ISSN: 2716-9189 E-ISSN: 2676-1750
Journal of Studies in Language, Culture, and Society (JSLCS). (07) 03, 2024. (PP. 197-213)
Received: 13/09/2024 Accepted: 04/12/2024 Published: 31/12/2024

SYSTEMATIC CONSTRUCTION OF SEMANTIC STRUCTURE COMPUTATIONALLY DIGITAL COMMUNICATION SYSTEMS AS A MODEL

Aida Haouchi[1]
University of Bejaia /Algeria
aida.haouchi@univ-bejaia.dz

Abstract: Our study deals with the systematic construction of the structural representation of meaning as it is based on a basic topic which is structure. It goes beyond the representation of meaning for its parts as logical representations are usually used to perform automatic inferences according to the appropriate theoretical confirmation. Furthermore, the transition from the ordinary level of meaning towards the automatic discovery of knowledge is a closely intertwined designation between the two features since resources that were created non-automatically are automatically extended or merged.This occurs by directing the automated search to semantic information and restricting it to non-automatically specified information. From here, logical representations of data are created at the intersection of non-automated specification and automated tuning; this has generated many questions about the computational structure of semantics and how it works. So, the question this study aims to answer is the following: Do we get better and deeper semantic analysis because we use specific linguistic knowledge in a non-automatic manner, or does this meaning comes from powerful communicative digital models that perform a complete task from natural language inputs and outputs alone without pre-defined linguistic knowledge?

Keywords: Systematic construction of semantics, artificial intelligence, computational semantics, digital systems.

How to cite the article :

Haouchi, A. (2024). Systematic construction of semantic structure computationally: Digital communication systems as a model. *Journal of Studies in Language, Culture, and Society, 7*(3), pp. 197-213.

[1] **Corresponding author :** Aida Haouchi
ORCID ID :https://orcid.org/0009-0004-2038-4280

1. Introduction

Our study is based on a scientific imperative established by the urgent need to keep pace with computing linguistics in light of what academic achievements require at the present time, starting from the scientific achievements that specialize ~~in~~ the Arabic language and are linked to the logic guiding the linguistic study in general. It is a challenging approach to the precise application and transfer of concepts.

What everyone is waiting for from this article is to hear something new regarding the answer to the question: “Why computational semantics?” It is an answer that requires scientific patience in line with research developments to access information through informatics, in other words, determining the answer space through the robot within the generations reached by smart applications that need semantics. Structured and deeper in terms of mathematical formulationWhat we can also market as models is the Apple engine model (1987) as a model that highlights and explains precise implications of an early example: Chat-80, which was developed between 1979 and 1982 by Fernando Pereira and David Warren. In light of it, the natural language interface was also defined in order to prove the concept of the (database system) that is used in projects …(Manning, 2015).

2. Methodology

2.1 Statement of the Problem

A descriptive approach is adopted in the present research in order to analyse and describe the findings of a group of studies that established the systematic construction of semantics computer-based. These results are based on a number of studies that shed light on computational semantics in the form of a scientific process that can be controlled according to the following:

Automated Structuring Models of Semantics in Digital Systems (Applications: Google Facebook / Chat GPT) :(Shallow vs. Deep Semantics), (SHRDLU), (Chat GPT) through which we tried to shed light on a diagram that is one of the diagrams which-establish the idea of semantic interaction with the computer.(Kornai, 2007).

We have also focused on the most important studies that started from the grammatical systems of the sentence, especially programmed language and the language of global computer semantic networks, leading to the ontology of global semantics, highlighting the effectiveness of grammar in directing meaning within the global linguistic network.

2.2 Research Questions

Our study is guided by two research questions

The first. What is the value of studies that focused on computing natural languages in order to gain two types of knowledge: accurate knowledge of the linguistic system in accordance with the latest modern linguistic theories and familiarity with computer knowledge related to natural language processing, especially in its logical programming aspect?

Second. How does a computer, as a logical programming system based on a set of precise algorithms, establish a meaning that mimics natural language from grammatical and ontological engineering standpoints?

3. Results and Discussion

Among the most prominent information models according to which semantic structuring has been computer-guided are the Shallow and Dipp methods. (It is not possible to ignore the structure of language or its semantic levels when we are faced with the mechanical facts of language processing. If we must produce a new text, we must take into account the inability to rely on the machine to do the matter in the place of the author, because it will not be able to interpret what the author wrote down. In this case, you only gain the computer logic that imposes its strategy on Humans.

Suitable for the level to be reached at a very high cost, necessitated by the quality of the results to be achieved, the speed may dazzle us. Computer-wise may make the results with a simple cost but in a fragile and weak way because it will be at the expense of the accuracy that we hope to reach from linguistic studies based on objectivity and accuracy that are associated with engineering, global semantic networks, and algorithms(Manning, 2015).

SHRDLU was a natural language understanding program written by Terry Winograd at the Massachusetts Institute of Technology (M.I.T.) in the Artificial Intelligence Laboratory from 1968 to 1970. It was an experiment conducted by SHRDLU in a simple dialogue with a user (via teletype), about a small world of objects (a BLOCKS world), showed on an early display screen (DEC-340, connected to a PDP-6 computer)(Manning, 2015).

