asked to write some statements. He could not do this task. He only wrote individual letters, and for some words he only wrote the first two or three letters. The only things that he can write quickly are his name and his signature.

Concerning reading, he started by spelling out the letters of each word, then he tried to pronounce the whole word. Sometimes he could read it, and other times he could not, depending on the length of the word, and his familiarity with it.

The interview and observations led to the conclusion that Kh G has the following types of anomia: nominal anomia, phonological anomia, averbia and color anomia.

5. Analysis of the Data

5.1. Types of Anomia

5.1.1. Nominal anomia

The subject has difficulty in finding the exact word, target words, so that he resorts to alternative words or circumlocution. It might be caused by damage to various parts of the parietal or temporal lobes of the brain (Laine and Martin, 2006).

Examples:

(3) Examiner: What do we call this? (Showing him a picture of a book)

The patient used a hand gesture to describe the object to the examiner, and then he said, "We read from it. It is …… It is *Quraan*."

The patient used the word *Quraan* instead of *book*. Similarly, he used the word *phone* to refer to *cell-phone*.

5.1.1.1. Nominal Anomia and Prototyping

During the interview with the subject, it was observed that the subject chooses an object and considers it as a prototype, typical example, for other objects that share some of the same features. The example below illustrates this issue:

(4) The examiner showed Kh.G. the first slide, which was a picture of an orange, and he was asked to name it.

Kh.G : It is an apple.

The examiner showed him a picture of a watermelon, and asked him to name it.

Kh.G: It is an apple.

The examiner showed him a picture of strawberry, and asked him to name it.

Kh.G: It is an apple.

The examiner showed him an apple, and asked him to name it.

Kh.G: It is an apple.

Examiner: Why did you recognize that this object is an apple?

Kh.G: Because I eat it everyday, and I like it.

From the previous examples, it is clear that Kh.G. considers the apple to be a prototype for any object that shares some features with the apple such as roundedness, or color.

5.1.1.2. The Substitution of the Exact Words with Alternative Words

When Kh.G. was asked about past events, he could not recognize the names of those events, even if they were things that he used to do a long time ago.

(5) Examiner: How did you start your life?

Patient: I worked in …….. in ……. What do we call it? In a school. No it is not a school, what do we call it?

He wanted to say that he worked in the Hajj Ministry, yet he could not access the word *Ministry*, and he used *school* instead.

(6)The examiner showed him a picture of a mobile, and asked him to name it.

Patient: It is the thing that we call with, it is telephone.

His wife: No, it is not a telephone. It is a mobile.

Patient: Yes, yes, It is mobile.

(7) The examiner showed Kh G a picture of a fish.

Patient: I ate it yesterday.
He looked at his wife, and said, "We ate it yesterday." What do we call it? It is……., umm. It is meat."

His wife: No, it is not meat.

Patient: Just say it once.

The examiner asked his wife to say it.

His wife: It is *fish*.

Patient: Fish, fish, fish.

(8) The examiner showed the subject a picture of a book.

Patient: We read from it. It is *Quraan*.

(9) The examiner showed the subject a picture of an orange, and he asked him to name it?

Patient: it is an apple.

From these previous examples, it is clear that Kh.G. can not access the root of the words, and he resorts to alternative words that share the same function (cell phone and telephone), or the same shape (apple and Orange).

5.1.2. Averbia

The subject has trouble remembering some verbs. Based on neuro-imaging techniques and on the previous studies(Laine and Martin,. 2006) Averbia is caused by damage to the frontal cortex, or near Borca's area. The following example taken from the interview illustrates this point.

(10) The examiner showed Kh.G. a picture of a well-known person, Saddam Hussian.

Kh.G.: I know this man. He is bad. He is not good. They took him away.

Examiner: Is he still alive?

Kh.G: No, they took him away.

Examiner: So, where is he now?

Kh.G: He is not here. They took him away.

The subject could not access the verbs "die or kill or execute" He kept saying, "They took him away."

5.2. Phonological Anomia

The subject has problems in repetition of some words and in oral reading. Also, there is a disturbance in the sounds of the words.

(11) The examiner showed Kh.G a picture of a horse, and asked him to name it.

Patient: It runs. People ride it.
The patient asked the examiner to say it once.

