

# Bilingual Aphasia

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## **BILINGUAL APHASIA**

Submitted in partial fulfilment of the requirements for the B.A. in English Language and Literature and German Language and Literature at the University of Rijeka

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# 1 Introduction

In this day and age, bilingualism, i.e. multilingualism is increasingly becoming a field of interest for linguists. Although there is more than a single definition of bilingualism, most scientists will agree on a definition that explains bilingualism as a "common human condition that makes it possible for an individual to function, at some level, in more than one language"<sup>1</sup>. There is an increasing number of bilingual people, the number, according to Francois Grosjean reaching over 50% of the world's population.<sup>2</sup> The phenomena is mostly caused by globalization and migration. As David Green mentions in his chapter *The Neurocognition of Recovery Patterns in Bilingual Aphasics*: "In the case of the United States, for example, Paradis (2001) estimates, on the basis of census data, that there will be well over 45,000 new cases per annum."<sup>3</sup>

Brains of bilinguals are different than the brains of monolingual people. It has been proven that people who are bi- or multilingual have more gray matter than monolinguals.<sup>4</sup> Because of this and many more differences between the mono- and multilingual brains, a significant challenge is proposed for medicine in instances where there is damage to certain areas of the bilingual brains. The most specific one for the bilinguals is their language production, and an impairment of the language that affects the production and and/or comprehension of language and its use is called aphasia. Different types of aphasia shall be discussed in the latter chapters of

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<sup>1</sup> Valdés, Guadalupe. *Multilingualism*. <http://www.linguisticsociety.org/resource/multilingualism>. Accessed 1<sup>st</sup> September 2016.

<sup>2</sup> Grosjean, Francois. *How many are we?* <https://www.psychologytoday.com/blog/life-bilingual/201209/how-many-are-we>. Accessed 1<sup>st</sup> September 2016.

<sup>3</sup> Green, David. 2008. "The neurocognition of recovery patterns in bilingual aphasics" in Judy F. Kroll & Annette M. B. de Groot (eds.), *Handbook of Bilingualism: Psycholinguistic perspectives*, Oxford: Oxford University Press, pg. 516.

<sup>4</sup> *Bilinguals of Two Spoken Languages Have More Gray Matter Than Monolinguals*. <https://gumc.georgetown.edu/news/Bilinguals-of-Two-Spoken-Languages-Have-More-Gray-Matter-Than-Monolinguals>. Accessed 1<sup>st</sup> September 2016.

this thesis. We can summarize the definition of bilingual aphasia as a language disorder of a person that speaks more than one language, which is caused by a damage (most usually a stroke) to the area of the brain that is used for language comprehension and production. The rationale behind this work, which is a theoretical overview of aphasic bilingualism and the link between the two, is the desire to learn more about this phenomena and its treatment in Croatia. The treatment of aphasia in bilingual individuals shall be discussed in the following chapters.

## **2 Aphasia**

According to the National Aphasia Association (NAA), aphasia is "an impairment of language, affecting the production or comprehension of speech and the ability to read or write."<sup>5</sup> Aphasia is a result of some type of brain injury, most commonly a stroke, however, other brain injuries such as head traumas, brain tumors or some infections may lead to aphasias. The severity of an aphasia may vary from being very mild and easily treatable, i.e. the language repairs itself eventually, or it can be severe and require a long term help from a speech therapist. Aphasias can, depending on the position of the trauma, affect only one aspect of language, e.g. the ability to read or name objects, however, it is more frequent that multiple regions of the brain are damaged.

### **2.1 Types of aphasia**

There are multiple types of aphasia and the first to study the representation of language in brain were Paul Broca, who labeled the inferior part in the third frontal convolution in the left brain hemisphere as the 'motor center for spoken words' (named 'Broca's area') and Carl Wernicke, who, a couple of years after Broca's findings, complemented his research by suggesting that the 'sensory speech area' (later named Wernicke's area) is located in the

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<sup>5</sup> *Aphasia Definitions*. <http://www.aphasia.org/aphasia-definitions/>. Accessed 1<sup>st</sup> September 2016.

posterior third of the upper temporal convolution of the left hemisphere of the brain.<sup>6</sup> Damages to these regions result in different language disorders. Other types of aphasias include global aphasia, anomic aphasia, primary progressive aphasia (PPA) and mixed non-fluent aphasia.<sup>7</sup>

### **2.1.1 Broca's aphasia (expressive)**

Paul Broca was a French physician whose research dealt with, among other, brain aneurisms. He discovered the speech production center after performing an autopsy on one of his patients whom Broca named Tan (his real name was Leborgne) because it was the only syllable he could utter. The autopsy Broca performed on Tan after his death showed a large lesion in his frontal area, i.e. in the posterior inferior frontal gyrus. After performing autopsy on other of his patients, Broca concluded that our speech is localized. We now call that area Broca's area, and the impairment of that area Broca's aphasia.

Broca's area is responsible for putting words together to form complete sentences and people whose Broca's area is impaired tend to have difficulties with:

- Forming complete sentences.
- Uttering certain words that belong in certain word classes such as verbs or determiners, e.g. 'is' or 'the'
- They can understand the speech of others, but can't produce any speech themselves

A person with Broca's aphasia might say 'truck...bump...boom', which one might understand, however, this is an agrammatic and incomplete sentence. Individuals with Broca's aphasia understand language spoken to them, but have difficulty finding the words they want to say.

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<sup>6</sup> Ijalba, Elizabeth, Loraine K. Obler & Shyamala Chengappa. 2006. "Bilingual Aphasia" in Tej K. Bhatia & William C. Ritchie (eds.), *The Handbook of Bilingualism*, Malden, MA: Blackwell Publishing. pg. 73.

<sup>7</sup> Aphasia Definitions. <http://www.aphasia.org/aphasia-definitions/>. Accessed 1st September 2016.

### **2.1.2 Wernicke's aphasia (receptive)**

Carl Wernicke was a German physician who, after Broca's discovery, completed his research by studying a patient who could barely understand what was spoken to him, even though he suffered from no hearing impairments. After the patient's death, Wernicke performed an autopsy and found a lesion in his rear parietal temporal region in the left brain hemisphere and concluded that this region, which was close to the auditory region, is somehow connected to speech comprehension. The area is called Wernicke's area and the impairment of that area is called Wernicke's aphasia, or fluent aphasia, since the patient is capable of speaking. A person with Wernicke's aphasia may have the following symptoms:

- Difficulty understanding language spoken to them or may not understand when topics in conversation change
- They may not realize that what they are saying does not make sense
- May make up non-existent words, e.g. 'jabbarry'

People with Wernicke's aphasia often do not realize that what they are saying is wrong, i.e. lack insight into their disability and therefore do not feel depressed, unlike people with Broca's area who do understand that there is a problem.

### **2.1.3 Global aphasia**

Global aphasia is a condition in which, after an injury, a larger portion of the brain is affected. People with global aphasia might not only have difficulty with understanding words and sentences, but also might have difficulty with producing them. They are unable to speak or write, and this type of aphasia might be seen immediately after an injury, e.g. stroke. One must act quickly in receiving a treatment. Global aphasia is the most severe case of aphasia.

### 2.1.4 Anomic aphasia

This is a milder form of aphasia. The patients generally are able to read adequately and understand speech, as well as repeat sentences and words, however, they are unable to provide words for things they want to talk about which often leads to using vague words or circumlocutions, and is often similar to the ‘tip of the tongue’ state – a state in which a person knows the word he or she wants to utter, but is unable to.

## 3 Bilingualism

Bilingualism is a difficult term to explain, since there is still no agreement as to which degree should a person be proficient in a language in order for him or her to be called bilingual. Some say that dialects fall under being bilingual as well, since there have been ‘no objective criteria to distinguish between languages and dialects’<sup>8</sup>. Although the distinction between the representation of a dialect, i.e. a language in a brain and their difference is still debated<sup>9</sup>, most scientists agree that a bilingual person is not ‘two monolinguals in a one bilingual person’.<sup>10</sup> The position on dialects and them not being distinguished from the definition of language should greatly influence this thesis, since the Croatian standard language is based on the three main dialects – shtokavian, kajkavian and chakavian. Shtokavian (57%) is the most prominent one, followed by kajkavian (31%) and chakavian (12%)<sup>11</sup>.

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<sup>8</sup> Pinker, Steven. 1994. *The Language Instinct*, New York: Harper Collins.

<sup>9</sup> Paradis, Michel. 1995. ‘Introduction: The need for distinctions’ in M. Paradis (Ed.), *Aspects of bilingual aphasia* Oxford, UK: Pergamon Press, pg. 1-9.

<sup>10</sup> Grosjean, François. 1989. ‘Neurolinguists, beware! The bilingual is not two monolinguals in one person’ in S.L. Small (ed.), *Brain and Language*, Vol. 36, Cambridge: University of Cambridge, pg. 3-15.

<sup>11</sup> Brozović, Dalibor. 1997. *Narječja hrvatskoga jezika*, u knjizi Hrvatski leksikon br. 2, Zagreb: Naklada Leksikon i Leksikografski zavod Miroslav Krleža, pg. 1. – 12.



There are many types of bilingualisms, however, Meisel<sup>12</sup> makes a distinction between successive and simultaneous bilingualism. Simultaneous bilingualism is the one in which people are exposed to two languages from birth, and successive is learning the second language after the age of three. Successive bilingualism is more frequent in Croatia, given the fact that a child in Croatia starts learning a second language in school, i.e. in the first grade, and some learn it as early as kindergarten. When it comes to foreign languages, a survey from 2009 by the *GfK - Centar za istraživanje tržišta*<sup>13</sup> conducted a research on 1000 people in Croatia on their knowledge of a foreign language. Approximately 74% of the people included in the survey said that they spoke at least one foreign language, out of which English is the most prominent one, followed by German and Italian. The survey also showed that 97% of young adults (years ranging from 15 to 24) speak at least one foreign language and use it frequently.<sup>14</sup> In the next chapter some cases of bilingual aphasia in Croatian will be presented and in the following chapter after that, I shall try to explain how more than one language is presented in the brain in order to understand why people 'lose' one of the languages they speak.

#### **4 Neurolinguistic aspects of bilingualism and aphasia**

In order to explain why aphasia is such a complex topic for scientists, it is very important to try and answer a very important question: is the second language located in the dominant (left) hemisphere as with the first language, or in a less dominant (right) hemisphere?

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<sup>12</sup> Meisel, Jürgen M. 2006. "The Bilingual Child" in Tej K. Bhatia & William C. Ritchie (eds.), *The Handbook of Bilingualism*, Malden, MA: Blackwell Publishing. Ch 3.

<sup>13</sup> Market Research Center

<sup>14</sup> Hrvatska udruga za odnose s javnošću, <http://www.huoj.hr/index.php?opt=news&act=mlist&id=2750&lang=hr>, Accessed 1<sup>st</sup> September 2016

Back in the 19<sup>th</sup> century, Europe was a place where people spoke in many dialects and languages, which meant that their aphasia was different from the aphasia of monolinguals. Scientists began to notice different patterns in recovery from aphasia in polyglots, concluding that not every language recovers equally. After these initial observations, a question arose – how are these languages and dialects presented in the brain? Initially, and this theory exists in a modified form even to this day, scientists believed that each language had its own ‘‘language center’’<sup>15</sup>, and that the recovery will be different depending on which language center was damaged, i.e. disrupted, which would explain why some languages were left intact or regained easier and some left severely damaged.

It was Albert Pitres, a French neurologist, who first reviewed<sup>16</sup> the clinical studies of his colleagues and rejected the notion of a separate language system claiming that each language would ‘‘need at least four distinct cerebral centers: two sensory centers, for auditory and visual images, and two motor centers, for graphic and phonetic motor images’’<sup>17</sup> (In layman’s terms, a bilingual person would have to have two Broca’s (sensory speech area) and two Wernicke’s areas (motor speech area)) and the chances that the lesions are spread in such ‘harmonious’ way is highly unlikely. Pitres mentioned that the first language that aphasics would recover is the one that is most familiar to them prior the injury (Pitres’ rule) which was similar to the ‘Ribot’s law’ (recovery of the native language). He also described the initial stage of a recovery from an aphasia as ‘inertial’ in which the patients have no ability of understanding nor speaking either language, however, over the course of time, these languages gradually start to recover – first the comprehension, then the speech (of a language that is the most familiar one). Because of this,

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<sup>15</sup> Ijalba, Elizabeth, Loraine K. Obler & Shyamala Chengappa. 2006. ‘‘Bilingual Aphasia’’ in Tej K. Bhatia & William C. Ritchie (ed.), *The Handbook of Bilingualism*, Malden, MA: Blackwell Publishing, pg. 73.

<sup>16</sup> See Pitres in ref.

<sup>17</sup> Pitres, Albert. 1983. Readings on aphasia in bilinguals and polyglots. Montreal: Marcel-Didier, pp. 26-49.

Pitres believed that the recovery from aphasia is not due to the neurological organization of a language (or languages) but due to its current or permanent ‘inhibition’<sup>18</sup>, i.e. knowledge of the language is never completely destroyed, but ‘‘hidden’’ and may eventually be restored. His research have influenced many other scientists, including Mieczyslaw Minkowski (1927), a Swiss neurologist, who claimed that within a common area, in aphasics, active elements from known languages interact at a linguistic level and that the linguistic systems (syntax, semantics, etc.) are not destroyed but ‘weakened’, which would imply that ‘aphasic symptoms are a reflection of the language system functioning at a reduced level of activation’<sup>19</sup>. Others, such as Sigmund Freud (1891) and Hughlings Jackson (1879) have supported this thesis and were one of the first to advocate the difference between the first-learned and later-learned languages. As a matter of fact, it was Sigmund Freud who, after taking into consideration the frequency of a bilingual’s usage of L2 and the age in which he learned it, confirmed that the language that is learned later in patient’s life is the one that recovers the hardest<sup>20</sup> (probably because the mother tongue is learned from an early age, and these connections in brain are stronger and not easy to break). This has led to the conclusion that, had there been a unique center for languages, the severity of the damage due to aphasia, and the recovery from it, would be the same. On the other hand, having one language center for each language, i.e., two separate centers, the aphasia would affect the two languages differently, and the level of recovery would not be the same, i.e. it would vary based on the level of damage of one language.

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<sup>18</sup> