

RESEARCH
ARTICLE**Analysis of sentence and flexibility strategies in arabic speaking aphasics**

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Abstract

This paper came to distinguish first between the concepts of sentence and grammatical structure, and it presents the linguistic principles on which it is based as norms for analysing the linguistic cognitive processes that control the sentence construction in aphasics. These norms were inspired by a modern Arabic linguistic theory, which is the neokhalilian theory. The main element that governs these principles is semantic-informative coherence of sentence. Our hypothesis claims that there is a significant difference between Broca's aphasics and Wernicke's aphasics and in terms of logical-semantic coherence of sentence and in particular in the processes of discursive denotation and predication and flexibility strategies. To achieve our objective, we applied a set of clauses related to the sentence we selected from a scale that was made before that includes several levels of language. These items were applied to two groups of people with aphasia : Broca's and Wernicke's aphasia. The results have confirmed our hypothesis.

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Introduction

Despite the advancements in neuroimaging techniques that prompt a reevaluation of classical aphasia classification, most specialists categorize it into two primary types: fluent aphasia and non-fluent aphasia, commonly referred to as Broca's aphasia and Wernicke's aphasia. These types are confined to injuries affecting two key areas of the brain: Broca's area and Wernicke's area. Regardless of these findings, aphasia remains a linguistic disorder that impacts cognitive linguistic processes. Consequently, research should focus on studying these specific processes and the disruptions they experience, necessitating a clear emphasis on language itself as the subject of study. Since the study of language and its levels is the focus of linguistics, only the analytical instruments and techniques offered by this field can reveal the root causes of this disorder. This paper aims to illuminate a particular aspect of linguistic

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study concerning aphasia, specifically focusing on sentences and the dynamic processes they encompass, which differ from those present in grammatical structure. Our analysis draws upon The Neo-Khalilian theory.

The development of concepts within this theory is attributed to Hadj Salah Abdul Rahman, who synthesized the contributions of ancient Arab grammarians, particularly Al-Khalil ibn Ahmad. He conducted a thorough scientific analysis of this rich Arab heritage, leading to a new and objective interpretation of the fundamental concepts established by ancient Arab grammarians. His scientific analysis employed an epistemological methodology, comparing the discoveries made by these grammarians with those achieved by various Western linguistic schools. This approach led to a significant discovery regarding the profound insights of Arab grammarians in their analysis of language, relying on principles of mathematical logic while also acknowledging an essential aspect of language : discourse, including sentences.

1. Problem Statement

For an extended period, neuroanatomical studies have largely overlooked the linguistic nature of aphasia, reducing it merely to an organic physiological disorder, particularly in its early stages of investigation. Despite significant findings related to studying human biology concerning mental functions predominantly linguistic ability these discoveries remain incomplete. While researchers have successfully identified specific brain regions associated with different types of aphasia and linked each type to particular neural points in the brain, they have neglected to consider that linguistic ability extends beyond mere neural processes confined to understanding or expression. Furthermore, they have limited their observations to symptom descriptions without attempting to explain them or uncover what affects linguistic operations themselves, especially since this pertains to language in terms of its system and unique mechanisms as well as its usage. Therefore, one cannot accept these classifications Indiscriminately.

It is accurate to state that speech is a physiological neural process ; nonetheless, it is also a phenomenon regulated by its own set of linguistic rules. This reality has given rise to numerous linguistic theories such as Saussurean semiology (1916), functionalism (A. Martinet), transformational-generative grammar (N. Chomsky, 1969), and others. Consequently, many linguists have adopted a linguistic perspective in their interpretations of aphasia. Among them are "Jean Gagnepain" (1990) and "Roman Jakobson" (1969), who significantly contributed to its linguistic classification and derived pure linguistic concepts for interpreting each type. Jakobson's linguistic analysis of aphasia marked a new starting point for linguistic studies on the subject ; he identified the source of disruption at the levels of substitution and combination through two complementary linguistic processes : selection (Sélection) and combination (Combinaison). When disruption occurs at the selection level, it leads to an impairment in the choice process ; conversely, disturbances at the combination level affect contiguity and connection.

Another notable perspective within this historical context is that of "Jean Gagnepain" (1990), who linked linguistic concepts with neurological concepts in explaining aphasia. He identifies this disorder as a loss in one of two linguistic abilities : taxonomic capacity and generative capacity. According to Gagnepain and his followers, Broca's aphasia represents a disruption in the generative principle that enables the formation of linguistic units, while Wernicke's aphasia signifies an impairment in identifying those units.

Both theories present numerous positive and objective analyses in interpreting aphasia, particularly their confirmed focus on both axes simultaneously ; notably from Gagnepain, who not only emphasized this but also provided significant concepts such as capacity, basing his analyses on both sémiological and phonological aspects. Thus, studies have transitioned from mere description to seeking pure linguistic causes and their explanations.

Given that the sentence constitutes a fundamental element of language, it has been influenced in its analytical foundations by various theories and perspectives that explain linguistic disorders, particularly aphasia. What, then, is the concept of the sentence according to Western linguistics (structuralism, functionalism, distributionalism, and transformational-generative grammar)?

A review of the concept of the sentence among Western linguists reveals that there are numerous definitions over two hundred to date reflecting the diversity of theoretical frameworks. Notably, in modern structuralist linguistics,

there is an absence of a precise definition of the sentence from its founder, Ferdinand De Saussure, despite its recognition as the primary pattern in syntagmatic structures. For Saussure, a syntagma (التضام) can be an essential component of the linguistic system and always consists of two or more sequential linguistic units, such as compound words, derivatives, sentence parts, and complete sentences. Antoine Meillet (1925), a student of Saussure, defined the sentence as a collection of sounds bound by grammatical relationships that is self-sufficient and not dependent on any grammatical group. However, this definition reveals ambiguity in Saussure's structuralist approach to defining the sentence ; it relies solely on grammatical structure while neglecting the purpose of that structure. Furthermore, his notion of self-sufficiency remains unclear.

In contrast, within functional structuralism as articulated by André Martinet, the sentence is defined as "the smallest utterance that must include two elements : one indicating content or event that draws attention to it : the predicate (المسند) and another referring to a positive or negative participant :the subject (المسند اليه), with its evaluation based on this foundation" (André Martinet, 1960). This definition underscores the fundamental role of the sentence in communication processes, with its core function residing in the predicate, while everything attached to it serves as expansions. However, Andre Martinet fails to distinguish between grammatical structure and the sentence itself ; he conflates what belongs to language as an abstract structure with its application in communication (usage). For him, predication (اسناد) equates to grammatical structure, which renders his concept of structure reliant solely on meaning while overlooking other essential elements in communication processes such as informativeness (الافادة) and various contextual cues. Most importantly, he neglects the speaker's actions in modifying grammatical structures to adapt to discourse situations.

Bloomfield, founder of distributionalism, posits that a sentence is an independent linguistic form that fulfills its function without reliance on a larger linguistic structure (Abdel Salam Al-Masdi, 1986,152). Thus, Bloomfield defines the sentence based on criteria of independence, focusing on form while neglecting meaning as a fundamental component of communication.

Noam Chomsky, a pioneer of transformational-generative grammar, defines the sentence as a set of phrases generated by rule-based mechanisms within a generative model (Noam Chomsky, trans. Mortada Jawad Baqir, 1983,39). Chomsky introduced innovative concepts regarding linguistic studies through his notions of generation and transformation ; he argued that language is not static as suggested by functionalists but rather a mental capacity governed by two essential processes : generation and transformation. He recognized three elements of a sentence : semantic elements, syntactic elements, and phonological elements. The production of a sentence begins with semantic components forming surface structure followed by syntactic components where grammatical transformations occur such as deletion and addition culminating in phonological components that shape the deep structure of the sentence. This dynamic context contrasts sharply with functional linguistics.

However, it is worth noting that Chomsky also overlooks the semantic and informative aspects of sentences by making grammatical structure a central criterion for their definition despite its belonging to the linguistic system rather than speech (usage). He determines sentence meaning based on linguistic code (semiological denotation), thus neglecting intended meanings and contextual cues associated with communicative processes.

