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**Abstract** (max. 150 words)

This dissertation is an exploration about what is aphasia and how Broca's aphasia affects language learning. For the purpose of this study, I have carried out a review of different articles that explain how Broca's aphasia affects speaking and grammar production in different languages. As a result, I have found that Broca's aphasia is also known as non-fluent aphasia, meaning that it mostly affects speaking and writing. For that reason, grammar and language learning are specially affected. An individual with Broca's aphasia relies mostly on important keywords (nouns and verbs) to communicate their message. Finally, what can be concluded is that due to Broca's aphasia repetition of words and sentences is usually poor. However, it does not affect the same way in all languages.

<b>Thematic key words</b>	Aphasia, Broca's aphasia, grammar, language learning
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<b>Total number of words</b>	5580
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# 1. INTRODUCTION

## 1.1 Motives

In English Studies, it is a matter of fact that we have dealt with different aspects of literature and linguistics. In some cases, students have been able to take a course in Clinical Linguistics. Unfortunately, I was unable to take it because I was abroad in my Erasmus stay. Therefore, I have decided to do my research on aphasia, an important feature of Clinical Linguistics. I especially like Clinical Linguistics because before starting the degree English Studies' degree, I was studying sciences at high school and I really liked biology. Nevertheless, I thought everything in English Studies will be studying literature or language, but when I came across the subject of Linguistics I was pleasantly surprised. I studied Linguistics in my first and second year, and in the part of Neurolinguistics, we covered some biological themes I really enjoyed learning. Neurolinguistics is the study of the neural mechanisms in the human brain that control the comprehension, production, and acquisition of language. As it combines biology and language, I could apply some of my previous scientific knowledge to those new I have learnt. That combination really interested me, and I realize it because I had the necessity to continue reading about Neurolinguistics when I got home after each class. I have read about Broca, Wernicke<sup>1</sup> or Lichtheim's sign<sup>2</sup>. However, the Neurolinguistics' studies that I enjoyed the most were the ones from Paul Broca about aphasia and its consequences. For that reason, I want to focus my TFG on Aphasia, and more concretely, Broca's Aphasia and how it affects grammar and language learning.

## 1.2 Objectives and Methodology

The aim of my project is to explore deeply what is aphasia and how one of the different types of it, Broca's aphasia, affects individuals' language learning. In order

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<sup>1</sup> Wernicke: German neuropathologist known for his influential study of receptive aphasia, among others.

<sup>2</sup> Lichtheim's sign: An aphasic phenomenon which makes patients indicate through their fingers the number of syllables of a word they have in mind but is unable to speak.

to achieve that objective, I have divided the paper in three parts: First I have introduced the concept of aphasia and specially how Broca's aphasia is produced. After that, I have dealt with the main consequences that this type of aphasia has on speakers, in so far as agrammatism in grammar and verb-argument formation in language learning. Besides, I have compared Broca's aphasia effects in four different languages: English, Spanish, Catalan and German. Finally, I have included the implications of Broca's aphasia problems on speakers and to what conclusions I have arrived after having done this dissertation.

## **2. CONCEPT OF APHASIA. What is an aphasia?**

This dissertation addresses the issue of the concept of aphasia, a very much unknown problem in society, and studies deeply one specific type, called Broca's Aphasia. Aphasia is a language impairment that occurs generally after a brain injury. It causes deficits in language and makes difficult the ability of communicate. But the concept "aphasia" will be deeply explained later on, because first of all an introduction of the concept is needed due to the great ignorance of this concept among society.

As the data states, there is limited public awareness of aphasia in society nowadays. In the article from Nina Simmons-Mackie , Chris Code , Elizabeth Armstrong , Lillian Stiegler & Roberta J. Elman (2002) *What is aphasia? Results of an international survey*, *Aphasiology*, they did a survey to people from United States, England and Australia to study the awareness and knowledge of aphasia in those societies in order to launch new campaigns to foment the public interest on this language disorder.

The results of those tests showed that there were few numbers of people who had some basic knowledge of aphasia: only 13,6%, corresponding to a number of 133 persons, had heard of this disorder and only 5,42% had basic knowledge of it, from the total of 978 individuals surveyed. Here in this Figure is illustrated the percentage from each country.

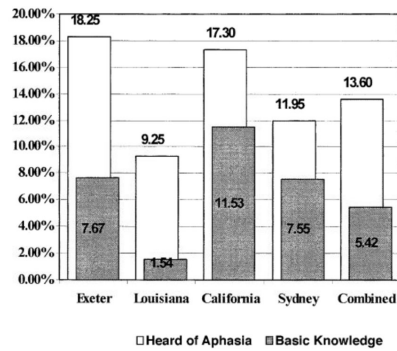


Figure 2. Percent of total respondents who had heard of aphasia and who had basic knowledge of aphasia for each survey location and combined.

(Simmons-Mackie et al., 2002, 842)

So as this survey states, we can conclude that there is a lack of public knowledge of the concept of aphasia among the world. As the results confirm, only a small proportion of individuals surveyed in this article had ever heard of aphasia, and many of those who said that they had heard of aphasia did not have a basic understanding of the disorder, which is even more worrying.

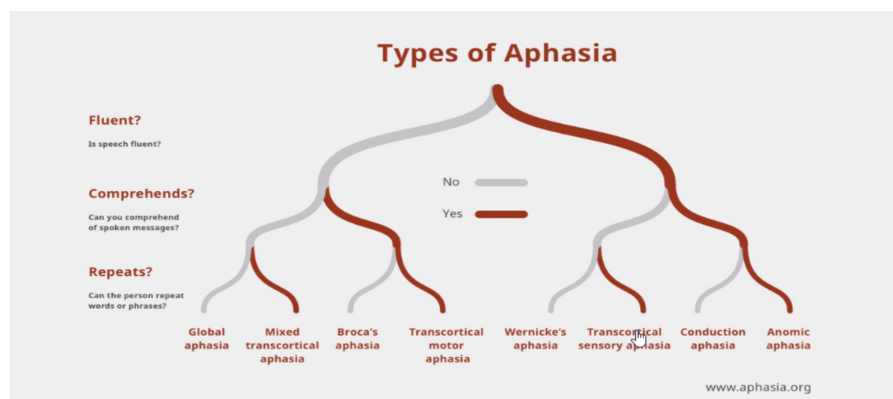
For that reason, nowadays it is necessary to continue investigating on this disorder and to start including aphasia issues in linguistic subjects at the earliest age possible. With that, we will start making public awareness of it in children to normalize the disorder and concern people about its causes and effects, to avoid this great public ignorance and avoidable future patients. Besides, increasing this conscience we will help people who have it to live the best way, and they will not feel discriminated.