The above is an introduction to the automated approach to understanding natural language through a computer program that seeks to understand language using a model that is employed within a specific discourse context. It is also possible to introduce new ideas for the purpose of exploring them cognitively in the form of controlled and specific procedures. What produces a dialogue seems natural, not artificial. “Winograd” equipped the program with a stock of knowledge limited to a specific topic: this topic is an empty box and a table, a few templates in the form of colored cubes and pyramids, and a robotic arm to place the toys in the box (Khurana, 2023) . It succeeded in making the functions The three different ones necessary to understand the language; From sentence structure, word meaning, and mental simulation ability; “Integrated within the program so that they all participate simultaneously in language processing, after they used to work sequentially one after another (Khurana, 2023) in the programs that were common at that period”(Sayed2022 ,).We can follow the dialogue that was used as a demonstration of the (SHRDLU) program as follows(Winograd, N.D):

Table 1

The Dialog that was Used as a SHRDLU Demo

Person: PICK UP A BIG RED BLOCK.

Computer: OK. (does it)

Person: GRASP THE PYRAMID.

Computer: I DON'T UNDERSTAND WHICH PYRAMID YOU MEAN.

Person: FIND A BLOCK WHICH IS TALLER THAN THE ONE YOU ARE HOLDING AND PUT IT INTO THE BOX.

Computer: BY "IT", I ASSUME YOU MEAN THE BLOCK WHICH IS TALLER THAN THE ONE I AM HOLDING.

Computer: OK. (does it)

Person: WHAT DOES THE BOX CONTAIN?

Computer: THE BLUE PYRAMID AND THE BLUE BLOCK.

Person: WHAT IS THE PYRAMID SUPPORTED BY?

Computer: THE BOX.

Person: HOW MANY BLOCKS ARE NOT IN THE BOX?

Computer: FOUR OF THEM.

Person: IS AT LEAST ONE OF THEM NARROWER THAN THE ONE WHICH I TOLD YOU TO PICK UP?

Computer: YES, THE RED CUBE.

Person: IS IT SUPPORTED?

Computer: YES, BY THE TABLE.

Person: CAN THE TABLE PICK UP BLOCKS?

Computer: NO.

Person: CAN A PYRAMID BE SUPPORTED BY A BLOCK?

Computer: YES.

Person: CAN A PYRAMID SUPPORT A PYRAMID?

Computer: I DON'T KNOW.

Person: STACK UP TWO PYRAMIDS.

Computer: I CAN'T.

Person: WILL YOU PLEASE STACK UP BOTH OF THE RED BLOCKS AND EITHER A GREEN CUBE OR A PYRAMID?

Computer: OK. (does it)

Person: WHICH CUBE IS SITTING ON THE TABLE?

Computer: THE LARGE GREEN ONE WHICH SUPPORTS THE RED PYRAMID.

Person: IS THERE A LARGE BLOCK BEHIND A PYRAMID?

Computer: YES, THREE OF THEM: A LARGE RED ONE, A LARGE GREEN CUBE, AND THE BLUE ONE.

Person: PUT A SMALL ONE ONTO THE GREEN CUBE WHICH SUPPORTS A PYRAMID.

Computer: OK. (does it)

Person: PUT THE LITTLEST PYRAMID ON TOP OF IT.

Computer: OK. (does it)

Person: DOES THE SHORTEST THING THE TALLEST PYRAMID'S SUPPORT SUPPORTS SUPPORT ANYTHING GREEN?

Computer: YES, THE GREEN PYRAMID.

Person: WHAT COLOR IS IT?

Computer: BY "IT", I ASSUME YOU MEAN THE SHORTEST THING THE TALLEST PYRAMID'S SUPPORT SUPPORTS.

Computer: RED

Person: HOW MANY THINGS ARE ON TOP OF GREEN CUBES?

Computer: I'M NOT SURE WHAT YOU MEAN BY "ON TOP OF "IN THE PHRASE "ON TOP OF GREEN CUBES ".
DO YOU MEAN:
1 - DIRECTLY ON THE SURFACE
2 - ANWHERE ON TOP OF?

Person: 2

Computer: THREE OF THEM.

Person: HAD YOU TOUCHED ANY PYRAMID BEFORE YOU PUT THE GREEN ONE ON THE LITTLE CUBE?

Computer: YES, THE GREEN ONE.

Person: WHEN DID YOU PICK IT UP?

Computer: WHILE I WAS STACKING UP THE RED CUBE, A LARGE RED BLOCK AND A LARGE GREEN CUBE.

Person: WHY?