It is important to highlight that Chomsky laid the groundwork for developing cognitive models for sentence production under what is known as linguistic modeling. These models drew inspiration from Chomsky's ideas regarding sentence components mentioned earlier and have significantly contributed to explaining linguistic disorders such as aphasia. Among these models is Garrett's model (1975, 1980), further developed by Levelt (1989), who posits that sentence production involves stages for processing linguistic information in memory sequentially :

- Concept preparation stage (semantic processing)
- Selection stage for lexical units (lemmas) and syntactic planning
- Retrieval stage for phonological information relevant to lexical units

- Planning stage for articulation

Studies incorporating such models in explaining aphasia suggest that this disorder arises from dysfunctions in one or more representations related to language : phonological, lexical, semantic, and syntactic.

However, reliance on these models for explaining aphasia is problematic for two reasons: first, language possesses its own cognitive processes that cannot be reduced merely to representations or units stored in memory; these processes are more complex and pertain to both language systems and their usage within speakers' brains encompassing constructions and recursivity (الاطالة) related to language code and predication along with discursive denotation (الدلالة على المعنى) and flexibility strategies as posited by the Neo-Khalilian theory.

The various linguistic studies on aphasia highlight the difficulty in providing a precise and comprehensive explanation of this disorder. This challenge may stem from the insufficiency of contemporary linguistic theories to adopt more procedural and inclusive concepts. Therefore, studying aphasia necessitates accurate and robust tools rooted in a theory that we believe to be both scientific and comprehensive, namely, The Neo-Khalilian theory (A. Hadj Salah, 1979). This theory does not limit speech to mere selection and composition processes or to opposition and segmentation alone but extends far beyond these elements. Consequently, the process of speech cannot be confined to merely neurological-physiological activities or solely to selection and composition operations or classification and generation capabilities. Instead, according to The Neo-Khalilian theory, it encompasses more complex and procedural operations such as analogy, the relation between root and derivative, and incremental transformation.

The notion that aphasia is solely a disorder related to selection or composition processes may result in misunderstandings, affecting both the description and explanation of the disorder within the clinical domain, as well as the definition of its linguistic concept in the theoretical domain. This functionalist perspective permits the identification of elements along the substitution axis solely within a singular morpho-syntactic category, neglecting their interrelations with other elements on the vertical axis. In contrast, The Neo-Khalilian theory posits that linguistic units are formed according to a generative schema tailored to each level, which simultaneously considers both the substitution and the composition or insertion axes. This approach makes the composition or relationships between linguistic units (O. Nasri-Boudali, 2001, 2005, 2010) not merely connected by roots, prefixes, and suffixes as functionalists suggest, The matter pertains to a multifaceted interaction between two procedural components, specifically the root and the derivative or isotope (الأصل و الفرع). This connection occurs in highly intricate contexts that go beyond mere linking or selection as Jakobson or Gagnepain believed but extend to structuration, successive and incremental variability, derivation, and so on. These processes vary depending on the type of generative scheme (الحد التوليدي).

Therefore, the shortcomings in aphasia analysis by Roman Jakobson and Jean Gagnepain are due to a lack of theoretical linguistic analysis, as emphasized by Abdel Rahman Hadj Salah (1979). Additionally, these theories neglected the communicative aspect of speech because that the primary goal of linguistic activity is communication with others. This aspect was never overlooked by The Neo-Khalilian theory, which distinguishes in its concept of language between the system of symbols (semiological/grammatical aspect) and its application according to communication circumstances or usage (semantic informative aspect). Among the concepts that have garnered our attention, besides usage, are predication and the discursive denotation and informativeness. These concepts have provided us with precise scientific criteria to study semantic-informative coherence at the sentence level, considering it the smallest informative unit differing in concept from the grammatical structure. The former is regulated by the principles of the system, whereas the sentence conforms to the rules of usage, despite the existing overlap and the priority of the grammatical unit due to its association with the language's structural system. In practical application, the sentence is influenced by the norms of communicative contexts and can either remain unchanged within the system or be adjusted in accordance with the demands of the communication process, guided by its contextual signals.

This study is part of a broader research effort where we have demonstrated, through the application of The Neo-Khalilian theory, that aphasia is a disorder affecting both the code (system) and usage. We have renamed these respectively as semiological-grammatical cohesion and semantic-informative coherence. The difference between Broca's and Wernicke's aphasia is attributed to varying degrees of this disorder concerning these two capabilities: Broca's aphasia can be explained by a greater disorder in the level of semiological-structural cohesion (formal) that controls the formation of linguistic units, including grammatical structures, while Wernicke's aphasia can be identified by a greater impairment in semantic-informative coherence, which governs the formation of discourse elements, including sentences. Our research has substantiated this through the implementation of the aphasia analysis protocol, thereby providing substantial validation for the principles of The Neo-Khalilian theory.

Therefore, our study here does not aim to present all the hypotheses, objectives, methodological procedures, and results of our research but focuses more on one aspect of the study, which is semantic-informative coherence at the sentence level. Hence, the objectives of this study, not the entire research, can be summarized as follows :

2. Objective

- Highlight the Importance of the Neo-Khalilian theory : This theory is significant not only as a linguistic framework but also as a perspective that views language as a system of cognitive processes and operations, rather than merely a classification of linguistic units. It emphasizes the unique cognitive processes inherent in human language, particularly in the study of language disorders such as aphasia.
- Focus on the Semantic and Pragmatic Aspects of Sentences: This study aims to shed light on an important aspect of aphasia analysis that has often been overlooked or superficially addressed in previous research: the semantic and pragmatic dimensions of sentences.
- The study will elucidate the differences between syntactic units and sentences as defined by the Neo-Khalilian theory.
- Conduct a Comparative Analysis of Broca's and Wernicke's Aphasia : The study will compare these two types of aphasia concerning sentence production and the underlying processes involved.

3. Hypotheses

The hypotheses related to sentence analysis in individuals with aphasia can be summarized as follows :

- Differences in semantic-informative coherence at the sentence level can be observed between a group of normal people and those with Broca's aphasia, and those with Wernicke's aphasia. These differences are evident in:
 - Discursive denotation (الدلالة على المعنى)
 - informativeness (الافادة)
 - Nucleus of Predicate (عمدة الاسناد)
 - Adjuncts of predication (فضلة الاسناد)
- There are differences in the use of speech origins and expansion strategies in semantic coherence among individuals with Broca's aphasia, attributed to variations in the degree of formulaic elaboration (Degree 1/Degree 2).
- Similarly, there are differences in the use of the root of speech and flexibility strategies in semantic informative coherence among individuals with Wernicke's aphasia, also attributed to variations in the degree of formulaic elaboration (Degree 1/Degree 2).

4. Methodology

It is essential to note that the methodology employed for analyzing sentences is part of a broader framework related to studying aphasia at two levels: the semiological- structural level concerning the construction of verbal units, and the semantic-informative level concerning the formation of discourse units. Therefore, our presentation will focus primarily on the second level related to sentences.

In our study on aphasia, we analyzed 30 cases (10 normal cases¹, 10 cases with Broca's aphasia, and 10 cases with Wernicke's aphasia). The field study was conducted in hospitals located in Algiers.

We employed two distinct methodologies in our research: the first was a statistical approach, characterized by descriptive quantitative analysis utilizing numerical data, while the second was a qualitative approach, focused on interpretive analysis.

The principles we designated as "semantic-informative coherence" were selected due to their complementary nature in examining linguistic activity from a comprehensive perspective. To analyze the collected data, we utilized statistical software (SPSS) employing T-tests and one-way ANOVA according to the requirements of each hypothesis.

5. Study Tools

The tools used in this research form part of an analytical and diagnostic protocol for aphasia, which includes :

- Developing a language and aphasia analysis framework that encompasses aspects related to sentences.
- Creating a scale that includes items assessing semantic coherence at the sentence level.

The contents of these tools can be further clarified as follows :

6.1 Language Analysis Grid for Sentence :

Our aphasia analysis grid was developed based on the principles of The Neo-Khalilian theory, particularly focusing on "code" (الوضع) and usage (الاستعمال). These principles refer to « semiological-grammatical Analysis » (التحليل) (اللفظي النحوي), which we termed "semiological-grammatical cohesion," and "semantic-informative analysis" (التحليل) (المعنوي الافادي), which we termed « semantic-informative coherence ». These principles were chosen for their complementarity in studying linguistic activity from all aspects.