Examiner: It is 7us□aan. (Horse)

Patient: s□u7aan, s□u…….7aan

Kh.G. switches the places of phonemes which leads to a wrong word. This phenomenon is called metathesis. Sometimes he misplaces phonemes. For example, instead of saying "3raq" he said "forag". Throughout the interview, he asked the examiner to name the objects and terms. However, sometimes, he could not repeat them. He had difficulty in pronouncing some words with the correct order of the phonemes. However, there were other words that he could repeat correctly. This difficulty of repeating some words arise from some factors such as the length of the word and familiarity of words.

5.3. Color Anomia

Kh.G. has problems in naming some colors especially the non-basic colors. He named the basic colors, such as, red, blue, black, white, and green; however, he could not name grey, pink, light green, light red, and others. When the examiner asked him to name to the color brown, he looked around, and said, "It is the same as this one." Pointing to the file on the desk. But he could not say that it is brown. This led to the conclusion that comprehension is intact, but naming storage is not accessible.

5.4. Universal Hierarchy of Color Denotation

The universal hierarchy of color denotations specifies a fixed order of basic color terms.

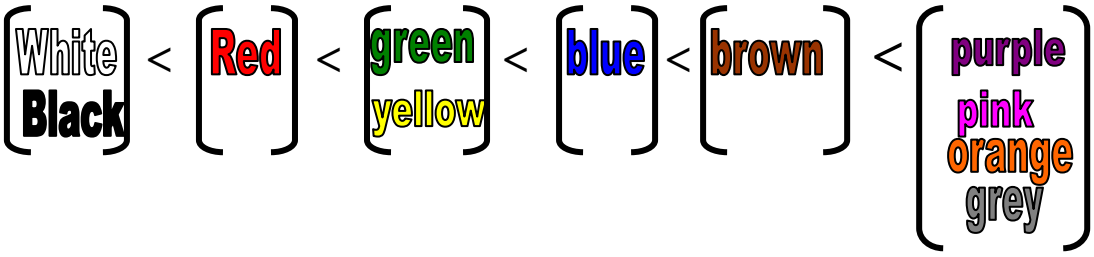


Figure 5.4.1 Berlin and Kay's Implicational Hierarchy, 1969.

During the interview, it was clear that Kh.G. recognized the basic colors and this may be due to the fact that these colors are universal. Kh.G. can access only the colors to the left of the hierarchy, and the more he moves to the right side of the hierarchy, the less he can recognize the names of those colors.

6.0. Language Acquisition and Language Dissolution

Thomas Scovel (1997) stated that all examples of speech dissolution are evidence of how the human brain functions and how the components of language are distributed in the brain. Diachronically, "acquisition and dissolution are considered to be the beginning and end of language" (Scovel, 1997). In this case study, the language of Kh.G. shares many features with a child's language. This is evidence that when someone loses his/her language, some linguistic processes and certain grammatical structures revert to the early stages of acquisition.

6.1. Overgeneralization Phenomenon

There is a stage in language acquisition where children use a word to refer to a whole set of objects. For example a child calls any animal such as lambs, cows, cats, or any other four- legged animal "dog" or "cat". This stage is called one-word stage or holophrastic stage. During this stage of language acquisition, children tend to generalize one word to refer to the whole set of objects. Studies show that this overgeneralization is only in production, but not in comprehension because the child knows that this object differs from others, but s/he does not have a more precise word (Gershkoff et al., 2006).

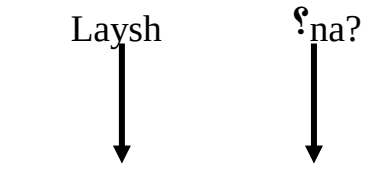
Similarly, Kh.G. used the word *apple* to refer to orange, watermelon, and strawberry. He overgeneralizes by using a word from the same category, or from the same semantic field. For example, he used the word *apple* to refer to objects from the same category of fruits. Also, he used the word *Quraan* to refer to *book*, in this case he used the word *Quraan* which is from the same semantic field of *book*. In addition, he used alternative words that share something with the target words. For example, he used the word *telephone*, which is more general, to refer to *cell phone*.