Computer: TO GET RID OF IT.

```
Person: WHY DID YOU DO THAT?
Computer: TO CLEAN OFF THE RED CUBE.
Person: WHY DID YOU CLEAR OFF THAT CUBE?
Computer: TO PUT IT ON A LARGE GREEN CUBE.
Person: WHY DID YOU DO THAT?
Computer: TO STACK UP THE RED CUBE, A LARGE RED BLOCK AND A LARGE GREEN
CUBE.
Person: WHY DID YOU DO THAT?
Computer: BECAUSE YOU ASKED ME TO.
Person: HOW DID YOU DO IT?
Computer: BY PUTTING A LARGE RED BLOCK ON THE TABLE; THEN LETTING GO OF
IT; THEN PUTTING A LARGE GREEN CUBE ON IT; THEN LETTING GO OF THAT CUBE;
THEN PUTTING THE RED CUBE ON THAT CUBE; THEN LETTING GO OF THAT CUBE.
Person: HOW MANY OBJECTS DID YOU TOUCH WHILE YOU WERE DOING IT?
Computer: FOUR OF THEM.
Person: WHAT DID THE RED CUBE SUPPORT BEFORE YOU STARTED TO CLEAN IT
OFF?
Computer: THE GREEN PYRAMID.
Person: THERE WERE FIVE BLOCKS TO THE LEFT OF THE BOX THEN.
Computer: NO, ONLY FOUR OF THEM: THE RED CUBE, TWO LARGE GREEN CUBES
AND A LARGE RED BLOCK.
Person: PUT THE BLUE PYRAMID ON THE BLOCK IN THE BOX.
Computer: OK. (does it)
Person: IS THERE ANYTHING WHICH IS BIGGER THAN EVERY PYRAMID BUT IS NOT
AS WIDE AS THE THING THAT SUPPORTS IT?
Computer: YES, THE BLUE BLOCK.
Person: DOES A STEEPLE
Computer interrupting: SORRY, I DON'T KNOW THE WORD "STEEPLE".
Person: A "STEEPLE" IS A STACK WHICH CONTAINS TWO GREEN CUBES AND A
PYRAMID.
Computer: I UNDERSTAND.
Person: ARE THERE ANY STEEPLES NOW?
Computer: NO.
Person: BUILD ONE.
Computer: OK. (does it)
Person: CALL THE BIGGEST BLOCK "SUPERBLOCK".
Computer: OK.
Person: HAVE YOU PICKED SUPERBLOCK UP SINCE WE BEGAN?
Computer: YES.
Person: WHY DID YOU DROP IT?
Computer: BY "IT", I ASSUME YOU MEAN THE SUPERBLOCK.
 I CAN'T EXPLAIN A NON-EXISTENT EVENT.
Person: IS THERE ANYTHING TO THE RIGHT OF THE RED PYRAMID?
Computer: YES, FOUR THINGS: THE BOX, THE RED CUBE, THE BLUE PYRAMID AND
THE BLOCK NAMED SUPERBLOCK
Person: THANK YOU.
Computer: YOU'RE WELCOME!
```

The **SHRDLU** program demonstrated “a great ability in its mastery of the subject and its control over its specific miniature world. It would give commands to the robot’s arm to move it with specific movements to pick up a specific mould and place it in the box. The program also allowed the person to establish a dialogue with the robot when he was asked questions asking him to perform a specific action; he would respond, for example, that he moved a block in order to make room for the insertion of a second block, or to fulfill orders issued to it, and thus it was an integrated program.

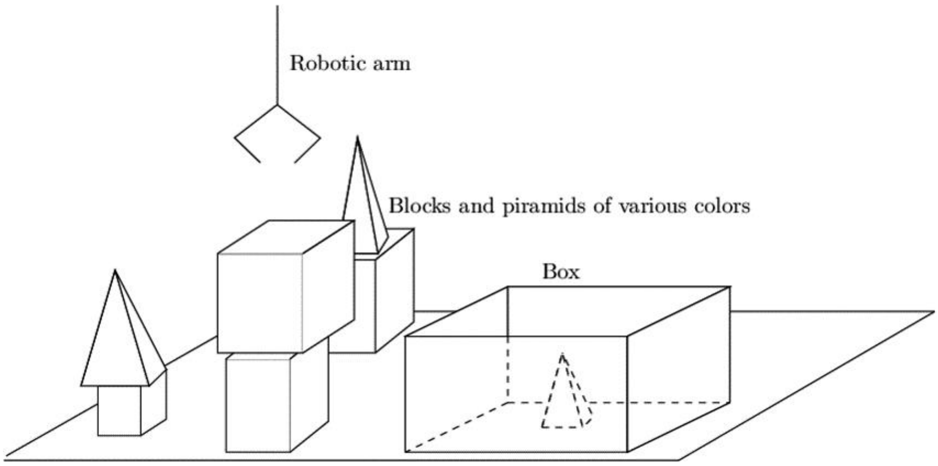


Figure 1

The SHRDLU plan

(https://arrafid.ae/Article-Preview?I=kaTad0limlY%3D&m=5U3QQE93T%2F0%3D)

Being subject to natural mental retrieval on the part of the person (human)and on the part of the computer; The machine only operates within the context of indexing subject to the mathematical code. This is what makes the discussion brought by Shrdlu a dialogue that considers the systematic structuring of meaning that is subject to precise algorithmic controls, which are essentially formed by a universal mathematical language.(Kornai, 2007)

The program "uses the linguistic structures, the connotations of the meanings, and the facts of these cubes. It becomes clear to those who look at the dialogue between the human and the robot that the machine is capable of determining the noun and the nominal phrase, the pronouns that refer to it, and the verb and the verbal phrase" (Manning, 2015).As for what the computer cannot understand, it does not venture to answer since it is not equipped with the algorithms of the semantic network in the ongoing dialogue between it and the human. The ability to understand sentences and their meaning and use them correctly within the context of natural dialogue, may be impossible for a machine if it is not subject to the conditions of global indexing (Manning, 2015).

What Shardlow stopped at in order to track the semantics automatically through the Google website, is his clarification of the automated areas of how automated search engines work, and how to adjust them to the requested material; Where Google searched for geographical locations represented as follows(Manning, 2015).

SHRDLU http://hci.stanford.edu/winograd/shrdlu/

Google: What is the capital of Algeria? (Winograd, N.D)

Google: Which countries does the Danube flow through? (Winograd, N.D)

Google: What are the capitals of the countries bordering the Baltic Sea? (Winograd, N.D)

The structure of semantics in digital discourse witnesses' difficulty in retrieving information in its normal form (at least at this level) because it "suffers from a deficiency represented in the absence of understanding the search words and their meaning in the context, and it is expected that semantic search will compensate for this deficiency through the use of search algorithms that take into account the meanings of words and contextual meaning... Given the promise of a revolution in the field of information retrieval, semantic search has led to companies producing widely-known web search engines; Such as Google, Yahoo, and Bing... that are taking the necessary steps towards this technology (Al-Said, 2019).

What proves the relationship of search engines with the structure of meaning is the answers they produce that are compatible with the asked question. The capital of Algeria does not require tracking its location on the web, but rather precisely identifying the capital of Algeria in which the algorithms were based on, and on the closest path that leads to the meaning through automated indexing, while enabling humans to Total probabilities(Van Dijk, 1983).

The site is available through encoding, which means "the semantic labeling of documents, words, and text units found on web pages using an ontology and one of the Semantic Web languages such as (OWL.RDFS.RDF.XML). This encoding is not displayed to the web browser, but the search engine can use it during the indexing process in order to benefit from this information during the semantic search process. (Al-Said, 2019) . This led to the use of computer systems to witness rapid progress. (Winograd, N.D) . What we can also market as models is the Apple engine model (1987) which is a model that highlights and explains precise implications of an early example: Chat-80, which was developed between 1979 and 1982 by Fernando Pereira and David Warren.

In the light of all these explanations, one can understand that the natural language interface was also defined in order to prove the concept of the (database system) that is used in projects... (Winograd, N.D) .This is because "speech, text messaging, and social networking sites are the new user interface for "software," which necessitated dealing with natural language understanding, such as what Google has been able to do since November 2015 release, which enabled us through the Google application to deal with superlatives such as: "Who are the tallest Mavericks players? He can also understand questions with dates, such as: What songs did Taylor Swift record in 2014? Finally, he began to respond to some complex groupings such as: What are the movies of Seth, Gable's father-in-law? (Winograd, N.D). Tracing the chat requires a practical analysis of the English language based on approaching the question: What is the capital of Australia? It is completed within 00 seconds with an answer of B, in line with the singular noun of the word Australia in this form:

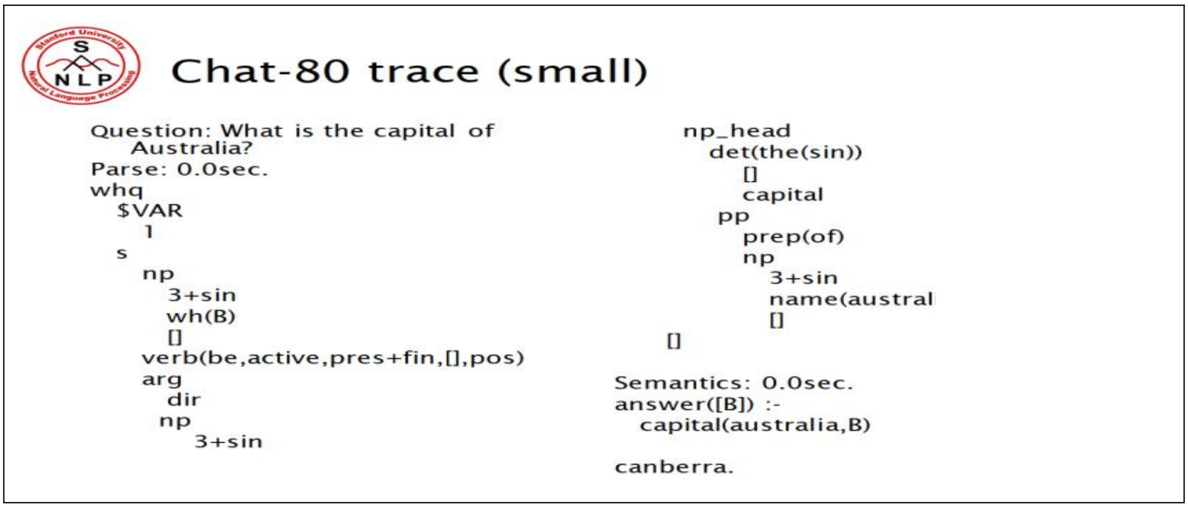


Figure 2: (Winograd, N.D).

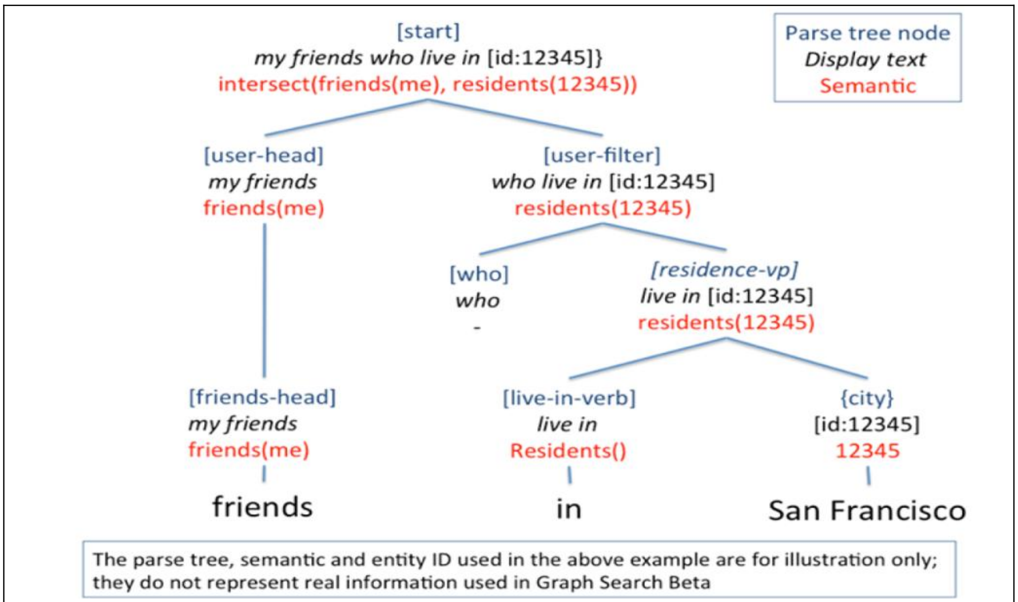
The CHAT-80 grammar database constitutes about 80 types of sentences and their forms, such as the declarative, the imperative, and the exclamatory; What directs meaning according to grammatical foundations that are controlled according to mathematical formulas in the robotic mind(Winograd, N.D).

The Facebook model uses Weighted Context Free Grammar (WCFG)** to represent the following graph search query language:

- **[start] => [users] ($1) ($1)**
- **[Users] => (my friend/friends) (friends) (me)**
- **[Users] => Friends [Users] Friends ($1) ($1)**
- **[Users] => {User$1}**
- **[users] => } user{ }filter-user { intersect($1, $2) ($1, $2)**
- **[Start] => [Images] ($1) ($1)**
- **[Photos] => Photos [Users] Photos ($1) ($1)**

Figure 3: (Winograd, N.D)

The location code can then be an entity, for example, {user}, {city}, {employee}, {group}; It can also be a word/sentence, for example; Friends, live at, works at, members, etc. The parse tree starts from [start] and expands through the rules to the final (final) symbols**.**



The parse tree
(https://www.facebook.com/notes/10158791580622200/)

Figure 4: (Winograd, N.D)

3.2 Programmed Language and the Language of Universal Computer Semantic Networks

The meaning of an algebraic structure is determined by what corresponds to it tree-wise in the machine mind in formal or syntactic terms (Sportiche, 2013). Computational semantics makes us document the sentence with grammatical documentation that directs the meaning. We can stop at the two sentences that were presented in the English language in this way:

- **C1- "John smokes"**
- **C2- Everyone who smokes snores.**

The two grammatical elements, the nominal and the actual, must undergo a grammatical analysis between the two extremes of attribution between: (John / smokes), through which the semantics are built in light of the language of inferential representation between the two extremes of smoking and snoring (Frank, 1998) . That is, smoke and snoring, which is what computational semantics has provided in accordance with the requirements of the English language in this way (Winograd, N.D) :

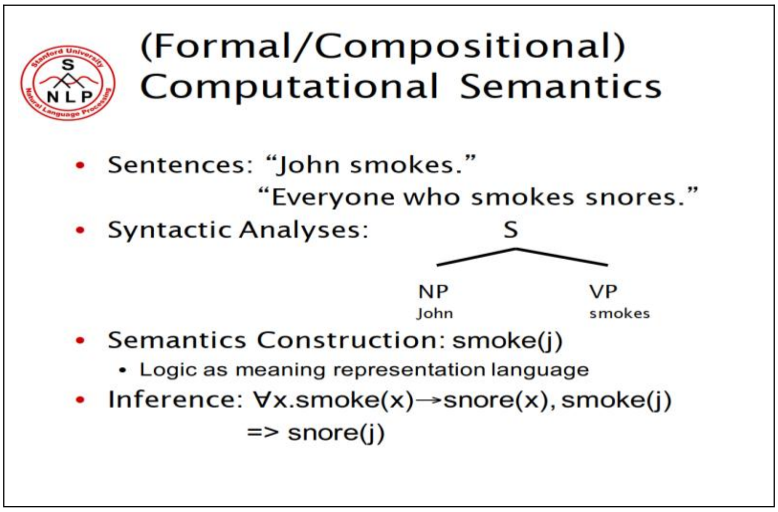


Figure 5: (Winograd, N.D)

This leads us to Compositional Semantics as being essentially based on simple language rules in the Defined Grammar (DCG), such as the logical programming language model consisting of (Winograd, N.D) :

Table 2: Logical programming language model consisting of (Winograd, N.D)

Phrase-> nominal sentence, verbal sentence. **• Nominal phrase ->propernoun.** **• Noun phrase ->determiner, noun.** **• Verb sentence ->verb (nominal sentence).** **• Proper noun -> [John] verb -> [ate]** **• Proper noun->[mary] verb ->[kissed]** **• Selected -> [the]name -> [cake]** **• Determiner -> [a] noun -> [lion]**	**Extending the grammatical rules to verify number in light of the agreement between the subject and the verbs through the following**(Winograd, N.D)(Hendrix, 1978) **• Phrase->nominal sentence (number), verbal sentence (number).** **• Nominal sentence (number) -> proper noun (number).** **• Nominal sentence (number) -> determiner (number), noun (number).** **• Verb (number) -> Verb (number) Nominal sentence (_).** **• (Proper name/proper names) -> [Maryam] (Name/s) -[Lion]** **• (Determiner / Determiners) -> [the] noun (AS) -> [Assad]** **• (Determiner / Determiners) -> [the] verb(s) -> [eats]** **• Verb (sentence) -> [eat].**

Table 2 is based on simple grammar and semantics (DCG) (Winograd, N.D) ; The sentences presented by researchers in computational semantics have multiple forms in which they started from the English language, and according to the specificity of the language being represented, we can stop at the different sentence structures and the mathematical formulas that can form a basis for the structural conception guiding meaning in computational semantics:

Table 3: *Structural Conception and Computational Semantics* (Winograd, N.D)

Meaning of the sentence/meanings of the sentence/sentences->meanings of noun sentences, **• The verbal sentence (the meaning of the verbal sentence), {Syntax: the meaning of the nominal sentence), the meaning of the phrase, the meaning of the verbal sentence)}.** **• Phrasal (meaning of verbal sentence) -> verb (meaning of verb),** **• Nominal sentence (meaning of the nominal sentence), {composition (meaning of the nominal sentence, meaning of the verb, meaning of the verbal sentence)}.** **• Noun (meaning of the nominal sentence) -> noun sentence (meaning of the nominal sentence)** **• Name (John) -> [John]. verb (λx.jumps(x)) -> [jumps]** **• Name (Mary) -> [Mary]. verb (λy.λx.loves (x,y)) -> [loves]** **• Combine(X,Y,Z) -> Apply(Y,X,Z)**

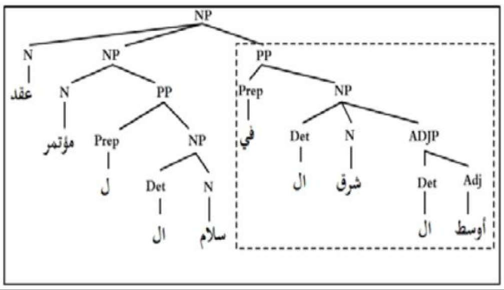
This means that the sentence "John must Mary" is a sentence with a grammatical structure, which branches into semantics that are transformed through inductive and analytical logic into mathematical formulas. Engineers and linguists have no recourse other than that, so that it becomes an automatic structure contained in the computer and transformed in this form:

In light of the above, we can move towards alternative semantic grammars: An alternative Semantic Grammars, which appears clearly by addressing the problem of traditional linguistics. That is, what can be dealt with by fighting the rules; Such as functions (Lambda functions) and complex terms. It is then a process of rewriting grammar in the light of semantics, abandoning some of the finer grammatical details known as “semantic grammar.” (Kornai, 2007).

The term semantic rules refer to the motivation behind grammatical rules towards their corresponding items in mathematical rules technology (Winograd, N.D) . What is important in all of this is that we obtain the meaning we need. The negative side of the issue is the need to develop new rules for every field that is in line with technological development, because they are still used in restricted fields. With a limited vocabulary accompanied by grammatical complexity, not to mention the semantic interpretation that can result from grammatical analysis that confronts what is “ungrammatical.” (Hendrix, 1978)**.**Many of the linguistic categories that might be used in accessing a database of US Navy ships are not "real" grammatical categories. Words are recognized by their context rather than by category, which is a useful trend for detecting and correcting errors.(Lasnik, 2021).

One of the advantages of semantic grammar is the effective recognition of limited domain input. The absence of comprehensive grammar rules allows for pattern-matching possibilities for expressions, there is no separate interpretation stage, and the strength of top-down constraints allows for strong deletion mechanisms. These positive points do not prevent the presence of negative ones, the most important of which is the lack of input domain-specific rules. Different rules are required for each new domain. Lack of syntax can lead to “spotty” grammar coverage. Grammar beyond a certain size is difficult to develop and is brittle(Hendrix, 1978).

What must be taken into consideration is the separation between structure and meaning so as not to create syntactic confusion. We should stop at the example: “Holding a peace conference in the Middle East.” If we look at the rules that will be applied to obtain the syntactic structure of the sentence, we find it branches into two trees (Al-Said, 2019).



(١٨)

(أ) NP→ N NP PP
(ب)NP→ N PP
(ت)PP→ Prep NP
(ث)NP→ Det N
(ج) NP→ Det N ADJP
(ح) ADJP→ Det Adj
(خ) NP→ N NP

Figure 6: Syntactic Structure Tree

The language of global computer semantic networks “came as an attempt to mediate between the cognitive form that is used to express this content in the form of sentences and phrases by representing the content in a correct and integrated way that differs from the way natural languages represent it. While natural languages represent the content in the form of specific language vocabulary and structures that follow... The rules of this language. The language of global computer semantic networks has vocabulary and structures that enable it to represent content effectively (Merigoux, 2021).

An abstract that carries all the morphological, grammatical, semantic, and pragmatic information contained in the original text in the form of a semantic network without bias towards the vocabulary or structures of a particular language or group of languages, such as bias towards the structures of the English language or languages of German origin, for example. This semantic representation enables the universal computer language of semantic networks to represent the content itself. It appears from it that the language of global computer semantic networks is an intermediate language between all natural languages... such as the following two illustrations, displayed in figure 7, that illustrate the mediation of the global word between natural languages (Al-Said, 2019).

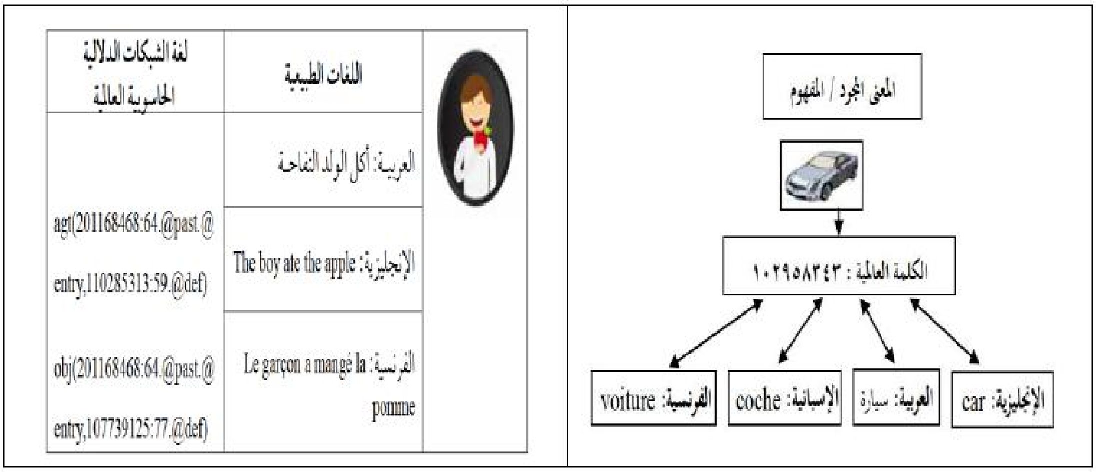


Figure 7: The mediation of the global word between natural languages

The global semantic language in this way is an artificial algorithmic structure that is basically designed to simulate human communication through the machine mind using automated systems and digital code taken from the English word network (WorldNet), which includes about 118,659 concepts (Al-Said,2019).

4. UNL Ontology and the Structuring of Semantics

It means the global word system with a tree structure in which global words are arranged hierarchically according to the ontological relationships between them. These relationships reflect the association of global words with each other through hierarchical relationships such as the (type of) relationship (icl) and the (example of) relationship (iof). The example shows the form of one of the ontology entries(Campbell, 1996).

It is that the apple as a type of fruit; It is what is expressed by the first universal word from the left (107739125), and by the second universal word from the left (113134947) using the (icl) relationship. The number at the end expresses the validity of this ontological relationship between the two universal words (Al-Said,2019).

Generation tools then work to re-decode the semantic representation represented in texts written in the language of semantic networks. That is, into a desired natural language using target language resources (generative dictionary, generative grammar), as well as resources(Campbell, 1996).

Also, the Universal Communication Language (UNL), and the ontology of the Semantic Network Language, so that the sentence is finally produced in a natural language according to the following figure, which highlights the mechanism of work of the resources and tools of the Universal Semantic Network Language (Al-Said, 2019).

The semantic network language dictionary provides "the storage of all types of words, whether they are simple, compound, or multi-concept words" (Al-Said, 2019). Where the indexes of entries in a particular language are presented in exchange for what is expressed in another language, which allows each language to have its own dictionary that links it to the vocabulary of the language of global networks.

In the context of the artificial mind's processing of digital systems, we can say, after all of the above clarifications that: The use of the language of global semantic networks has adapted the work of linguists for the sake of easier dealing with natural sentences within the language of global semantic networks (Universal Words).This contributes to the automatic structuring of semantics through the dictionary and the nature of sentences to the construction of grammatical relationships in a tree-form that allows the transition to a semantic level leading to the refinement of the language of global computer semantic networks, which confirms the principle of algorithms in controlling the code of words with their precise mathematical formulation (Al-Said, 2019).

5. A Bet on Structuring Meaning Computer-wise with a Chabot (Chat GPT)

One of the latest applications that digital systems have created is the Chabot Chat GPT which is a bank of unlimited information, and which goes beyond direct answers to automatic answers to all types of questions, with high-level linguistic processing. This conception exceeds most of the applications that were stopped at, because it deals with natural language and various dialogues by all available means, whether dialogues, translations, or processing. But, does this means that the systematic structuring of semantics is experiencing a revolution that goes beyond all foundations of computer semantic (Xu, 2021).

On 01/11/2023, the Sorbonne University website provided a definition of the application that was updated on: 02/21/2023 with the title: Chabot GPT technological break? Chat GPT: a disruptive technology (Soulier, 2023).

Is it an application that threatens Google at all levels, and overturns the balance of the systematic structuring of meaning computer-wise? At this level of our research, we must explore another question that corresponds to the first questions with which we began our research (Stahl, 2024). We are now faced with a scientific imperative to move beyond the question "Why computational semantics?" To another question: "Where is computational semantics headed? A challenge or a bet?" (Dwivedi, 2023).

In front of the stakes and challenges of this application, scientific research in computational semantics within digital systems must confront what the artificial mind has accomplished, even if the application is at its beginning, because its rushing means a terrible acceleration in the structuring of meaning, and an hastening in programming, and we can stop at the summary of what was specified by the website Sorbonne of that application (Soulier, 2023):

- Able to talk to people with an organized response
- Recover a certain amount of knowledge
- Writing and debugging code
- Composing music
- Play games
- Answering evaluation questionnaires
- Writing poems and songs
- Editing scientific articles...
- It works to teach the user the language he wants, because A trained transducer

Figure 8: ChatGPT abilities

According to Laure Soulier, a lecturer in computer science in the Machine Learning for Information Access de l'ISIR team, this new tool is compatible with many language models that have been developed in recent years, which is a means capable of processing a very large number of data and solving diverse and complex problems. This is what prevents the application from the idea of rupture, because it has simply achieved a qualitative leap that contributes to achieving the democracy of artificial intelligence among people, which will open the door to laboratory work automatically to control the mechanisms of semantic structuring computer-wise, in accordance with the developments imposed by joint work between sciences(Soulier, 2023).

Based on the aforementioned Sorbonne University website: The level of efficiency that the application has reached in digital systems is due to the use by Open AI engineers of the GPT 3.5 algorithm trained on many documents (Wikipedia, web articles, forums, etc.), which allows the process to be refined according to linguistic models that are integrated (Dwivedi, 2023).

It contains human judgments since the engineers also selected and adapted the GPT instruction data to direct it toward dialogue tasks to achieve better performance in answers that leave many questions open about the concepts and results reached, in terms of the ethical principle of intellectual honesty. (Soulier, 2023)

6. Conclusion

Computational semantics is in the process of being established and making a hasty judgment about it would be neither academic nor scientific. This state of fact is due to the scarcity of studies and the lack of interest among research in this field, This is what the proposal will lead to in academic research over the next few years, and what needs to be taken into account to keep pace with the rapid development affecting computational linguistics.

It is a great scientific responsibility and challenge that falls on the shoulders of all them in laboratories, universities, academic institutions, and scientific research centers, because computer applications, in their continuous acceleration, are no longer limited to the mechanical adaptation of natural language. Indeed, the issue now affects all visual, audio, textual and educational data...(Dwivedi, 2023).

This is what has been achieved through the above mentioned models of digital systems, which indicate systematic development computer control of semantic structure, which continued to follow the developments observed in digital programs and various automated applications of secondary education institutions. the semantic structure computer-wise, as it has continued. (Mansouri, 1985).

This makes it necessary for laboratories working in linguistic computing to intensify efforts with specialists, including mathematicians, programmer engineers, and linguists, to gain more insight into ways to encompass the general structure of computer semantics globally.

7. References

Al-Said A. B. & Rashwan M. (2019). *Machine Processing of Arabic Texts*, King Abdullah Center for Arabic Language Service, Riyadh, Saudi Arabia

Campbell, A. E. (1996). Interpretation: The relationship between language and ontology. *AAAI-96 Fall Symposium Series on Knowledge Representation Systems Based on Natural Language*.

Dwivedi, Y. K. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*.

Frank, R. (1998). Structural complexity and the time course of grammatical development. *Cognition*.

Hendrix, G. G. (1978). Developing a Natural language interface to complex data. *ACM Transactions on Database Systems*, 105 - 147.

Khurana, D. K. (2023). Natural language processing: State of the art, current trends and challenges. *Multimedia tools and applications*.

Kornai, A. (2007). *Mathematical linguistics.* Springer Science & Business Media.

Lasnik, H. (2021). Levels of representation and semantic interpretation: A brief history and a case study. *Cadernos de Linguística*.

Manning, C. (2015, novembre 16). Récupéré sur https://web.stanford.edu: https://web.stanford.edu/class/archive/cs/cs224n/cs224n.1162/handouts/Computational-Semantics.pdf

Mansouri, A. N. (1985). Secondary schools. *Thesis submitted for the degree of Ph.D.* . Département of linguistics, University of Sheffield. .

Merigoux, D. (2021). Proof-oriented domain-specific language design for high assurance software. *Thèse de doctorat*. Ecole doctorale sciences Mathématiques se Paris centre.

Sayed R. A. (2022). *Arabic Language and Artificial Intelligence*, Arrafid Electronic Cultural Journal, Sharjah, UAE

Soulier, L. (2023, février 01). *ChatGPT : Une rupture technologique ?* Récupéré sur sciences.sorbonne-universite.fr:https://sciences.sorbonneuniversite.fr/actualites/chatgpt-une-rupture-technologique

Sportiche, D. K. (2013). *An introduction to syntactic analysis and theory.* John Wiley & Sons.

Stahl, B. C. (2024). The ethics of ChatGPT–Exploring the ethical issues of an emerging technology. *International Journal of Information Management*.

Van Dijk, T. A. (1983). *Strategies of Discourse Comprehension.* Academic Press.

Winograd, T. (N.D). Récupéré sur https://hci.stanford.edu/winograd/shrdlu: https://hci.stanford.edu/winograd/shrdlu

Xu, Y. L. (2021). Artificial intelligence: A powerful paradigm for scientific research. *The Innovation*.