Once we have seen that the concept of aphasia is a totally unknown concept among us, the population, it is the time to investigate more about it and explain what is concluded in order to make it more familiar and normalize it.

According to the official page of that disorder, “aphasia is an impairment of language which affects the production or comprehension of speech and the ability to read or write” (National Aphasia Association, 1987, page 1: Aphasia Definition). As the definition states this disorder is caused due to an injury to the brain, most commonly by a stroke, and as normal it usually affects older people.

It’s a brain disorder, but it doesn’t affect each patient the same way. On the one hand, it could be as hard as to make communication between the patient and society

almost impossible in specific cases. On the other hand, it can also be minor in some cases and even very difficult to detect in other ones. Usually it affects specifically a concrete aspect of language use, as for example the ability to find or remember the names of objects, to construct sentences or to read, but can also affect more than one. As it comes suddenly, after a stroke, people who suffer from it currently become frustrated and they do not understand what happens to their brain and why it does not work as it used to do before. So, they get angry and nervous because they can't speak correctly nor remember how to construct a simple sentence, as for example to ask for the time. In addition to the different levels of intensity, thanks to the scientific investigations and research about aphasia we now know that there are also different types of aphasia depending on the area in which the stroke has taken place. Each type of aphasia can damage different parts of language and occurs in a different area of the brain, being the most common types the following represented in that outline:



(National Aphasia Association, 1987, page 1: Aphasia Definition)

But fortunately, there have been scientific investigations during centuries about brain disorders and there are professionals of aphasia that study each case particularly to see how important are the consequences of stroke in patients. Then, they prescribe the most appropriate treatment to recover the comprehension of language of each stilted person.

As can be seen in the table, the third type of aphasia from the left is a non-fluent type of aphasia, in which people affected can comprehend spoken messages but can't repeat words or phrases, and it's called Broca's aphasia. The following parts of my project are going to cover that particular type of the aphasia disorder.

## 2.1 Broca's aphasia

In 1861, the French scientist Paul Broca treated a patient who was only able to pronounce the word "tan". After some investigations, he realized that there was a damage in the left frontal area of the brain caused by a brain stroke, and for that reason the patient could only pronounce that word. He discovered that damage as a new type of aphasia and as he was who made the connection between the area of the brain and the disorder, that region was baptized as Broca's area and its consequent aphasia, Broca's aphasia.

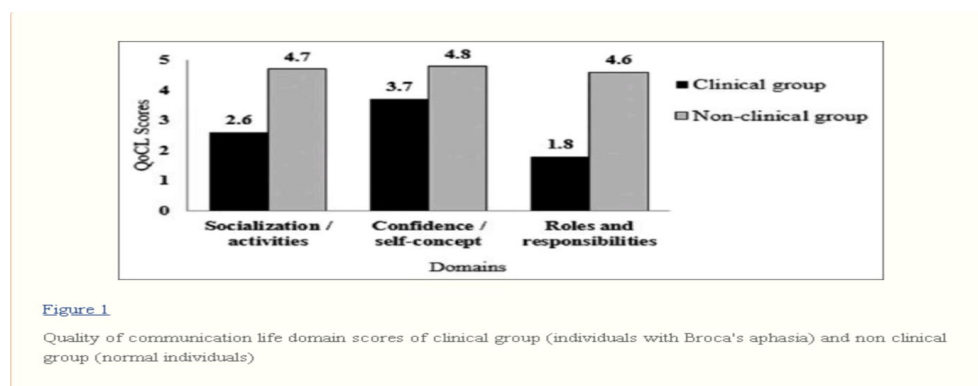
FIGURE 2: Broca's Area. From Helm-Estabrooks & Albert (1994).



(Martínez Ferreiro, 2003, page 4)

According to the official page, [aphasia.org](http://aphasia.org), *Broca's aphasia results from injury to speech and language brain areas such the left hemisphere inferior frontal gyrus, among others* (National Aphasia Association, 1987, page 2: Broca's aphasia). We can affirm that aphasia is often caused by a stroke, but it can also be caused by a brain trauma. In the second situation, there are differences in the damage consequences, because the abilities different from speech and language wouldn't be in danger. So patients with Broca's aphasia due to a brain trauma will have difficulties in speaking and in structuring grammatical sentences. Besides, their way of speaking will be limited to utterances and expressions short than four words, as for example "water!" or "go shower", as if they were babies again. So that finding the appropriate words that they want to use will be a complex process for them when trying to understand complex and long grammatical structures, although they will easily understand simple constructions. For example, "Charles cooked Sally pizza" will be easy to understand for people with Broca's aphasia due to a brain trauma, but "The pizza

was cooked for Sally by John” would be difficult, because they will have problems in understanding who cooked the pizza and who was the receptor. And it is because of that, that Broca’s aphasia is also called non-fluent or expressive aphasia, because the conversations with people who suffer from that would have to be simple and not especially fluent. So once studied the consequences of this expressive aphasia, it is easy to differentiate people who have it and people who do not when having a conversation. As the article *Quality of Communication Life in Individuals with Broca’s Aphasia and Normal Individuals: A Comparative Study* (Pallavi et al, 2018 Oct-Dec; 21(4): 285–289) says, individuals with Broca's aphasia suffer from frustration when they try to communicate with others. They are usually aware of their difficulty of thinking of the correct words and grammatical structures to, for example, answer a question, and this disrupts their Quality of Life. In the study made for this article, they make a comparison between a group of aphasic individuals and a group of normal people. The results that they obtain are that people with aphasia take more time in socialization practices, because those individuals themselves usually reject to participate in social activities because of her motor and communication skills. They feel a bit ashamed and decide not to participate in those activities, and that negation is what makes them fail in socializing. We can see this comparison represented in the following table:



(Pallavi et al, 2018 Oct-Dec; 21(4): 285–289)

To sum up, we can conclude that Broca’s aphasia has mainly consequences in Grammar and Language Learning, so that individuals with this type of aphasia may



be able to read but be limited in writing and speaking. Besides, there are differences between the abilities to socialize of normal people and of Broca's aphasic individuals. However, it does not affect the same way in all languages. In the next part of this project I will explain deeply that effects of Broca's Aphasia in both fields and some examples of the consequences in different languages, to depict and understand better that aphasic disorder.