The key points of our new aphasia analysis grid, from which we developed our protocol and designed our measurement scale, can be summarized as follows (ouahiba Nasri-Boudali, 2017):

6.1.1 semiological-Structural Cohesion :

The notion of cohesion pertains to the examination of the structural dimensions of language, detached from semantic considerations, which we have termed semiological- structural cohesion. Drawing from the Neo-Khalilian framework, we articulate this concept through the lens of incremental transformation, which transcends mere syntactic-semantic relationships inherent to speech acts (syntaxico-énonciatives) and is instead anchored in fundamental structural principles (القواعد البنوية) that connect two procedural components: the root (الاصل) and the isotope (derivative) (الفرع). These linguistic principles govern the verbal cohesion observable within each linguistic unit, irrespective of its hierarchical level whether it be a word, a phrase, or a signifier segment (المقطع الدال) and regardless of its cohesion degree, whether root or isotope (derivative). It is important to highlight that, within the

¹ It is worth noting that our focus on normal individuals was limited to quantitative study only, meaning that their data was not analyzed qualitatively. This approach was taken to provide greater credibility regarding how closely or distantly the abilities of individuals with aphasia (both Broca's and Wernicke's) align statistically with normal individuals. The primary comparison was aimed at distinguishing between Broca's aphasics and Wernicke's aphasics.

Neo-Khalilian perspective, "structure" frequently denotes grammatical structure or syntactic units. How does this theory interpret this concept ?

6.1.1 The Concept of Grammatical Structure According to the Neo-Khalilian theory :

The level of structures is considered to be higher than that of individual words, and its concept differs from what is presented in modern linguistics (with the exception of transformational-generative grammar) and among some later Arab grammarians. As Haj Saleh (2006) points out: "These scholars conflate what pertains to the structure belonging to a word such as the construction of a pronoun with a verb, mixed constructions, and the combination of feminine markers with feminine nouns with pure constructions that do not belong to any word." They refer to everything above the morpheme as a structure (syntagme). This indicates that Western linguists and even some contemporary arab grammarians fail to distinguish between structures at the word level, such as "أكلت" (I ate), "حقيبتي" (my bag), or "بيت الخال" (the uncle's house), and those occurring at a level above the word. Thus, structure here is not merely a connection between words or morphemes themselves, as these scholars believe. This view diverges significantly from the Neo-Khalilian theory and from the reality of language, which is far more complex. The primary distinction between the Neo-Khalilian theory and contemporary Western linguistics lies in their methodologies for defining units. Functional linguists segment discourse units including sentences into pieces without criteria other than the ability of these segments to substitute for one another while maintaining the meaning of the discourse. This results in a system of differentiation or opposition alone. Even though distributional linguists employ a more precise approach than functionalists by using substitution principles in their structural analysis focusing on components incrementally until they reach the smallest analyzable unit their analysis remains interwoven and hierarchical (Hadj Salah, 2007).

In contrast, the concept of structure in the Neo-Khalilian theory relies on a methodology that serves as metrics from which specific structures of the Arabic language system are derived. One of the most important metrics is analogy, which differs from Aristotle's analogy used in structural linguistic studies. As Haj Saleh states, analogy involves "applying one thing to another due to commonality between them." He explains that analogy means "to relate all elements belonging to a certain category or class of linguistic elements to one another so that structural equivalence can be clarified." The commonality among members of a single class does not depend solely on their distinguishing features that categorize them but also considers their structure and form. For structures like significant segments (الكلم) and lexies (اللفظات) there is a generator scheme which can be detailed as follows:

Ø	زيد Zayd	قائم is standing	
إن Indeed	زيذا Zayd	قائم Is standing	هنا Here
Zayd زيد	Was كان	Standing قائما	Yesterday أمس
حسبت I thought	زيد Zayd	قائما Was standing	غلطا Incorrectly
أعلمت عمرا I informed Amr	زيذا that Zayd	قائما is standing	حالا Now
زيد Zayd	أكرم honored	عمرا Amr	إكراما in honor
أكرم I	ت Honored	عمرا Amr	كثيرا Greatly

(الاصل) Root	(العامل) Governor	(المعمول الأول) First dependent Term	(المعمول الثاني) Second dependentTerm	المخصص complements
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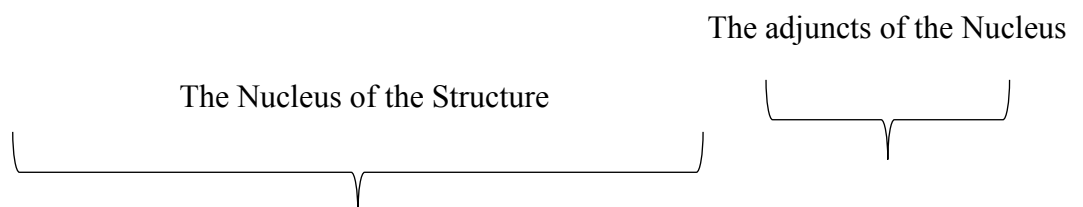
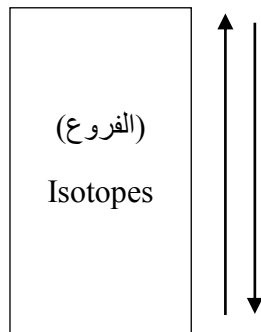


Diagram representing the generative example of structures (syntactic structure) (Hadj Salah, 2006)

The essential element in determining syntactic structure is the Governor (G) (ع: العامل). The early arab grammarians referred to that which influences the original piece, both in terms of expression and meaning, as the Governor, while they termed each element affected by that Governor as (dependent). There are two such dependents (D) (م: المعمول), and they also noted that the Governor can never be preceded by any of the dependents. Thus, they assigned a rank to each dependent : the first is characterized by stability (FD) (م1: المعمول الأول), while the second (SD) (م2: المعمول الثاني) can precede the Governor. The characteristics of the generated example for structures and the concept of the Governor can be summarized in the following points (A. Hadj Salah, 2007) :

- The root of the syntactic unit is determined by the absence of excess. This means that the Governor here is unexpressed, equating to zero, which ancient grammarians referred to as (initiation) and represented by the mathematical symbol ($\emptyset$) (A. Hadj Salah, 2007).
- The zero-equivalent Governor has a structural relationship with the first dependent ; it is not a relational connection because it carries the first dependent, which is subordinate to it in both estimated and verbal order. The first dependent is part of the ordered pair (Governor $\rightarrow$ first dependent) and can never precede the Governor.
- The complements (denoted as M) (خ : المخصص) at the level of structures are elements that enter into the nuclear group : Governor (G), first dependent (FD), second dependent (SD). These elements enter into the root of structure through a process of connection, and their absence does not affect the syntactic unit. However, when they are linked to the nuclear unit, they are influenced in terms of expression and meaning by the factor and

dependents. Thus, the relationships among all elements of a syntactic unit can generally be represented by the following structure or formula :

$$\left[\begin{array}{c} \left(G \rightarrow FD \right) \pm SD \pm M \\ \left(\text{ع} \leftarrow 1_M \pm 2_M \pm \text{خ} \right) \end{array} \right]$$

- There are two basic forms of structures represented according to Hadj Salah as follows:

* A form where the Governor (G) is either equal to zero ($\emptyset$), indicating a position of initiation, or a particle (P) such as (ان) "that," or a copulative verb (CV) like (كان) "Was." This form, if limited only to the root of structure, contains a subject (المبتدأ) and predicate (الخبر):

$$\left(G (\emptyset / P / CV) \rightarrow D1 \right) \pm D2 (D3 + D4 \dots) \pm M$$

$$\left(\text{ع} (\emptyset / \text{ح} / \text{فن}) \leftarrow 1_M \pm 2_M \pm (\dots 4_M + 3_M) \text{خ} \right)$$

* A form where the Governor is a verb (V) :

$$\left(G (v) \rightarrow D1 \right) \pm D2 \pm M$$

$$\left(\text{ع} (\text{ف}) \leftarrow 1_M \pm 2_M \pm \text{خ} \right)$$

These structures may be linked with a modifier (M) through a process of connection, such as an adverbial clause or an exception....

However, there exists a higher level that is more abstract than structures, which pertains to conditionality (C) : (ش) and interrogation (I) (س: الاستفهام), represented as follows:

$$\text{ع (س، ش)} \leftarrow 1_M (\text{ع} \leftarrow 1_M \pm 2_M \text{خ}) \pm 2_M (\text{ع} \leftarrow 1_M \pm 2_M \text{خ})$$

$$G (I, C) \rightarrow D1 (G \rightarrow D1 \ D2 \pm M) \ SD \ (G \rightarrow D1 \ D2 \pm M)$$

It is evident from this presentation of grammatical structure that the contexts governing its formation are not merely about connection, opposition, segmentation, or substitution, as is the case in Western linguistics. Instead, they involve more complex processes such as construction, structural integration, and extension, in addition to connection. What distinguishes these contexts is their ability to link two essential procedural elements : the root and the isotope . This linkage results in coherent and organized relationships among the elements of the structural unit at both the syntactic axis and the vertical axis simultaneously.

Since this study focuses on the sentence, we will not expand here on the grammatical unit and its associated processes such as construction, structural integration, and extension. We will only provide a brief overview of this concept to differentiate it from the concept of a sentence.

6.1.2 Semantic- informative Cohérence :

Semantic-informative coherence refers to a system encompassing all contexts of coherence that allow for the real use of semiological- structural analysis within a communicative situation. The Neo-Khalilian theory has focused its analysis at this level on the sentence or what Al-Khalil refers to as "independent speech." This meaningful communicative unit is governed by rules of communication, primarily involving the processes of predication (including its nucleus and adjuncts components) and discursive denotation. In this context, the predicate relates to the subject (the nucleus of predication), which makes it a unit that not only has meaning but also serves a purpose (information), as it represents an event (i.e., an action) for informing, prohibiting, commanding, or other speech acts. The sentence may adhere strictly to the rules of linguistic positioning (root of speech) (أصل الكلام) or may exhibit flexibility (الانفتاح), allowing the speaker some freedom within these rules. However, this freedom is regulated by other rules related to the circumstances surrounding the communicative process. Contextual clues can intervene to compensate for what is dictated by situational rules, such as direct observation or what said or happened in speech (verbal or situational context) (ما جرى من الذكر). Furthermore, this adaptability may stem from the speaker's capacity to express their intentions through rhetorical techniques learned through convention, including the use of figurative language or metaphors. We suggest designating these processes associated with the speaker's adjustment to discourse contexts as "flexibility strategies" (استراتيجيات الاتساع).

In our analysis of discourse-text, we have incorporated some concepts related to discourse analysis grid (H. Nouani, 1996 ; F. François, 1991), Pragmatic analysis must view discourse-text as an integrated event or action that emerges from various speech acts, which are regulated by the principles of communication. This perspective establishes a dynamic equilibrium among participants, observable through the progression of actions and the distribution of rhetorical functions. The concepts integrated into our framework pertain to analyzing narrative discourse content across two levels: the first involves determining coherence from a semantic and relational perspective, referred to as major sequences. The second level concerns minor sequences.

What is relevant in this study pertains specifically to sentences ; therefore, we will present below the content of this grid :

Given what has been said about aphasia and its associated studies at the sentence level, we cannot accept modern linguistic principles in our analysis of this unit, especially since they do not align with the specificities of the Arabic language system and its usage among individuals with aphasia. Hence, our focus in studying sentences among these individuals is based on the Neo-Khalilian theory and how ancient Arab scholars perceived sentences.

6.1.2.1 Sentence Analysis Grid

The sentence or "independent speech," as defined by Sibawayh, is "that which can stand alone without silence ; it does not suffice unless you see that "كان" (Was) functions like "ضرب" (Hit), and if you say "كان عبد الله" (Abdellah was), it is not considered speech; however, if you say "ضرب عبد الله" (Abdellah hit), it is considered speech" (Hadj Salah, 2007). The implication of this term, as clarified by Hadj Salah, is that independent speech is such that it is appropriate for the speaker to pause upon its completion because it stands alone in both wording and meaning. Thus, it forms a communicative unit that provides benefit to the listener. Consequently, it can be stated that Sibawayh's term for « speech » (الكلام) suffices to denote the concept of a meaningful and informative sentence. Hadj Salah notes that « speech » in discours, is at its minimum when there are no omissions" (Hadj Salah, 2007). What then governs the criteria for defining a sentence ?

A.1 Predication (الاسناد)

The sentence can be analyzed into discursive components, each of which has a semantic and informative function. These elements, as previously mentioned, are the predicate and the subject.

A.1.1 Nucleus of predication (عمدة الاسناد)

The fundamental aspect of predication encompasses the crucial constituents : the predicate and the subject, which align with the verb and the subject (in a verbal construction) or the subject and the predicate (in a nominal construction).

- **The subject (المسند اليه)** is the entity being discussed and must be a noun in terms of discourse, or something equivalent, such as in the phrase (and if you fast, it is better for you).
- **The predicate (المسند)** refers to the statement or information provided about the subject, which Hadj Salah refers to as "the communicated." It can be a noun, verb, or something equivalent (such as an adverbial phrase, prepositional phrase, etc.).

Arab grammarians have classified sentences into :

A.1.2 Adjuncts (or additional elements) of the predication (فضلة الاسناد)

These elements pertain to all components that enhance the meaning of the predicate and subject, including adjectives and adverbials...

The criterion of predication is crucial for analyzing sentences in a discursive rather than merely semiological or semantic manner. Here, the sentence has its own formulation that differs from semiological-structural formulation, a distinction often overlooked in modern linguistics, particularly functional linguistics. However, analyzing semantic and informative coherence in a sentence relies on two other criteria without which the study would be incomplete : discursive denotation and informativeness.

A.2 Discursive denotation (الدلالة على معنى الحديث)

Early Arab grammarians considered verbal units or words to serve meaning ; they always begin their analysis of meanings with the the verbal unit (اللفظ) itself. Consequently, they divided meaning (denotation) into several categories as follows :

- **Semiological denotation (الدلالة اللفظية)**: This is dictated by the word according to its conventional code. Here, meaning is situationally defined. Each language has its agreed-upon indicators whereby verbal units (signifiants) are linked to their meanings (signifies) according to what is dictated by conventional code (the root of speech).
- **Semantic denotation (الدلالة المعنوية)**: Referred to by Abdul Qahir al-Jurjani as "the meaning of meaning (دلالة معنى المعنى)", this type arises from conventional meaning but is understood through reason rather than convention. This includes figures of speech such as metonymy and metaphor. It encompasses not only the literal meaning but also intended meanings within discourse, such as metaphorical expressions and other rhetorical devices. Every discourse represents an action by the speaker even informative statements although they distinguished between informative verbs and performative verbs, differentiating between acts of informing and events corresponding to performative verbs.
- **Contextual denotation (الدلالة الحالية)**: This pertains to meanings arising from the context of discourse based on non-verbal cues that can substitute for conventional indicators. In pragmatic terms, this is referred to situational context and is associated with non-verbal cues such as facial expressions and gestures.
- **denotation from what was said (دلالة ما جرى من الذكر)**: This relates to the verbal context of discourse.
- **Knowledge of the interlocutor (دلالة علم المخاطب)** : This concerns the speaker's personal experience related to the topic at hand and their understanding of language structure and usage.

From all this, we can conclude that sources for indicating meaning in a sentence are diverse and may all or some combine during comprehension. However, the Neo-Khalilian theory begins its search for sentence meaning primarily from semiological denotation as an observable scientific criterion. In cases where this is lacking, it turns towards other indications for understanding while relying on logical reasoning.

It is important to note that the Neo-Khalilian theory does not focus solely on the receiver during communication in terms of comprehension but also considers the speaker's intent when conveying their purposes to ensure understanding. This indicates that this theory is not merely linguistic or pragmatic ; rather, it is a cognitive theory that emphasizes the significance of meaning in communication. Generally speaking, speakers employ two types of approaches in conveying their purposes and thus their meanings :

A.2.1 The root of Speech (اصل الكلام):

This means that their speech aligns with what has been established in terms of wording and meaning according to convention. However, it should be noted that speech, regardless of how well it conforms to linguistic rules, undergoes some modification due to its connection with discourse conditions. Arab grammarians have classified meanings within constructions based on their conventional origins into two types: informative and performative acts such as prohibition and command.

A.2.2 Flexibility in Speech (الاتساع):

This refers to speech that varies either in signifier or signified or both simultaneously. As a result, this leads to phenomena such as ellipsis, abbreviation, amplification, metonymy, metaphor, syntax variations, and even phonetic aspects like substitution or assimilation phenomena. Flexibility can only occur with non-verbal cues such as contextual and semantic denotation. This translation aims for clarity while preserving academic rigor and coherence throughout the text.