The word or the phrase that he uses most of the time is "that / this thing" to refer to any object for which he can not access the name.

6.2. Question Formation

The case study shows that there is also a problem in forming questions. Due to his inability to access words, he can not complete the questions. He also can not put words in the correct order. For example, he produced the following questions:

(12) " Laysh ʕna? "



Wh-word Why pronoun me?

Why me?

He wanted to say:

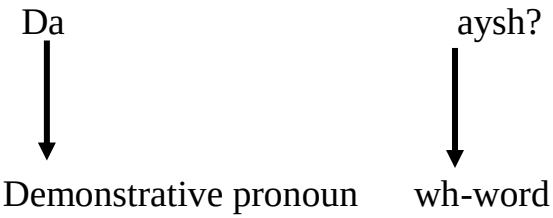
Laysh akhtartini ʕna?

Why did you choose me?

For some Arabic speakers, the previous question seems to be acceptable. In fact, the previous question is acceptable only if it is uttered in a meaningful situation. However, if it is uttered in a context-less situation, it is neither acceptable, nor understandable. The patients asked that question in the middle of the interview, in a context-less situation. And it was not clear what he was intending to ask.

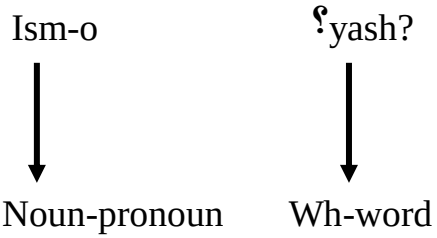
Also, each time a new picture displayed, he kept asking himself the following question:

(13) "Da aysh? "



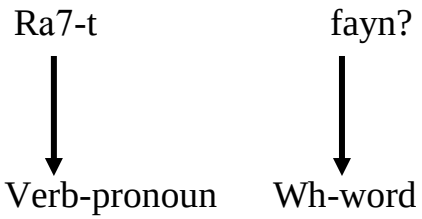
What is this?

(14) " Ismo ʔyash? "



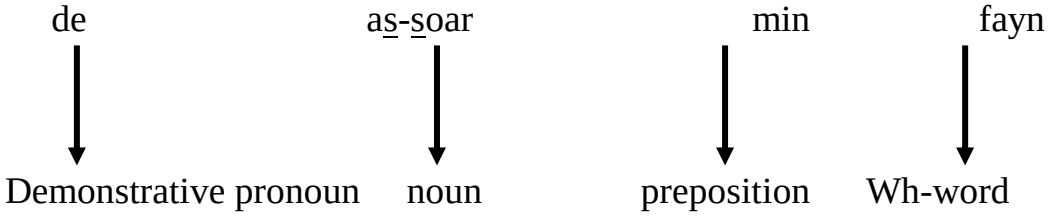
What is its name?

(15) " Ra7at fayn? "



Where did it go?

(16) " De as-soar min fayn? "



From where did you bring theses pictures?

The formation of the previous questions resemble those used by children. It is noticeable that the patient deletes main verbs, and inverts the WH-word and the subject, or other elements in the sentence.

6.3. Primacy Rule and Recovery of First Language and Earliest Grammar

This study suggests that the primacy rule can be applied to the structure of language, not only to language itself. The Primacy rule states (Damasio and Damasio, 1992) that the language that is acquired first, recovers first. The patient was bilingual, speaking Arabic and English, though both languages are not equal in proficiency level. In this study, this bilingual patient recovered his first language, Arabic. In addition, he recovered the earliest grammatical rules of his first language. This is clear from the process of question formation, since he formed questions in the same way children do. Also, he reverts to the one-word stage, when children tend to overgeneralize. This patient's utterances show evidence of the same stage. He tends to overgeneralize by using certain words or terms to refer to other entities or actions to compensate for the inaccessibility of his vocabulary.

6.3.1 Selective Recovery

Selective recovery means that the patient did not recover one or more of his/ her languages(Pearce, 2005). In this case, this bilingual patient recovered only his native language, Arabic. He lost his second language, English, completely. Though he recovered his native language, some aspects of his native language are damaged. He is not fluent as before.

6.3.2 Ribot's Law and Recovery of First Language

The data also support Ribot's Law which states that " In a multilingual patient with aphasia, recovery first comes in a person's mother tongue (Pearce, 2005). " Ribot's Law has the same concept of Primacy Rule.

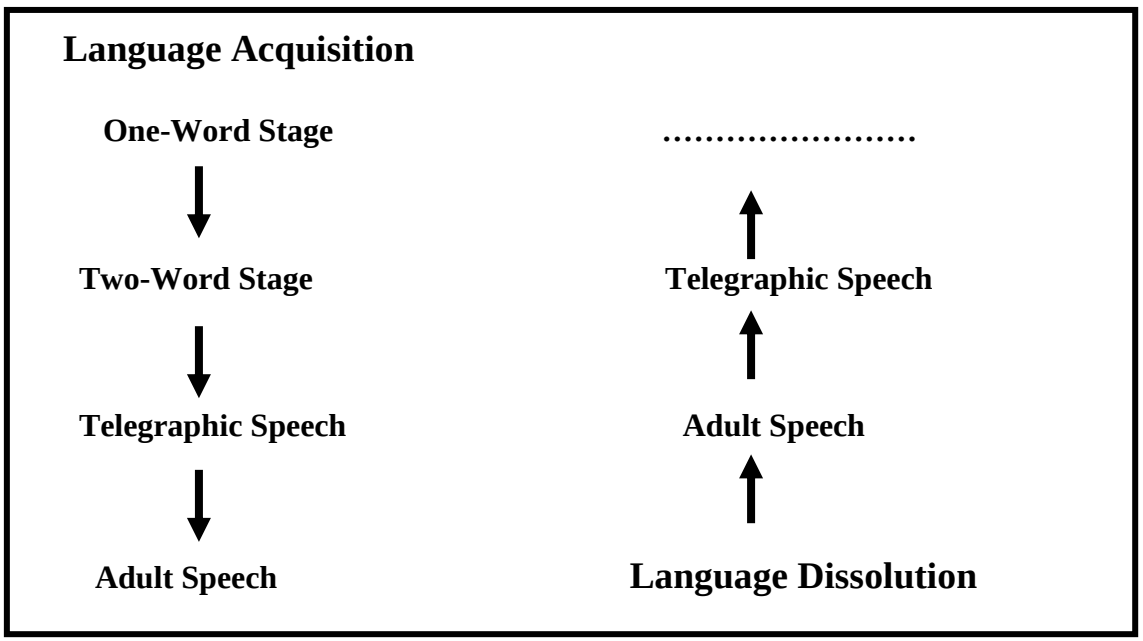
7.0. Lexicon Impairment

When a patient can not find the exact words, it means that his lexicon is inaccessible. Words are organized and classified in the brain, and those words can be selectively impaired (Damasio and Damasio, 1992). In this case study, there is no evidence that the patient Kh G has difficulty in accessing only specific set of words. He has difficulty in accessing some nouns, and some verbs, from different semantic fields. Dissociated lexical damage is evidence for the independency of the mental lexicon and of the underlying processes**.** This patient shows more noun impairment than verb impairment, and that shows the superiority of verbs (Pashek and Tompkins, 2002). Verbs are lexical in nature; they carry the main semantic information in the sentence.

8.0. Anomia and the Regression Hypothesis

The Regression Hypothesis states that language dissolution following brain damage occurs in the reverse order of language acquisition (Caramazza, 1994). Though this hypothesis dates back to Ribot (1881) and Freud (1891), it was first formulated in linguistic terms by Jakobson (1941). The Regression Hypothesis has been a matter of much debate in research on both pathological and non-pathological language loss. This hypothesis suggests that language

competence is layered, and that language loss will work its way from the topmost layer to the bottom (Andersen, 1982, Berko-Gleason, 1982, and Seliger, 1991). For example, vocabulary acquisition goes through different stages (Yule, 1996). The first stage is one-word stage, holophrastic stage, where children use one word for naming objects and as phrases and sentences. The second stage is two-word stage where children's vocabulary increases so that they start using two words as sentences and phrases. After that children start producing telegraphic speech. During this stage children start developing sentence forming and the vocabulary expend rapidly (Yule, 1996). As children grow up and communicate with others, their vocabulary increases and their speech become more like an adult speech.



Generally, language acquisition starts with the simplest rules and moves towards the more difficult and more complicated rules. However,

language dissolution moves from the more difficult rules and forms towards the simplest rules and forms.

The behavior of Kh G supports the Regression Hypothesis. It seems that some aspects of his language resemble the early stages of acquisition. In general, his speech is telegraphic, especially in forming questions, which is similar to children's speech. In comprehension, he only can understand simple, short, direct descriptions. In addition to speech, his reading ability goes back to the early stages of reading. He starts by spelling out the letters, then pronouncing the syllables, and then the whole word. Furthermore, his writing is slow. In fact, he only can write his name and his signature correctly. When it comes to writing other words or phrases or sentences, he starts by writing individual letters. Sometimes, he writes half of the word only, and then he stops and starts guessing the other letters. This behavior is similar to that of children when they start learning to write.

Also, this patient could not find the exact verbs, instead he used general ones. He could not access the word *die*, nor *kill*, nor *execute* and he substituted them with the verb *took away* which is more general than the other verbs.

Limited vocabulary is a stage that all children go through in acquiring language. There are different stages to increase vocabulary. It is this lack of vocabulary that makes children overgeneralize.

9.0. Conclusion

This present study focuses on a single subject suffering from Anomia, difficulty in finding exact words. The test assesses naming ability, ranging from concrete objects to abstract ones.

This study shows that this subject has the following types of Anomia: nominal Anomia, phonological Anomia, averbia and color Anomia. The subject did not lose his memory, but rather he his lexicon is inaccessible. It was also found that there is no evidence for semantic anomia nor for selective anomia.

This study provides more evidence that language dissolution occurs in the reverse order of language acquisition. Examples from the interview support the Regression Hypothesis, such as overgeneralization, question formation, and lack of vocabulary. The data also provide evidence that the primacy rule includes recovery of early grammar not only the earliest language. Examples also provide evidence for Ribot's law.

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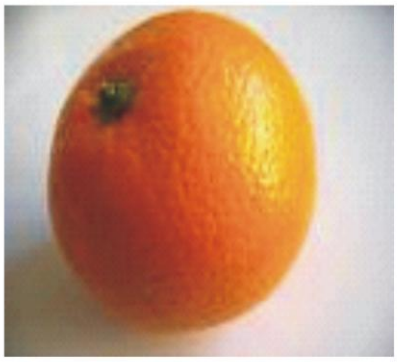
Appendix A

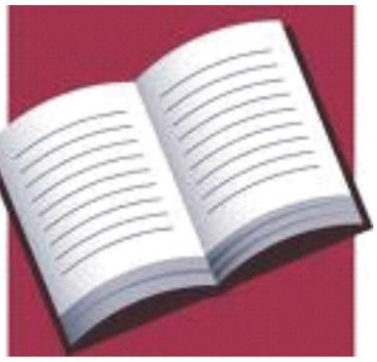
Standard Arabic consonant phonemes

		Bilabial	Labio-dental	Inter-dental	Dental-alveolar		Post - alveolar	palatal	velar	uvular	Pharyngeal	Glottal
					plain	emphatic						
Polosive	**voiced**	ب b			د d	ض d̲	ج j		k ك	ق q		ء ʔ
	voiceless				ت t	ط t̲						
Fricative	**voiced**				z ز	ظ ð̲			خ Kh		ح 7	ه h
	voiceless		ف f	Ɵ ث	s س	ص s̲	ش sh		3' غ		ع 3	
Nasal		م m			n ن							
Lateral					L ل							
Trill					r ر							
approximant		و w						ي y				

Appendix c

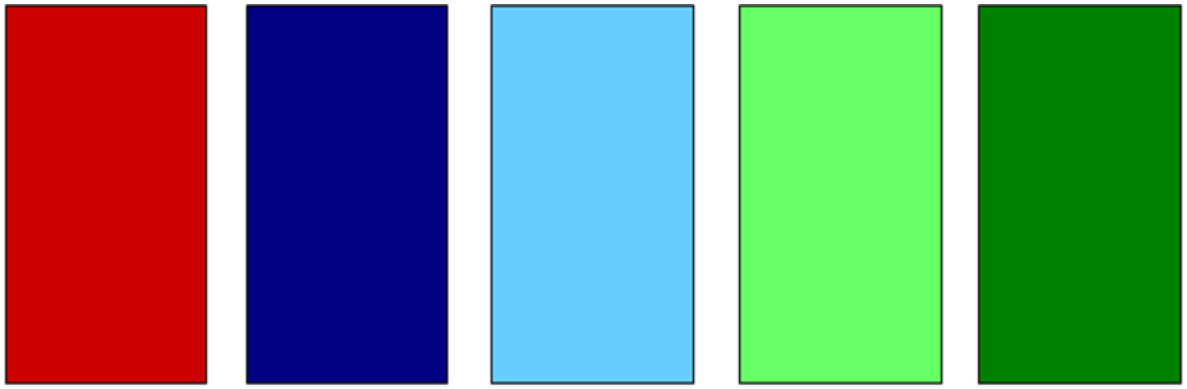
Look at the following objects and name each one :
(This part assesses nominal anomia)

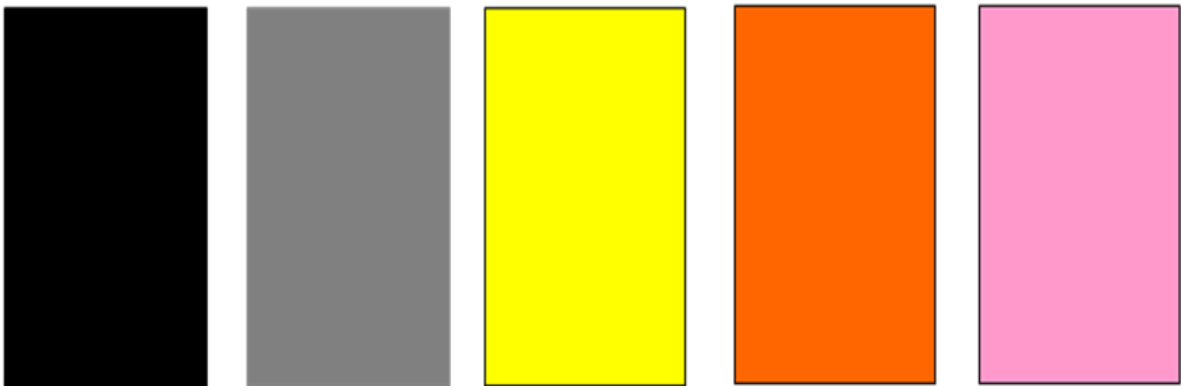





لا إله إلا الله محمد رسول الله

Name the following colors :
(This part assesses color anomia)





Read the following passage aloud:

(This part assesses phonological anomie)

يبدأ دماغ الإنسان في التطور بعد الحمل بثلاثة أسابيع ، حيث تتطور آلاف الخلايا الجديدة في كل دقيقه مصحوبة بنمو سريع في الفترة من ثمانية أسابيع إلى ثلاثة عشر أسبوعا يزن الدماغ عند الولادة ما يقا رب 370غراما وبتعاقب النمو تبعا لتسلسل منطقي.

فالأجزاء التي تنظم العمليات الأساسية كالوعي والدورة الدموية والتنفس تكون في كامل وظيفتها عند الولادة وذلك لأنها ضرورية لبقاء لطفل على قيد الحياة أما الأجزاء التي تنظم الوظائف الأخرى كالحركة واللغة فأنها تتطور بعد الولادة .

د. سعادة خليل

Repeat after me:

(This part assesses phonological anomia, which tests the ability of repetition.)

1- car

2- horse

3- house

4- window

5- sea

6- kill

7- slept

8- came

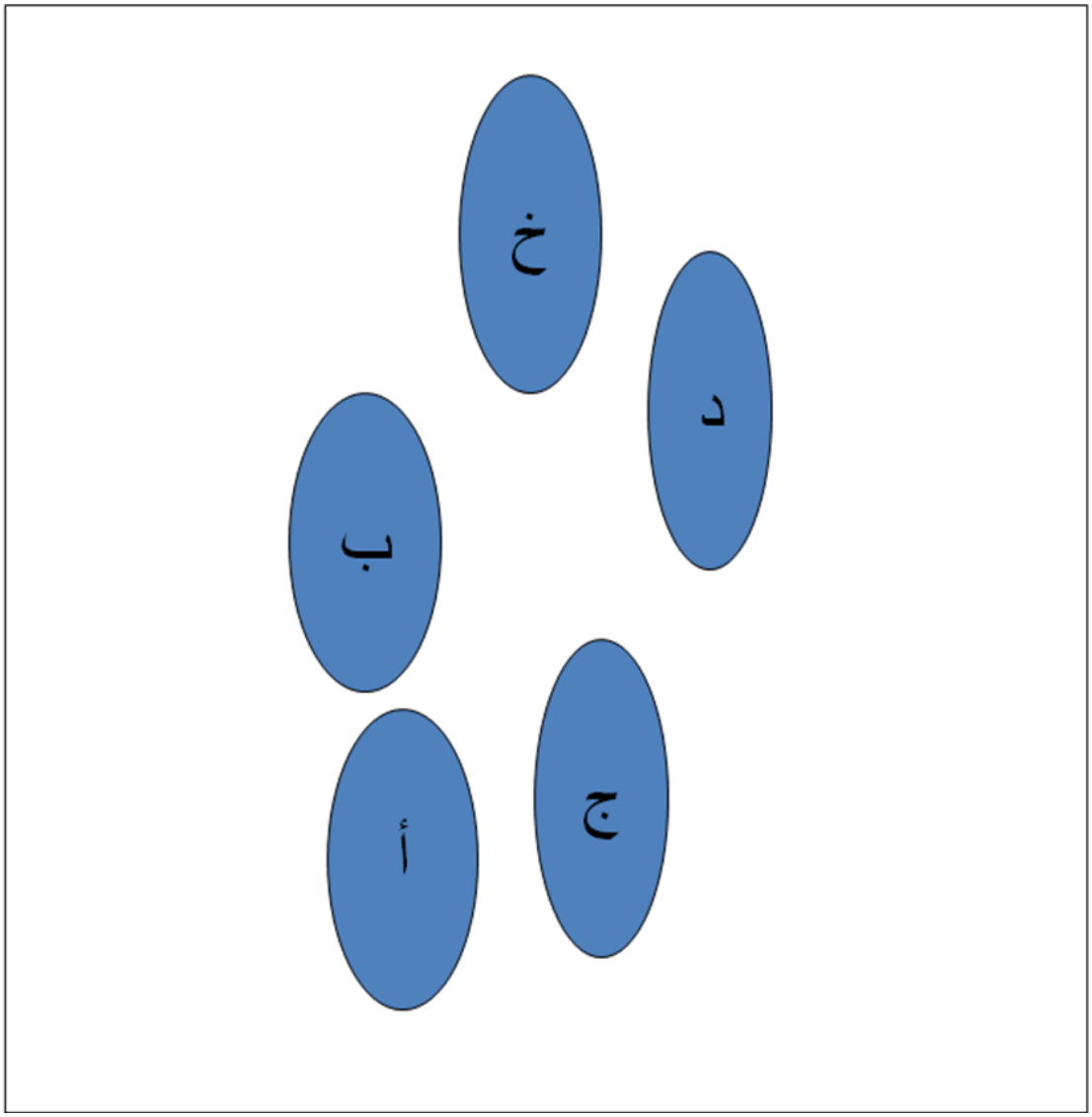
9- died

10- apple

11- watermelon

What is the following letter:

The purpose of this part is to assess the patient's naming ability and to determine the reasons for naming difficulty. Does this difficulty arise from accessing individual phonemes, or from accessing free morphemes, or from accessing the whole word?



What is the right term for the following descriptions:

(The purpose of this part to see if the subject could find words, target names, when they are given the description for those words.)

1- Someone takes money from you and he told you that he will return it after two days , after that he denied. What would you call this person?

2- what do we call a person who always tells things that are not true?

3- You went to a garden, which has many green trees, colorful flowers, birds, fountain, and other nice things, what is the word that could describe this garden?

Point to the picture which refers to the word that the examiner will utter:

(This part assesses comprehension).

Point to the picture that tells the story , or gives the description that the enaminer will tell:
(This part assesses comprehension).