### **3. EFFECTS OF BROCA'S APHASIA**

As mentioned above, people with Broca's aphasia may be able to read, and to comprehend what is being said but may be unable to write or to speak fluently. Due to a stroke or a trauma, the brain is not capable to communicate with all the muscles needed to form or think of words and the individuals struggle when try to speak or write. Some of the symptoms (Corey, 2017), characteristic of that type of aphasia, are: The difficulty in forming complete sentences, the omission of certain words like "the," "an," "and," and "is" (a person with Broca's aphasia may say something like "Cup, me" instead of "I want the cup"); and problems in articulating sounds, words, in repeating what has been said by others or in following directions. Aphasic individuals suffer from these symptoms and become frustrated very easily, since they know what they want to say but they can not pronounce the words as they should. So analyzing what it is been treated in the previous points, we can affirm that Broca's aphasia has severe effects in grammar, as the troubles in writing sentences struggling more in the difficulty of using verbs than in using nouns correctly; and in language learning, causing a strong difficulty when speaking and problems with the full comprehension of the speech. Those effects in grammar and language learning are different too depending on which language the aphasic patient speaks. Those effects in grammar, language learning and different languages examples are going to be covered in the next sections of my paper.

### 3.1 Aphasia and Grammar

As I have said before, through history several studies have been done about Broca's aphasia and they show that the disruption in verb production is higher than the one in the production of nouns (Kim and Thompson, 2000). But as Bastianse et al. (2004, 198-202) states, more studies have been done and there are more factors in which a verb depends on to be more or less difficult for an aphasic patient. In the case of grammatically more complex verbs, these are more difficult to pronounce than simpler ones for patients with aphasia. For that reason, in this article they did two experiments with the same verbs used in two different situations: the first one was verb + object position and in the second one they altered the transitivity. On the one hand, the result of the first experiment was that "verb-object production diminishes in a linguistically more complex construction; the object-finite verb string in embedded clauses is produced very well, while they hardly ever produce embedded clauses spontaneously" (Bastianse et al., 2004, 198-202). So we can conclude that the structure of sentences that are apparently more difficult to produce turn out to be simpler. On the other hand, the result of the second experiment was that "Sentence construction in the intransitive condition is significantly more difficult than in the transitive condition" (Bastianse et al., 2004, 198-202). In this case, the conclusion is that transitive sentences, subject + verb + object, are easier to construct than intransitive sentences, subject + verb.

In addition to the difficulties dealing with transitive and intransitive verbs, parts of verbs contain more grammatical information than noun parts, verbs are more difficult to produce than nouns for individuals with Broca's aphasia (Bastianse et al., 2004, 198-202). This is since the main consequence of Broca's aphasia is on grammar, called agrammatism.

### 3.1.1 Agrammatism

It was in 1972 when for the first time Zurif, Camarazza and Myerson gave proof of a new concept called “agrammatic comprehension” or “agrammatism” (Martínez, 2003). As mentioned previously, agrammatism is the main symptom of Broca’s aphasia. Back in the 19th century, Hughlings (1884) proposed the failure to create complete grammatical sentences as an aphasic consequence.

In the first half of the 20th century, according to Martínez (2003), Jakobson (1941) first used the concept of agrammatism and he defined it as the, non-fluent, effortful, telegraphic and hesitating speech in which there is a loss of patterns of rhythm after brain damage observed in some patients. After brain damage, he analyzed the speech of those patients and realized of the omission or reduced use of certain grammatical classes. Their speech was characterized by brief utterances, repetitions of different parts or words and the omission of embedded structures or wh-questions, and this happened in both speech and writing. Later on, Menn and Obler (1990) stated that those syntactic simplifications differ in severity: severe agrammatic subjects are speechless or almost it while mild agrammatics show only anomia (inability to name objects) or paraphasia (substitution of words) (Martínez, 2003).

Martínez (2003) also explains that, during many years, Grodzinsky (1984,1990,1991,2000) had been investigating agrammatism and finally concluded that it is directly related to the loss of composition of functional categories (FCs) in syntactic representation. As it is known, the language used in Broca’s aphasic people is mainly reduced to content words as adverbs, adjectives, nouns or verbs and even the process of thinking about this words is hard and some pronunciation errors are made by them. So we can assume that FCs are omitted too in agrammatic speech, and it can be illustrated with this example taken from Arutin (2001), as cited in Martínez (2003, p. 7):

(1) *B.L.: Wife is dry dishes. Water down! Oh boy! Okay. Awright. Okay ... Cookie is down... fall, and girl, okay, girl... boy... um*

*Examiner: What is the boy doing? B.L.: Cookie is... um... catch Examiner: Who is getting the cookies? B.L.: Girl, girl!*

*Examiner: Who is about to fall down? B.L.: Boy... fall down!*

(Avrutin 2001)

As a conclusion, it can be said that the omission (meaning the deletion of functional elements) and the substitution (meaning the use of another word or expression to replace the original element) of inflectional morphemes and different function words (as determiners, complementizers, prepositions and auxiliaries) characterize agrammatical speech.

### **3.2 Aphasia and language learning**

As has been mentioned throughout this paper, Broca's aphasia is of a motor type which damages the production of language because of a limitation in the formation of words or sentences. It is also known that Broca's aphasic patients can not appropriately translate their thoughts into words, and this problem in which the meaning is clear but the syntax is missing is called telegraphic speech. Besides agrammatism which has been explained before, other language consequences (Schreiber, 2017) are: *Alexia*, in which the damage is caused in the part of the brain responsible for the processing of the visual language. This damage can cause the person difficulties in reading, but not in the ability of writing; another one is *Agraphia*, which is a neurological injury in which the ability of writing is lost.

In addition, Broca's aphasia causes an important damage too in language learning. Language learning (Schreiber, 2017) is a process that consists of developing a formal knowledge of a second language. It is done in a conscious way and develops explicit knowledge, because of a formal teaching. Nevertheless, Broca's aphasia symptoms

(Carragher et al., 2015) have consequences for language production and communication in everyday contexts and aphasic patients struggle a lot in this discipline due to, mostly, agrammatism. Some examples by Carragher et al. (2015), are how those individuals refer to a past event, because they have grammatical problems in marking the tense and because of the lack of fluency, they struggle also with social interaction. But according to Carragher et al. (2015), agrammatism is a temporal disorder (Kolk 1995) so that by training and with therapies, aphasic patients can improve their abilities of language learning. As it is known, agrammatism (Carragher et al., 2015) decreases the capacity for language production and so leads to morphosyntactic deficits. But some agrammatic speakers adapt to that deficit by producing simplified sentences, avoiding wh-questions, embedded constructions and negation (Kolk 1995). Because of that and to communicate, agrammatic speakers produce ellipsis, which are (Caragher et al.,2015) constructions made of a non-finite verb forms, as “coming now”, or lacking a verb, as “small problem” to compensate and manage their linguistic target. They are trained to produce elliptic utterances and learn, by avoiding well-formed structures, to produce informative constructions without processing techniques.

### **3.2.1 Verb-argument formation**

However, it is also known that verbs are the most difficult structures to learn in aphasic patients, and that is also applied to aphasic language learners. According to Sung (2006), in the production of arguments the verb-production decreases as the number of arguments increase (Thompson et al. 1997). Therefore, aphasic patients have problems when learning a new language which speech is full of verb-arguments. Logically, if pronouncing verb-arguments is difficult for agrammatic people in their mother tongue, it will be even harder in their second or third language.

Besides, another problem related to verb-argument structure explained by Sung (2006) is the thematic role. According to Lee and Thompson (2004), individuals with

agrammatic aphasia perform in a worse way the process of naming intransitive verbs . And that problem has an explanation. Perlmutter (1978) divided intransitive verbs in two types: unaccusative and unergative verbs. On the one hand, Perlmutter (1978) affirms that unaccusative verbs (*melt*) are those that take the theme (*the ice*) in the subject position and represent informal actions or states. On the other hand, unergative verbs (*sleep*) take the agent (*the boy*) in the subject position and state formal actions (Perlmutter, 1978, cited in Sung, 2006). These types of verbs are illustrated by Sung (2006, p. 288) with the following examples:

1. Unaccusative verbs: The ice [theme] melts (unaccusative).
2. Unergative verbs: The boy [agent] sleeps (unergative).

To conclude, we can affirm that unaccusative verbs are more difficult to produce by agrammatic individuals than unergative verbs because the first ones resemble passives, and the passive is a difficult structure to learn for aphasic patients.

### **3.3 Aphasia in different languages**

Returning to the previous points, it is explained that grammatical and lexical problems occur always in aphasia, and that patients with agrammatism maintain a kind of sensitivity to their native grammar, although they can also learn another language. Besides, as Broca's aphasia does not affect everyone equally, there are different degrees , neither does it have the same effects in all languages. In the next part of this paper I will cover those effects in the four different languages that I speak: English, Spanish, Catalan and German.

### **3.3.1 English**

According to Dick (2015), Broca's aphasia provokes alterations in the retention or omission of grammatical inflections in English speakers. As it is known, agrammatism is the main effect Broca's aphasia has on speakers and it affects omissions and substitution of function words and inflections in verb-language production.

As Martínez (2003) affirms in her paper, De Villiers' (1978) study of spontaneous speech in non-fluent English speakers declares that omission errors, mainly of bound morphemes, are frequent because of the occurrence of stems that function as independent words. The percentages obtained in De Villiers' (1978) experiment showed that omission errors in verb-inflection were detected in different tenses, being the percentage the following: there was 35,1% of errors in 3<sup>rd</sup> person singular present (-s) and 28,1% of error in the past tense (-ed). Besides, there are not only errors in past tense. There was a case of a 71-year-old agrammatic English subject that was analyzed by Nadeau and Rothi (1992). After the experiment, they concluded that there is 50% of errors with verbs in the present ended in /-z/, 33% of errors with verbs in presents ended in all letters, and a 33% of errors with past verbs ended in /-d/.

To conclude, we can affirm that according to Martínez (2003) we have seen that in English, "Tense and Agreement are difficult to set apart." So there are many cases in which the errors in omission or substitution of different verbs, are not clear if they have to be attributed to difficulties in Tense, in Agreement or if they are due to difficulties in both.

### **3.3.2 Spanish and Catalan**

In a study carried out by Martínez (2003), some Catalan and Spanish aphasic subjects took part in two different experimental tasks to observe the behavior of Tense and Agreement problems: repetition and completion of different sentences by alternating

tense and grammatical person. As we know, in Spanish and Catalan there is a rich verb inflection, with different forms for person and number, so that it is more difficult in agrammatic subjects to dominate it.

Firstly, the two tenses chosen by Martínez (2003) to develop the tasks were the Present and the Preterite for Spanish people, and the Present and Imperfect for Catalan people. The first survey Martínez (2003) did, was about the delayed repletion of sentences. The percentage of omission and substitution errors according to Martínez's (2003) task were calculated in both languages and the results were the following: In Spanish, 93.19% responded with a substitution, 7.8% didn't know and none responded with any omissions; while in Catalan, the percentage of people who responded with a substitution was 86.89%, 12.30% didn't know the answer and 0.82% responded with omissions. After that, Martínez's (2003) did a second task about the completion of sentences. However, this time she calculated the percentages of tense and agreement (rather than the omission and substitution) in both languages and the results Martínez (2003) obtained were: in Spanish, the percentage of errors and "do not know" responses in the different tenses and agreement was 20.98%; while in Catalan, the errors and "do not know responses" were 17.42%.

To conclude, we can affirm that according to the results of Martínez (2003), the statistical comparisons showed that, between Spanish and Catalan agrammatic subjects, the differences are not significant. Their way of speaking is almost equally and they make mistakes more or less in the same aspects.

Besides, after an exhaustive research through Internet, more useful material have been found. As a native Catalan speaker, with Spanish as my second language, I wanted to learn more about this field and find information and methods for me as a future professional of aphasia problems, to deal with patients. Finally, I found two "mini-test" in Spanish to interview possible aphasia patients, one for children and another one for adults. I find them very useful in order to clarify a possible aphasia case in people who have many symptoms. So that I will attach them in the last part



called "Appendix", to classify them as important materials in my TFG for future practices.

### **3.3.3 German**

As we have seen in the previous sections, Broca's aphasia causes different effects on speakers. And these effects can vary depending on the characteristics of the different languages. In German (Dronkers et al., 2009), it has been demonstrated that patients with Broca's aphasia do not usually omit words as "the", because they are function words and are critical to the meaning of the noun, whereas in English they are not. The differences in this cross-cultural process suggest that Broca's aphasia patients can produce content grammatical forms if necessary, but they simplify production by omitting what is not essential.

The German language (Martínez, 2003) confirms the validity of the cross-linguistic tense-agreement dissociation. Many years ago, two linguists called Wenzlaff and Clahsen (2002) tested the contrast between agreement and tense production. Besides, they did a study about sentence completion and grammaticality judgment tasks among several German subjects. However, According to Wenzlaff and Clahsen (2002, p. 32) the results showed a deficit in tense but not agreement features, because subject-verb agreement was almost intact while tense results were worse. Those results of sentence completion in agrammatic German speakers were based on Höhle (1995) studies, and the percentages showed that 29% of people committed tense errors, 9% failed in agreement and non made errors in substitution.

Consequently, German is different in comparison to English, Spanish or Catalan. And that again confirms the effects of Broca's aphasia on the characteristics of the different languages.

## 4. CONCLUSIONS

According to the experiments, the analysis and all the websites and journals consulted, I have arrived to several conclusions. Aphasia is a mental disorder that occurs after a brain injury. It is an unknown concept among society nowadays, because according to survey percentages' previously studied, only one third of the population, approximately, have general concepts of what is aphasia. For that reason it is important to continue investigating and introducing it as much as possible into society. However, there are several types of aphasia but the one I have been studying is called Broca's aphasia. Broca's aphasia is a non-fluent type of aphasia, also called expressive, caused by a brain trauma that damages the left frontal area of the brain. It makes speaking difficult for patients, who limit their speech acts to utterances and short expressions. Consequently, the quality of life of those people decreases because their socialization practices are also affected. Broca's aphasia affects grammar, specially verbs, which are more difficult to pronounce. Agrammatism is its main consequence, since verbs have the grammatical information that part of the brain is in charge of processing. This damage makes it difficult to pronounce verbs while speaking. In addition, it also affects language learning, since the brain is responsible of processing visual language. Aphasia also has a negative influence on reading and writing. However, Broca's aphasia does not affect all languages in the same way and although English, Spanish and Catalan have similar problems, in German the use of function words as "the" are also affected. In conclusion, Broca's aphasia affects grammar, language learning and different languages in diverse ways.

### **Acknowledgements.**

I would like to thank my dissertation tutor Teresa Morell Moll for her help and support in the topic. This semester has been different in comparison to how a normal semester would be. Due to coronavirus, I was unable meet my tutor more than once since I returned to Spain. However, we have been doing online TFG tutorials, through "Google Meet" video calls, and Prof. Teresa Morell has been giving me her

advises and corrections, in order to do my TFG as well as possible. I am very pleased to have had her as a tutor and as I am very grateful for all her support, I wanted to include in my TFG my sincere gratitude.

## 5. APPENDIX

### 1. Table with the articles, journals and websites consulted.

Noelia Coloma Navarro

TFG

**TABLE WITH ALL THE ARTICLES, JOURNALS AND WEBSITES CONSULTED**

Green = aphasia; Orange = aphasia and grammar; Blue = Aphasia and language learning; Purple = Aphasia in different languages.

	Author + year	Article/Journal	Topic	Methodology	Results	Implications
<a href="#">Article 1</a>	Nina Simmons-Mackie, Chris Code, Elizabeth Armstrong, Lillian Stiegler & Roberta J. Elman 2002	<b>What is aphasia? Results of an international survey</b> <i>Aphasiology</i> , 16:8, 837-848	A survey undertaken to sample public awareness of aphasia.	A face-to-face survey of individuals in public places in England, the USA, and Australia was undertaken. A total of 978 individuals were surveyed. Data were analysed to determine the number of informants who had "heard of aphasia" and the number with "basic knowledge of aphasia". In addition, characteristics of informants were analysed.	Of the individuals surveyed, 133 said they had heard of aphasia (13.6%), but only 53 (5.4%) meet the criterion of having "basic knowledge of aphasia".	These findings lend support to the notion that the public lacks awareness or understanding of aphasia. As public awareness can affect funding, quality of services, and public acceptance of individuals with a disorder, public awareness and advocacy campaigns are needed.

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<p><a href="#">Article 2</a></p>	<p>Martha Taylor Sarno, MA, MD 1987</p>	<p><b>National Aphasia Association (NAA)</b></p>	<p>Definition of Aphasia and classification of the different types.</p>	<p>Explanation of each type and the differences between them.</p>	<p>Treatments to help in the improvement of the aphasic patients.</p>	<p>Everyone can <u>lives</u> better if they are helped.</p>
<p><a href="#">Article 3</a></p>	<p>Jagadeesan Pallavi, Radhakrishnan Chella Perumal and Murugesan Krupa 2018 Oct-Dec</p>	<p><b>Quality of Communication in Life in Individuals with Broca's Aphasia and Normal Individuals: A Comparative Study / Annals of Indian Academy of Neurology</b></p>	<p>The comparison of the Quality of Communication Life (QoCL) between individuals with Broca's aphasia and normal individuals.</p>	<p>The first phase of the study translated and validated QCL scale in Tamil and the second the administration of the Tamil QCL. The marked responses were analysed on a visual analogue scale independently.</p>	<p>The QoCL scores across three domains were observed to be lower in individuals with Broca's aphasia, when compared to normal adults.</p>	<p>This study reveals information regarding the extent of impact of communication difficulty on the QoCL, is best expressed in native and familiar language. <u>Thus</u> requires language specific self-reported scales for facilitating appropriate client-specific intervention plans. This information can also be used to gauge the prognosis and progress of communication intervention programmes.</p>

<p><a href="#">Article 4</a></p>	<p>Whelan, C 29 August 2017</p>	<p><b>Broca's Aphasia Healthline</b></p>	<p>Aphasia is the loss of the ability to understand speech or communicate using language. It can occur when areas of the brain responsible for language become damaged.</p>	<p>It's named for Pierre Paul Broca, a French physician who discovered the area in 1861. Broca's aphasia is also referred to as expressive aphasia.</p>	<p>There are several different types of aphasia. Each type is categorized as either fluent or non-fluent. Broca's aphasia is a non-fluent type.</p>	<p>Broca's aphasia results from damage to a part of the brain called Broca's area, which is located in the frontal lobe, usually on the left side. It's one of the parts of the brain responsible for speech and for motor movement.</p>
<p><a href="#">Article 5</a></p>	<p>Roelien Bastiaanse, Ron van Zonneveld July–September 2004</p>	<p><b>Broca's aphasia, verbs and the mental lexicon Volume 90, Issues 1–3, Pages 198-202 / Brain and Language</b></p>	<p>Verb production is notoriously difficult for individuals with Broca's aphasia, both at the word and at the sentence level.</p>	<p>To identify the functional locus of the impairment that results in verb production deficits in Broca's aphasia. Two experiments have been conducted, one on verb movement and one on verbs with alternating transitivity.</p>	<p>The results suggest that the functional impairment in Broca's aphasia should be located in Level's "grammatical encoder."</p>	<p>All in all, verbs are more difficult to produce than nouns for individuals with Broca's aphasia, because verb lemmas contain more grammatical information than noun lemmas. This information needs to be grammatically encoded, both in single word and in sentence production.</p>