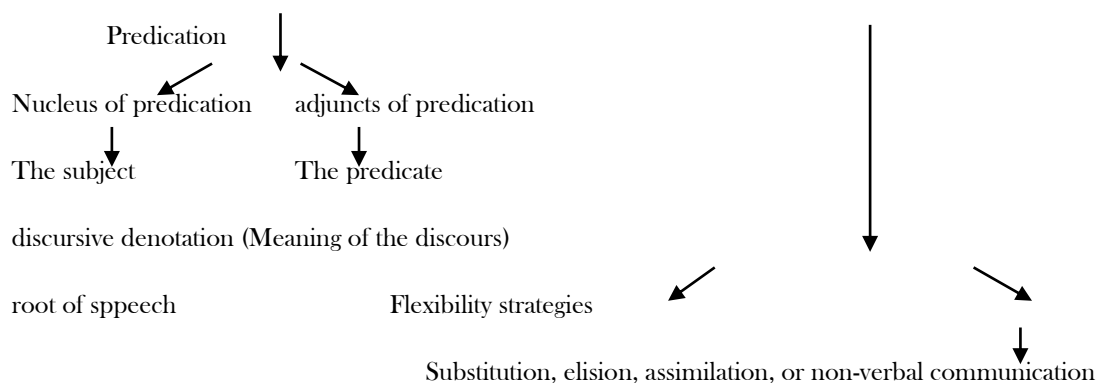
We have preferred to refer to these phenomena as "flexibility strategies," as flexibility is a cognitive process. It can be described as a cognitive strategy due to its incorporation of planning, intentionality, and adaptation to the situation. As Al-Zayyat (1996, p. 325) defines cognitive strategy: "a behavior, thought pattern, or intentional method that an individual uses to influence their choices, processing, solutions to problematic situations, or interactions with their environment." Thus, in order to convey their purposes, speakers choose a flexible approach instead of what the linguistic system requires (root of speech) to adapt to discourse conditions by utilizing non-verbal cues such as semantic and contextual denotation. Often, this process is linked to the speaker-listener's ability to articulate (the art of communication). It is noteworthy that these flexibility strategies have recently been identified by specialists in psycholinguistics and speech pathology (J. L. Nespoulous & M. Leclerc, 1990) among both typical individuals and those with aphasia. They refer to these strategies as compensatory strategies, believing that they pertain not only to language but also fall within the realm of underlying cognitive abilities related to performance. Consequently, they are considered aspects of individual behavior rather than components of language itself. This indicates the precedence of Arab grammarians in uncovering the components and laws of language. They assert that language is both a code and its usage. Since flexibility strategies involve the application of this system according to discourse conditions, they are thus an integral part of language. While it is true that these strategies may vary from person to person based on individual experiences and cognitive and physiological abilities, they are acquired through environmental influences and social conventions. Therefore, they represent a linguistic phenomenon specific to human beings that can be generalized rather than being limited solely to individual behavior, as suggested by western scientists.

A.3 informativeness (الافادة) :

The true measure of informativeness is the degree of ignorance or doubt experienced by the addressee when receiving a particular piece of information. This means that informativeness consists of those ideas and concepts (information) that have entered the mind of the addressee and which can only be acquired through the spoken words received (whether verbal : through hearing or writing, or non-verbal : through flexibility). Informativeness is

characterized by quantification based on the volume of information obtained by the receiver. This quantification can be influenced by the components of the sentence in terms of predication, which have been previously mentioned : the nucleus of predication and its adjuncts .Our analysis grid for sentences can be represented as follows :

Semantic and informative Coherence at the Sentence Level (The Pragmatic Use of Sentence)



6.2 Items for Semantic - informative Coherence at the Sentence Level :

These items were developed within a broader diagnostic protocol for aphasia, which primarily originated from the aforementioned analysis grid. The aim of these items is to study sentences among individuals with aphasia.

In the development of this scale, we considered the unique linguistic characteristics of Algerian dialects, employing a methodology that operates on two distinct levels (Ouahiba Nasri-Boudali, 2017): the level of nominal and verbal lexies (which includes significant segment analyzed vertically (الكلمة) and the level of grammatical structures (التركيب). In formulating the items for this scale, we followed the principle of generator schemes to delineate these levels and the corresponding linguistic units. The core principle guiding this process is that of progressive transformation (i.e., incremental transformation), which begins with the roots (الاصول) or nucleus of each unit at these two levels and extends to their derivatives or isotopes (الفروع) . The analysis aimed at semantic and informative coherence was structured around these two levels, advancing from simpler to more complex structures. The items included :

- Forming sentences from words.
- Filling in gaps within sentences.
- Constructing sentences based on provided examples.
- Completing sentences.

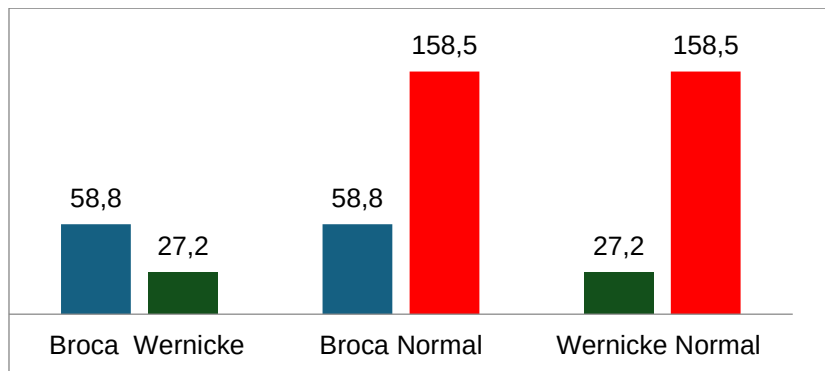
These items underwent psychometric evaluation where validity and reliability were calculated ; results confirmed their credibility regarding what was intended to be measured. This translation maintains an academic tone while ensuring clarity and coherence throughout the text.

6. Results of semantic-informative coherence analysis at the sentence level in aphasia patients :

Statistical analysis of this level revealed that both Broca's and Wernicke's aphasia patients exhibited difficulties with semantic-informative coherence. Significant differences were observed in the mean scores between these groups

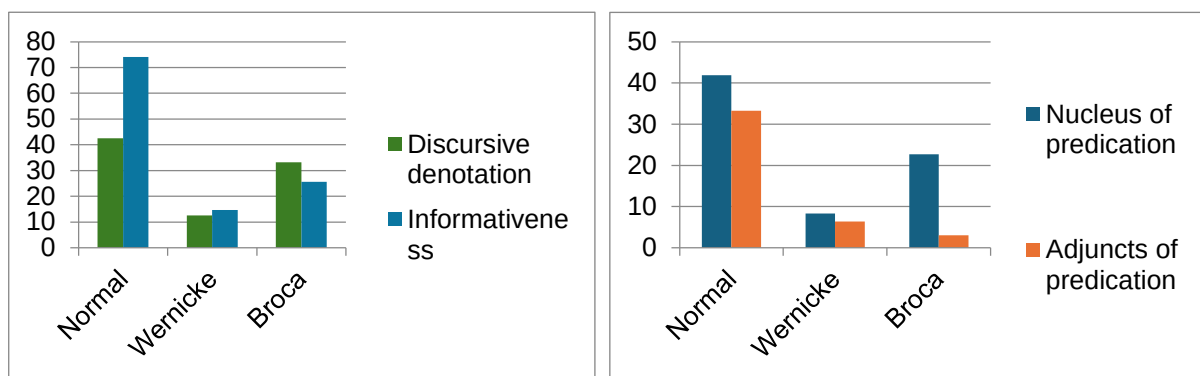
(58.8 for Broca's and 27.2 for Wernicke's) and the control group (158.5), with the latter performing significantly better. However, Broca's aphasia patients demonstrated considerably better semantic-informative coherence at the sentence level compared to Wernicke's aphasia patients. Despite their superior performance in semiological-grammatical cohesion, Wernicke's aphasia patients struggled to go beyond the structural level and provide meaningful content in their speech. Their utterances were characterized by phonemic and semantic paraphasias, as well as fragmented and incomprehensible sentence fragments.

The following bar graphs illustrate the mean differences between the paired groups:



A bar chart illustrating the pairwise mean differences in sentence-level semantic-informative coherence between normal individuals, and Broca's aphasics, and Wernicke's aphasics.

Analysis of the transcripts of Broca's aphasia patients revealed that, despite their limited ability to use grammatical structures, they were better able than Wernicke's aphasia patients to convey meaning and content in their speech. This was evident even in their use of telegraphic speech, suggesting a greater capacity for linguistic comprehension. This can be attributed to their greater reliance on discursive denotation and their ability to construct informative sentences. The average scores for semantics and pragmatics among patients with Broca's aphasia were 33.2 and 25.6, respectively, while patients with Wernicke's aphasia exhibited scores of 12.5 and 14.7. Additionally, individuals with Broca's aphasia demonstrated a greater reliance on the nucleus of predication, namely the subject and predicate, achieving mean scores of 22.7 and 3, respectively. In contrast, Wernicke's aphasia patients recorded mean scores of 8.3 and 6.4 for these same elements. The subsequent graphs provide a visual representation of these results:



A bar chart illustrating mean differences in sentence-level semantic-informative coherence in terms of discursive denotation and informativeness between normal individuals, and Wernicke's aphasics, and Broca's aphasics.	A bar chart illustrating mean differences in the use of the nucleus and adjuncts of predication in sentence-level semantic-informative coherence between normal individuals and Wernicke's aphasics, and Broca's aphasics.
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All these results can be explained through the following examples:

Some Items from the Scale	Some Responses from Individuals with Wernicke's Aphasia	Some Responses from Individuals with Broca's Aphasia
Construction According to the Formula (G) V → FD Some sentences for formation: طاح / طار / الولد (The boy/ flew/ fell) → قلع / علق / الطائرة The airplane / hung / took off →	طار الولد (The boy flew). علقتهم في الطائرة (I hung them in the airplane).	طاح (He fell) قلع الطائرة (Took off an airplane)
Construction According to the Formula (G) V → FD SD (Some sentences for formation): مضروب فريق رفيق سمير (Samir / companion / team / hit) → مشروب الشيخ سلمى (Salma / old man / Artemisia / drunk) → ...	ضربوه السميع الفريق ألي واسمو (They hit Samir, the team that was named). شربت سلمى الشيخ (Salma drank the old man) سلمى الشيخ شربتها (Salma the Artemisia drank it).	ضرب (He hit) شرب.....ت الشيخ (she drank the Artemisia)

The responses indicate that both individuals with Broca's aphasia and those with Wernicke's aphasia exhibit a deficiency in semantic and informative coherence at the sentence level, manifesting in two primary aspects :

7.1 Discursive denotation :

This inadequacy is apparent either due to an absence of clarity in the meaning of the sentence or through mistakes that undermine logical reasoning. Notably, individuals with Wernicke's aphasia often struggle to construct complete and logically acceptable sentences. In our view, this arises from two main reasons :

- Firstly, there is a deficiency in the root of meaning (أصل المعنى) represented by the semiological denotation. This is illustrated by the presence of semiological errors that affect the conventional usage itself, resulting in a mismatch between signifiers and their respective signifieds. For instance, we have previously observed examples where terms such as "الطيارة" which incorrectly refers to "الطائرة" (the airplane) exemplify what is termed in aphasiological literature as paraphasias. The lack of semiological denotation among these individuals may also be noted through their use of vague terms e.g., "واسمو" (the named), which serve as placeholders.
- Secondly, This issue may also arise from a difficulty in moving from the root of meaning (semiological denotation) relative to the language code to the derivatives of meanings that are pertinent to the practical usage of that code, all while maintaining semantic coherence. Each signifier in a sentence carries an inherently ambiguous conventional meaning, and when it is associated with other signifiers in the sentence, its meaning is refined and

made specific. To accomplish this, it is crucial that each denotation within the sentence conforms to relational semantics. A concept that Arab scientists describe as semantic implication (تلازم المعنى). The errors affecting this implication among individuals with Wernicke's aphasia can be illustrated by their constructions such as "طار الولد" (The boy flew) or "شربت سلمى الشيخ" (Salma drank the old man), where the denotation of "طار" (flew) does not correspond logically with "الولد" (the boy), and similarly for "شربت" (drank) and "الشيخ" (the old man). This also indicates their inability to utilize their capacity of semiological-grammatical cohesion in usage; despite their sentences being structurally and semiologically correct due to the inclusion of governor of verbs and appropriate elements to the code, they ultimately lack semantic denotation.

- The difficulties experienced by individuals with Wernicke's aphasia regarding semantic coherence may also be attributed to challenges associated with semiological- structural cohesion. This often arises from an inability to form more than one linguistic unit simultaneously, where each unit pertains to a specific structural process. In sentence formation, the Wernicke's aphasia are required not only to produce lexies but also to construct grammatical structures. Given they face greater challenges in structuration than in concatenation, they may overemphasize the latter by excessively using linking elements such as "الذي" (which/That), leading to incomplete expressions that merely connect and arrange words without achieving full syntactical structure, as demonstrated in phrases like "ضربوه السميع" (They hit Samir, the team that was named...).
- Thus, it can be argued that one of the primary reasons Wernicke's aphasics fail in semantic denotation is their excessive and irrational reliance on concatenation and elongation processes (الاطالة).
- The inability of Wernicke's aphasics to semantic denotation is further exemplified by their difficulty in appropriately using ambiguous signs. For example, when using third-person pronouns incorrectly where a masculine pronoun is used instead of a feminine one this does not align with its referent (e.g., "الشاي" in the example: "Salma the Artemisia drank it شربت سلمى الشيخ" should refer back correctly).

In contrast, individuals with Broca's aphasia, despite exhibiting a noticeable deficiency in their linguistic repertoire compared to those with Wernicke's aphasia, are generally more capable of constructing semantically acceptable sentences. This ability can be attributed to:

- A greater control over verbal denotation or original meaning, which results in a more appropriate alignment between signifiers and their conventional meanings. This is evident through fewer transformations they commit compared to those with Wernicke's aphasia.
- The capacity to shift from primary meanings to associated branches while preserving coherence among the meanings of the words that constitute the sentence.
- Their capacity to construct simple forms that can be classified under "basic forms" across all linguistic levels.
- The errors in semantic coherence among individuals with Broca's aphasia primarily stem from difficulties related to verbal structural consistency, as observed in phrases like "قلع طائرة" (He removed an airplane), which merely consist of a sequence of basic words.

7.2 Regarding the informativeness (الافادة):

Both individuals with Broca's aphasia and those with Wernicke's aphasia encounter challenges in conveying their thoughts effectively. This phenomenon aligns with what Sibawayh refers to as information (الاعلام), and these difficulties stem from similar issues related to discursive denotation. The informativeness or utility of communication is contingent upon the presence of meaning within a sentence; thus, it cannot be measured without assessing discursive denotation. While a sentence like "الثلج ابيض" (The snow is white) contains meaning, it lacks informativeness because it does not provide information unknown to the interlocutor.

If Neo-khalilien theory establishes a criterion for discursive denotation based on acceptability or impossibility, then the criterion for informativeness according to this theory relies on the quantity of information intended for transmission to inform the listener. Consequently, Hadj Salah (2013) states that it is possible to quantify informative denotation. Observations from responses provided by individuals with aphasia indicate that their ability

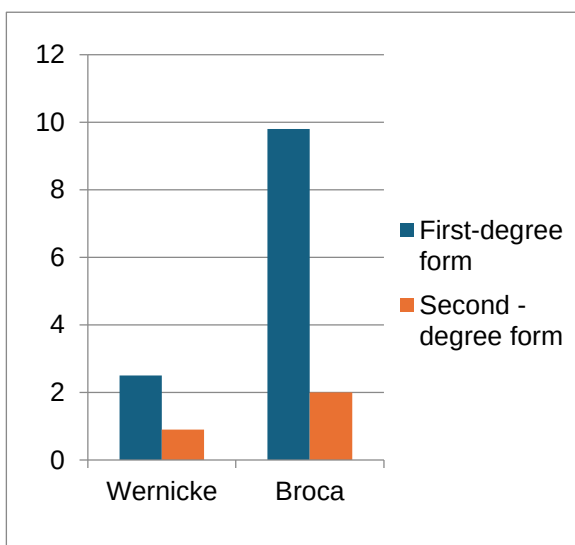
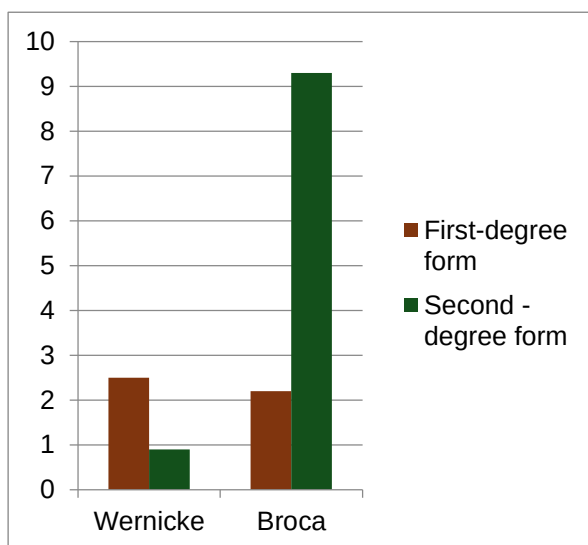
to convey information is adversely affected by difficulties associated with discursive denotation ; whenever these latter experiences are impeded or diminished, informativeness suffers accordingly this remains evident regardless of whether the impairment is Broca's or Wernicke's type. However, individuals with Broca's aphasia demonstrate a greater capacity for informativeness despite their reduced ability for semiological-grammatical cohesion.

6.3 Regarding the nucleus of predication and its adjuncts :

Concerning the components of predication, an examination of the responses from individuals with the aforementioned types of aphasia, specifically regarding discursive denotation and informativeness reveals that the lack of use of these components in Wernicke's aphasics primarily stems from their difficulties with discursive denotation. Although they can construct sentences that are structurally sound in terms of semiological-grammatical cohesion, they struggle to transition from the root of meaning (the conventional meanings of words within a sentence) to its derivatives (فروع المعنى). This challenge arises from their inability to manage the coherence of meanings, which is a fundamental condition for moving from ambiguous conventional meanings to specific defined meanings. For instance, sentences that appear structurally correct, such as "شربت سلمى الشيخ" (Salma drank the old man), fail to convey meaningful content or informativeness because they lack the essential components of predication that contribute to the construction not of its grammatical but of its predicative formula, represented by the nucleus of predication and its adjuncts. Thus, this sentence could be devoid of these adjuncts. Consequently, the phrase "طار الولد" (The boy flew) cannot be considered a complete sentence with a nucleus of predication (subject and predicate), despite its grammatical structure containing the form $G(V) \rightarrow FD$. Similarly, "شربت سلمى" (Salma drank the old man) also does not constitute a complete sentence with a nucleus of predication and adjuncts, even though it possesses the grammatical structure $G(V) \rightarrow Fd Sd$. These two components not only provide content for the sentence but also carry a specific amount of information intended for communication to the interlocutor. In contrast, Broca's aphasics demonstrate through their responses that the required structural forms are generally absent. However, the phrases they produce often contain simple forms: either root-lexies (لفظات-اصول) such as "طاح" (fell) and "ضرب" (hit), which follow the pattern of the verb in the past (فعل), or root-grammatical structures (بنى نحوية-اصول) like "شربت سلمى" (Salma drank Artemisia...), which have the form $G(V) \rightarrow FD (D) SD$. These sentences align more closely with predicative forms, particularly with respect to their nucleus of predication, where it is evident that most sentences they construct include nucleus of predication, which are essential for sentences formation ; without this component, a sentence cannot exist. This does not imply that individuals with Broca's aphasia are incapable of forming sentences with adjuncts of predication ; rather, their use of them is less frequent than that of nucleus of predication. This can primarily be attributed to their noticeable deficits in semiological-grammatical cohesion, as they often find themselves unable to perform incremental transformations, and thus struggle to create phrases with additional elements that could serve as adjuncts. From this analysis, we conclude that Broca's aphasics have managed to retain some degree of root-forms (صيغ-اصول) relevant to code, allowing them to utilize these forms in constructing sentences, particularly in forming nucleus of predication encompass not only meaning but also informativeness.

7.4. Regarding the root of Speech and flexibility strategies :

The findings indicate that aphasics exhibit varying degrees of semantic-informative coherence based on differences in the derivation of forms and the quality of adjuncts used. Broca's aphasics tend to employ root of speech more frequently when recalling first degree linguistic units compared to second degree units. The mean scores for these individuals were approximately 9.8 for first degree forms and 2 for second degree forms. In contrast Wernicke's aphasics had mean scores of 1.8 for first degree forms and 3.9 for second degree forms. They are more adept at utilizing root of speech when dealing with second degree forms. Conversely, Wernicke's aphasics rely more on flexibility strategies when asked to recall first degree structures compared to second degree structures ; their mean scores were 0.9 for first degree forms and 2.5 for second-level forms. This contrasts with Broca's aphasics, who utilize flexibility strategies more frequently when recalling second degree units compared to first degree structures, as evidenced by mean scores of 2.2 for second degree units and 9.3 for first degree units. These results are further supported by the following columns:



A graph illustrating the differences in mean values regarding the use of root of speech in semantic-informative coherence and at the sentence level, based on the degree of transformation forms between Wernicke's aphasics and Broca's aphasics.

A graph illustrating the differences in mean values regarding the use of flexibility Strategies in Semantic-informative Coherence at the Sentence level based on the degree of transformation Forms between Wernicke's Aphasics and Broca's Aphasics

To clarify these results regarding original speech, we selected the following examples:

Clause for the structural integration of the element (كان) « was » (some construction sentences):	Some responses of patients with Wernicke's aphasia	Some responses of patients with Broca's aphasia
Sentence degree 1 : كان / محمد حنين (Mohammad compassionate / was) → Sentence degree 2 : كان / طبيب بابا غايب (Dad's doctor absent /was)→	كان محمد الحنين (Mohammad was the compassionate) طبيب بابا كان غايب (Dad's doctor was absent)	كان محمد حنين (Was Mohammad compassionate) كان... اوف صعب (Was... oh. Difficult)

It appears from the responses of aphasics that whenever the sentences require first degree forms Broca's aphasics are more capable of producing sentences that align with the code (الوضع), both in semiological units (اللفظ) and meaning (المعنى), which is referred to by ancient arab scholars as root of speech. For example, the sentence "كان محمد حنين" (Was Mohammad compassionate) is constructed in the required form G (was) →FD (Mohammad) SD (compassionate). Conversely, as the requirement shifts to second degree forms, their ability to utilize root of speech to convey meaning and informativeness diminishes, as seen in the phrase "كان... اوف صعب" (Was... oh. Difficult),

where the words express frustration and difficulty. In contrast, for Wernicke's aphasics, as the sentences they are asked to form require first degree structures, their capacity to use root of speech as a source of meaning declines. This is evident in the phrase "كان محمد الحنين" (Was Mohammad compassionate), which fails to achieve even basic structure due to the inclusion of a definite article (ال) in "الحنين" compassionate." However, when these sentences contain second degree forms, they demonstrate a better ability to employ root of speech, as exemplified by "طبيب" طبيب "بأبأ كان غايب" (Doctor dad was absent), which follows the required structure G (was) → FD (Doctor dad) SD (absent).

Thus, it can be concluded that retaining certain characteristics of language as a system or structure is significant for aphasics, regardless of the type of impairment. This retention facilitates their task of achieving not only some correct forms or structures in terms of code (الوضع) but also obtaining meaningful and useful meanings that are appropriate for use (الاستعمال).

Numerous studies have examined aphasia based on what is retained or lost (Nespoulous, 1980, 1986, 1990, 1994, 1996 ; Watzlawick et al. 1972 ; Tran, 2000). However, they have often focused primarily on Broca's aphasia. These studies consistently describe it as characterized by simple and non-expansive forms capable of conveying informational messages. Yet, they fail to provide an explanation for this phenomenon. We argue that this can be attributed to a greater retention among Broca's aphasics regarding structural processes compared to connections and a higher retention of first degree forms compared to second degree forms. Some studies (Rondal et Seron, 2003) have found that Wernicke's aphasics struggle with naming objects and tend to use paraphrases instead of providing target words. However, these studies did not offer a linguistic explanation for this behavior and attributed it to difficulties accessing phonological representation while retaining semantic representation (Rondal et Seron, 2003 ; Caramazza et Hillis, 1993), overlooking that paraphrasing itself involves structures that extend beyond single words and thus necessitate complex forms that can only be produced by those who have retained them. This aligns perfectly with our findings that Wernicke's aphasics perform better with sentences requiring second degree forms.

Regarding the Results Related to Flexibility Strategies : These can be illustrated through the following examples :

Some Sentences for Composition from the Scale Items	Some Answers by Wernicke's Aphasia Patients	Some Answers by Broca's Aphasia Patients
Item : Sentence Construction According to the Formula (G (V) → D) : First degree Sentence : طاح / ولد / طار / (The boy/ flew/ fell) → Second degree Sentence : قلع / علق / طيارة (The airplane/ stuck/ took off) →	رابهم الولد (The boy collapsed) قلعت الطائرة (The airplane took off)	الولد طاح (The boy fell) طيارة..... سما (Airplane..... sky) (the patient gestures to the sky)
Item : Structural Integration for the Element "Was" : First degree Sentence : سمير سمين / كان (Samir fat/was) → Second degree Sentence : سمير باباه معروف / كان (Samir's father known /was) →	كان الراجل الي هو سمير سمين (The man, who is Samir, was fat) كان باباهم معروف، هذا سمير (His father was known, this is Samir) (the patient points to the word "Samir")	سمير سمين (Samir is fat) كان معروف (Was known)
Item : Integration in Position FD of Formula (S) :	عمر المضروب على وهرب (Omar, who was hit, Ali and ran	عمر ضرب علي وهرب

First degree Sentence : عمر علي مضروب هرب (Ali was hit /Omar → ... and ran)	away)	(Omar hit Ali and ran)
Second degree Sentence : الطفلة الصغيرة مضروبة (The little girl was hit)	فريد يضرب الطفلة الصغيرة ويهرب (Farid hit the little girl and ran away)	فريد يضرب يهرب (Farid hits and runs)
فريد ويهرب (Farid → and runs)		

The observations derived from the examples of responses provided by individuals with aphasia affirm the assertions made in the last two hypotheses regarding the differences in the use of flexibility strategies, which stem from variations in the degree of formulation. It is evident that Wernicke's aphasics may struggle to construct sentences with first degree structures, as illustrated by the phrase "عمر المضروب علي و هرب" (Omar, who was hit Ali and ran away). Alternatively, they may resort to other means of conveying their intentions by employing a type of flexibility (الاتساع), which we have termed flexibility strategies. These strategies manifest in their attempts to approximate target meanings either through:

- Semantic denotation using metaphor, as seen in the phrase "رايلهم لولد" (The boy collapsed), where there is a convergence between the meanings of "طاح" (fell) and "راب" (collapsed in Algerian dialect). Although "راب" (collapsed) is not conventionally used to denote falling, this approach indicates their ability to form what resembles a metaphor, which is considered one of the mechanisms of rhetoric.
- Syntactic expansion through "expansion," exemplified by the phrase "كان الرجل الي هو سمير سمين" (The man who is Samir is fat), where an embedded clause using a relative pronoun "الذي" (Which / That) is incorporated into the statement. This serves as further evidence that Wernicke's aphasics can sometimes utilize their remaining capacity for incremental transformation to construct sentences.
- When Wernicke's aphasics are tasked with forming second degree sentences, they tend to succeed more frequently compared to their attempts at first degree sentences, as demonstrated by phrases like "قلعت الطائرة" (The airplane took off) and "فريد يضرب الطفلة الصغيرة و يهرب" (Farid hits the little girl and runs away). Nevertheless, these individuals may still employ flexibility strategies even when dealing with second degree sentences, as illustrated by the phrase "كان باباه معروف هذا سمير" (His father was known, this Samir), where they use demonstrative elements "هذا" (this) and gesture towards "سمير" (Samir).

We believe that the reliance of Wernicke's aphasics on flexibility strategies when confronted with first degree sentences stems from their inability to achieve semiological-grammatical cohesion at roots level. Since constructing first degree sentences necessitates roots, they encounter difficulties and thus resort to alternative techniques to navigate these challenges through non-verbal positioning, metaphor, syntax, expansion, and redundancy. Given the correlation between verbal form and semantic meaning, most strategies they employ are fundamentally linked to their remaining structural capabilities, particularly their ability to formulate branches rather than roots, especially when compared to individuals with Broca's aphasia. Consequently, they leverage these residual linguistic capabilities to convey meaning and facilitate understanding.

In contrast, Broca's aphasics exhibit a greater use of flexibility strategies when asked to construct second degree sentences compared to first-degree ones. These strategies include:

- Non-verbal positioning (or non-verbal language), as demonstrated in the phrase "طيارة.....سما" (Plane.....sky), where this statement is accompanied by a gesture towards the sky. This highlights the significance of non-verbal cues in comprehension for these individuals.

- Omission and conciseness, as seen in the phrase "كان معروف" (He was known), where both the subject "سمير" (Samir) and descriptor "خباز" (Baker) are omitted. Additionally, in "فريد يضرب" (Farid hit) the object "الطفلة الصغيرة" (The little girl) is also omitted, resulting in an elliptical construction.
- Ellipsis in several phrases such as previously mentioned "كان معروف" (He was known), where the subject has shifted from a nominal form "سمير" (Samir) to an implied third-person pronoun.

As illustrated by examples from responses provided by Broca's aphasics, they too can employ flexibility strategies even when forming first degree sentences, as seen in "سمير سمين" (Samir is fat), where the element "كان" (was) has been omitted. However, these individuals predominantly utilize such strategies when faced with second degree structures due to this type requiring a specific capacity for incremental transformation. Given that previous findings indicate a deficiency among Broca's aphasics concerning this capacity, they resort to alternative methods for conveying their intentions, such as omission, conciseness, ellipsis, and even non-verbal positioning. Since there exists a relationship between semiological-grammatical cohesion and semantic-informative coherence, their strategies are contingent upon their remaining capabilities for incremental transformation while primarily focusing on root structures.

Numerous scholarly investigations have examined the notion of strategies commonly designated as palliative strategies, including the seminal works of Nespoulous (1980, 1986, 1990, 1994, 1996) and Watzlawik et al. (1972). Nevertheless, a majority of these investigations interpret such strategies as manifestations of what they designate as cognitive flexibility. As instances of application, these strategies are regarded as dynamic processes that pertain to cognitive dimensions rather than to linguistic frameworks perceived as static and immutable. Revisiting The Neo-Khalilian theory elucidates that this cognitive flexibility is likewise manifested within language systems via dynamic processes intrinsic to structures that promote semiological-grammatical cohesion across all levels. Furthermore, these scholarly works have primarily concentrated on Broca's aphasia while overlooking Wernicke's aphasia. They have also inadequately supplied precise elucidations for these strategies, merely considering them as evidence of preserved semantic representation or as outcomes derived from issues related to phonological or lexical access. The sentence-level semantic and conceptual abilities of Broca's aphasics in comparison with Wernicke's aphasics are essential markers for evaluating their proficiency in discourse contexts (macro-sequences).

8. Conclusion

The findings presented are of significant importance, not only concerning diagnosis but also rehabilitation. They allow for a focus on what aphasics can accomplish in terms of operations and linguistic units, based on the differences in the nature of their impairments. Consequently, Broca's aphasics rely on semantic-informative coherence at the sentence level, particularly regarding discursive denotation and informativeness, through the use of nucleus of predication. In contrast, Wernicke's aphasics face greater challenges in sentence construction due to their diminished capacity for semiological denotation and difficulties transitioning to semantic denotation, rendering their utterances largely devoid of informativeness. Moreover, the semantic-informative coherence at the sentence level varies among individuals with aphasia according to the degree of transformation complexity. When they encounter difficulties in constructing sentences with specific linguistic units, they increasingly resort to what are termed flexibility strategies as a compensatory mechanism for this deficiency, particularly when compared to foundational speech. For Wernicke's aphasics, these linguistic units are predominantly found in first degree structures, while those with Broca's aphasia typically engage with second degree structures. Accordingly, among the recommendations arising from this research are:

- Development of an effective technique for diagnosing aphasia in Arabic speakers based on principles from The Neo-Khalilian theory, which specialists in language and speech disorders and medical professionals can utilize when interacting with individuals experiencing this type of disorder.

- Provision of a new perspective in scientific research for analyzing atypical speech, particularly aphasia, thereby enabling researchers and students to establish appropriate frameworks for their studies in the field of clinical linguistics.
- In light of aphasia research, emphasis is placed on the fundamentals of the Arabic language in the fields of science and technology.

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