<p><a href="#">Article 6</a></p>	<p>Frederic Dick, Elizabeth Bates, Beverly Wulfeck, Jennifer Utman, Nina Dronkers and Morton Ann Gernsbacher. 2015 Jan 21</p>	<p><b>Language deficits, localization, and grammar: Evidence for a distributive model of language breakdown in aphasic patients and neurologically intact individuals.</b> / Psychol.Rev. 2001 Oct; 108(4): 759-788.</p>	<p>Selective deficits in <u>aphasics</u> patients' grammatical production and comprehension are often cited as evidence that syntactic processing is modular and localizable in discrete areas of the brain.</p>	<p>The authors review a large body of experimental evidence suggesting that <u>morphosyntactic</u> deficits can be observed in a <u>number of</u> aphasic and neurologically intact populations.</p>	<p>They present new data showing that receptive agrammatism is found not only over a range of aphasic groups, but is also observed in neurologically intact individuals processing under stressful conditions.</p>	<p>The authors suggest that these data are most compatible with a domain-general account of language, one that emphasizes the interaction of linguistic distributions with the properties of an associative processor working under normal or suboptimal conditions.</p>
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<p><a href="#">Article 7</a></p>	<p>Martínez, Silvia. 2003</p>	<p><b>Verbal inflectional morphology in Broca's aphasia</b> de Universitat Autònoma Barcelona</p>	<p>To explore the nature of agrammatism, the main symptom of <u>Broca's</u> aphasia, by seeking to clarify if some of its characteristic grammatical errors are a consequence of impairment of functional categories.</p>	<p>It focuses on the inflectional domain, i.e. Tense and Agreement in the verbal production of Catalan, English and Spanish <u>agrammatic</u> subjects. This issue is analysed within the theoretical framework of generative grammar.</p>	<p><u>Agrammatic</u> speech is characterized by the omission or substitution of two main types of functional elements: inflectional morphemes and 'free-standing function words' (prepositions, determiners, auxiliaries and <u>complementizers</u>), which are selectively impaired.</p>	<p>For bound morphemes, <u>assuming that</u> patients respect rules of lexical well-formedness (as established by <u>Grodzinsky</u> 1984, 1990), the grammatical properties of the language used mark in which cases omissions are impossible and substitutions take place.</p>
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<p><a href="#">Article 8</a></p>	<p>Sung, <del>lee</del> Eun Apr 2016</p>	<p><b>The Effects of Verb Argument Complexity on Verb Production in Persons with Aphasia: Evidence from a Subject-Object-Verb Language /</b> Journal of Psycholinguistic research</p>	<p>The effects of verb argument complexity on verb production in individuals with aphasia using a verb-final language.</p>	<p>The verb-argument complexity was examined by the number of arguments (1-, 2-, and 3-place) and the types of arguments (<del>unaccusative</del> vs. <del>unergative</del> comparisons). Fifteen Korean-speaking individuals with aphasia and 16 normal controls participated in the study.</p>	<p>Individuals with aphasia presented lower mean percentage correctness in 3-place than in 1-place verbs, and showed differentially greater difficulties with <del>unaccusative</del> constructions than with <del>unergative</del> verbs, compared to the control group.</p>	<p>The verb-argument structure is concerned with the meaning relations of the thematic roles associated with a <u>particular verb</u> (Thompson et al. 1997). Thompson et al. (1997) found systematic decrease in verb-production performance as the number of arguments increased.</p>
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<p><a href="#">Article 9</a></p>	<p>Karin Schreiber 17 April 2017</p>	<p><b>Learning Language; Losing Language /</b> Medical Reference</p>	<p>Aphasia is a language impairment that appears when a person suffers a brain injury that affects <del>Broca's</del> or Wernicke's area. Aphasia can affect language production (ability to speak) or language comprehension (ability to understand when someone is speaking).</p>	<p>Paul <del>Broca</del>, who conducted research on children with language disorders and aphasias, discovered an area in the left side of the brain that is crucial to language processing. <del>Broca's</del> area of the brain is involved in the process of how we understand grammar.</p>	<p><del>Broca's</del> aphasia affects the production of the language by limiting the formation of words or sentences; patients with this type of aphasia can't correctly transform their thoughts into words. This is known as telegraphic speech, because the meaning is clear but the syntax is missing. <del>Broca's</del> aphasia also affects the motor control of one side of the body, resulting in other impairments such as hemiparesis, hemiplegia, alexia and agraphia.</p>	<p>Hemiparesis is muscle weakness in only one side of the body. Hemiplegia is the inability to move a group of muscles in one side of the body. It is also known as palsy. Alexia is caused by an injury to the area of the brain that processes visual language. Alexia can prevent a person from reading, but it doesn't affect the ability to write. Alexia is also known as text blindness or word blindness. Agraphia is a neurological disorder through which the ability to write is lost.</p>
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<p><a href="#">Article 10</a></p>	<p>Marcella <a href="#">Carragher</a>, <a href="#">Karen Sage</a> Paul Conroy 27 February 2015</p>	<p><b>Outcomes of treatment targeting syntax production in people with Broca's-type aphasia: evidence from psycholinguistic assessment tasks and everyday conversation /</b> International journal of Language and Communication disorders</p>	<p>The therapy within everyday communication is the aphasia treatment design and evaluation.</p>	<p>A case series design was utilized with pragmatic selection of participants with chronic aphasia undergoing the same assessment and treatment procedures.</p>	<p>Treatment showed strong direct effects in trained and untrained sentence construction tasks, with some generalization to narrative retell tasks.</p>	<p>Improvement in language production in constrained assessment tasks may not impact on everyday conversations. Implications for further research are discussed, e.g. the need for bridging interventions between constrained and unconstrained contexts of language production. Clinical implications include the potential to streamline therapy planning and delivery by making use of rich, hybrid therapies to treat individuals with similar symptom profiles but with a range of underlying deficits.</p>
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<p><a href="#">Article 11</a></p>	<p>Frederic Dick,<sup>1</sup> Elizabeth Bates,<sup>1</sup> Beverly Wulfeck,<sup>2</sup> Jennifer Utman,<sup>3</sup> Nina Dronkers,<sup>4</sup> and Morton Ann <a href="#">Gernsbacher</a>, 21 Jan 2015</p>	<p><b>Language deficits localization, and grammar: Evidence for a distributive model of language breakdown in aphasic patients and neurologically intact individuals /</b> Psychol Rev. 2001 Oct; 108(4): 759-788</p>	<p>Selective deficits in <a href="#">aphasics</a> patients' grammatical production and comprehension are often cited as evidence that syntactic processing is modular and localizable in discrete areas of the brain (e.g., Y. <a href="#">Grodzinsky</a>, 2000).</p>	<p>The authors review a large body of experimental evidence suggesting that <a href="#">morphosyntactic</a> deficits can be observed in a <a href="#">number</a> of aphasic and neurologically intact populations</p>	<p>They present new data showing that receptive agrammatism is found not only over a range of aphasic groups, but is also observed in neurologically intact individuals processing under stressful conditions.</p>	<p>The authors suggest that these data are most compatible with a domain-general account of language, one that emphasizes the interaction of linguistic distributions with the properties of an associative processor working under normal or suboptimal conditions.</p>
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<p>Artículo 14</p>	<p>Martínez, Sílvia, 2003</p>	<p>Verbal inflectional morphology in Broca's aphasia</p> <p>Universitat Autònoma de Barcelona</p>	<p>To explore the nature of agrammatism, the main symptom of Broca's aphasia, by seeking to clarify if some of its characteristic grammatical errors are a consequence of selective impairment of functional categories.</p>	<p>It focuses on the inflectional domain, i.e. Tense and Agreement in the verbal production of Catalan, English and Spanish agrammatic subjects. This issue is analysed within the theoretical framework of generative grammar.</p>	<p>Agrammatic speech is characterized by the omission or substitution of two main types of functional elements: inflectional morphemes and 'free-standing function words' (prepositions, determiners, auxiliaries and complementizers), which are selectively impaired.</p>	<p>Different results were found depending on the language analyzed. Omission and repetition in verb Tenses and Agreement varied depending on the origin of the languages and their own characteristics.</p>
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## 2. Aphasia in different languages: Spanish and Catalan: Aphasia tests

### a. "Mini-test" in Spanish for children

#### CUESTIONARIO BÁSICO PARA LA DETECCIÓN DE TRASTORNOS EN EL ÁREA DE LENGUAJE

[DETECTORES DE RIESGO POR NIVELES DE EDAD]

#### INTRODUCCIÓN

Aunque el desarrollo de los niños suele variar con frecuencia y normalizadamente de unos a otros, teniendo cada uno su propio ritmo en la adquisición de los aprendizajes, existen unos aspectos generales que deben aparecer o mostrarse aproximadamente durante los mismos periodos evolutivos. De no hacerlo, son **indicadores** que deben ser tenidos en cuenta.

El presente cuestionario se ha elaborado con la intención de servir de **instrumento de apoyo para la detección de dificultades en el desarrollo del lenguaje**.

Pensado para su aplicación por profesores, logopedas y lingüistas clínicos, debe servir como **prevención** y en su caso, cuando predominen claramente las respuestas negativas o las situaciones de duda, orientación específica a los padres si se estima necesario.

#### CUESTIONARIO

A continuación, una vez cumplimentados los datos básicos del niño, aparecen una serie de **detectores generales de riesgo de trastornos de lenguaje por niveles de edad**. Para que su aplicación pueda ser de utilidad, marque con **objetividad** lo que se ajusta a la realidad o es más correcto en cada caso.

DATOS BÁSICOS	
NOMBRE DEL NIÑO:	
EDAD/FECHA NACIMIENTO:	
CENTRO:	
NIVEL:	
FECHA DE LA OBSERVACIÓN:	
LINGÜISTA CLÍNICO:	

De 0 a 1 años... (RESPONDER: "SI", "NO", "AV" -a veces-)
Reacciona ante ruidos fuertes
Deja de llorar al oír la voz de su madre
Se producen variaciones en las vocalizaciones (aumento en cantidad, longitud, variedad)
Responde a juegos con componente gestual
Incrementa los juegos vocálicos en presencia del adulto de apego
Realiza (al final de la etapa) vocalizaciones con significado muy general
Observaciones de interés:

De 1 a 2 años... ("SI", "NO", "AV" -a veces-)
Se inicia en la emisión de alguna palabra
Acompaña a sus gestos de petición-información con vocalizaciones prolongadas
Comprende órdenes sencillas (toma, dame...) con gestos
Imita sonidos a propuesta del adulto, sonidos dichos previamente por el niño
Comprende palabras de uso común sobre ropas, juguetes, comidas...
Reacciona adecuadamente a los diferentes ruidos (extraños y familiares)
Realiza jergas, canturreos...
Imita sonidos y movimientos específicos como chasquidos de lengua, pedoretas...
Observaciones:

De 2 a 3 años... ("SI", "NO", "AV" -a veces-)
Dice entre 5 y 10 lexías familiares
Usa combinaciones de dos lexías
Usa elementos deicticos (aquí, allí...)
Imita algún fonema
Imita el uso adulto del lenguaje (ecolalia)
Comprende oraciones sencillas de una sola orden
Observaciones:



<b>De 3 a 4 años...</b> ("SI", "NO", "AV" -a veces-)
Comprende órdenes con doble mensaje (ej. "coge la pelota y dánclala")
Hace oraciones de tres palabras (ej. "mamá quiero agua")
A veces confunde algunos sonidos ("p", "r", "k")
Pronuncia lexías de tres sílabas
Hace juegos morfológicos (singular/plural; masculino/femenino)
Sabe hacer oraciones coordinadas (...y...)
Observaciones:

<b>De 4 a 5 años...</b> ("SI", "NO", "AV" -a veces-)
Puede seguir un cuento o una historia corta y lo comprende
Se expresa con oraciones bien estructuradas
Pregunta utilizando "¿porqué?", "¿cómo?", "¿qué?"
Sabe contar una experiencia o relata un cuento sencillo
Sabe usar prácticamente todos los juegos morfológicos
Sabe usar oraciones subordinadas
Observaciones:

**CONCLUSIONES:**

Cuando se entienda que la aplicación de este cuestionario es significativa (como confirmación objetiva de posibles sospechas de dificultades en el desarrollo del lenguaje), debe comenzar una fase de atención y comunicación con la familia, así como una valoración más completa y exhaustiva del desarrollo del niño, que puede dar lugar al inicio de un tratamiento específico por parte de los servicios de atención infantil temprana de la zona.

(Patirequete's, 2010)

**b. "Mini-test" in Spanish for adults**

Batería Memoriza  
Test de afasias  
www.memoriza.com

TEST PARA EVALUACIÓN DE AFASIAS "MEMORIZA"

Nombre: \_\_\_\_\_  
Fecha: \_\_\_\_\_ Escolaridad: \_\_\_\_\_  
Amfibotismo: SI - No \_\_\_\_\_ Lateralidad: \_\_\_\_\_  
Diagnóstico y fecha del evento: \_\_\_\_\_

Nombre del evaluador: \_\_\_\_\_

Describir la actitud general del paciente (ej. Cooperador, angustia, anosognosia, etc.): \_\_\_\_\_

Tiene el paciente algún problema visual, auditivo, motor o fonatorio? (describir): \_\_\_\_\_

**LENGUAJE ESPONTANEO (marcar con un círculo) (6 puntos):**

Gramática: \_\_\_\_\_

Normal (2) Moderadamente alterada (1) Muy alterada (0)

Anomia: \_\_\_\_\_

Sin anomia (2) Moderadamente alterada (1) Muy alterada (0)

Fluidez: \_\_\_\_\_

Normal (2) Dudosa (1) Verborrea (1) No fluente (0)

**ORIENTACIÓN:**

No otorga puntaje para el test, es sólo referencial. Escriba en la línea la respuesta del paciente. Intente interpretar la respuesta considerando su trastorno del lenguaje. Si no puede llegar a una conclusión por la afasia, catalogue de inaplicable.

fecha \_\_\_\_\_ mes \_\_\_\_\_ día \_\_\_\_\_ año \_\_\_\_\_ estación \_\_\_\_\_

lugar \_\_\_\_\_ piso \_\_\_\_\_ ciudad \_\_\_\_\_ región \_\_\_\_\_ país \_\_\_\_\_

Batería Memoriza  
Test de afasias  
www.memoriza.com

**COMPRESIÓN (12 puntos):**

Dé las siguientes instrucciones al paciente en forma clara y pausada. En caso necesario, repetir cada instrucción máximo dos veces. Dar 1 punto por cada respuesta correcta.

-Comprensión de órdenes (Máximo 8 puntos):

Cierre los ojos (1 punto) Saque la lengua (1 punto)

Levante el brazo (1 punto) / Mueva los dedos de la mano (1 punto)

Toque su oreja izquierda (1 punto) / Tóquese la cabeza (1 punto)

Muéstreme tres dedos de la mano (1 punto) Empuje su mano (1 punto)

-Respuestas Si y No (máximo 4 puntos):

¿ Es usted una mujer? 1 punto

¿ Los perros son animales voladores? 1 punto

¿ Estamos en una fiesta de disfraces? 1 punto

¿ Es esto un hospital? 1 punto

**REPETICIÓN (13 puntos):**

El examinador debe anotar tal como repite el paciente en la línea. Es posible que se le deba reiterar la frase o palabra al paciente antes que éste la repita. Una vez que comienza, no se reitera la palabra o frase (máximo 8 puntos).

Papá \_\_\_\_\_ 1 punto

Dedo \_\_\_\_\_ 1 "

Zapato \_\_\_\_\_ 1 "

Cefuroxima \_\_\_\_\_ 1 "

Mar Cantábrico \_\_\_\_\_ 1 "

El llan tiene frutillas \_\_\_\_\_ 1 "

El quiere irse a casa \_\_\_\_\_ 1 "

No existen muchas cosas que no se puedan tocar \_\_\_\_\_ 1 "

**Digit span:**

"Le voy a decir unos números, y quiero que los repita inmediatamente después de que yo los diga. Escuche con atención". Administre ambos ensayos para cada ítem. Pare si el paciente se equivoca en dos ensayos consecutivos del mismo nivel. Se otorga un punto por cada dígito de la serie máxima que logró repetir (máximo 5 puntos).

1.	9-3	
2.	1-5	
1.	5-8-2	
2.	6-9-4	
1.	6-4-3-9	
2.	7-2-8-6	
1.	4-2-7-3-1	
2.	7-5-8-3-6	

**NOMINACIÓN:**

Muestre al paciente colores, partes del cuerpo, objetos y partes de objetos. Consigne la respuesta tal cual la emite el paciente, puntuando 1 por cada respuesta correcta. Si existen parafasias, consígnelo y puntúe cero (máximo 16 puntos).

Colores (1 punto por cada respuesta correcta)

- Blanco:
- Rojo:
- Azul:
- Amarillo (alternativas naranja, verde, negro):

Partes del cuerpo (1 punto cada respuesta correcta)

- Nariz:
- Frente:
- Codo:
- Oreja:

Objetos (1 punto cada respuesta correcta)

- Llave:
- Lápiz:
- Vaso:
- Teléfono, celular, móvil:

Partes de objetos (mostrar como parte del objeto general) (1 punto cada respuesta correcta)

- Botón:
- Bolsillo:
- Tapas (de un lápiz):
- Manga:

**LECTURA:**

Instrucción: "Lea en voz alta lo que dice aquí"... "Ahora cumpla la instrucción escrita"  
 Suma 1 punto si lee y 1 punto si ejecuta cada instrucción escrita en un papel (Máximo 4 puntos).

1- Lea en voz alta : "CIERRE LOS OJOS" Lee: Sí No (1 punto)  
 Ejecuta: Sí No (1 punto)

2- Lea y haga lo que dice aquí: "LEVANTE LA MANO"  
 Lee: Sí No (1 punto)  
 Ejecuta: Sí No (1 punto)

**ESCRITURA:**

Confirmar si el paciente no puede escribir por parésia o dificultad osteoarticular de la extremidad superior. (Máximo 8 puntos)

Escriba su nombre (1 punto) y apellido (1 punto)  
 Frase espontánea "escriba una frase de una línea que tenga sentido" (otorgar 1 punto por sujeto y 1 punto por predicado)  
 Escriba al dictado: "El quiere irse pronto" (1 punto por palabra, máximo 4 puntos; no descontar por faltas ortográficas)

**PUNTAJE TOTAL:**  
 Lenguaje espontáneo: \_\_\_\_/6 puntos  
 Comprensión : \_\_\_\_/12 puntos  
 Repetición : \_\_\_\_/13 puntos  
 Nominación : \_\_\_\_/16 puntos  
 Lectura : \_\_\_\_/4 puntos  
 Escritura : \_\_\_\_/8 puntos  
**TOTAL** : \_\_\_\_/59 puntos

**Conclusión tipo de afasia:**

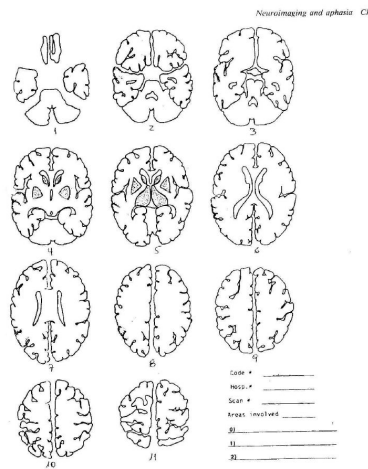


Fig. 4. Planning of the lesion seen in Fig. 3, in its best-fitting complete system.

(González-Hernández, 2019)

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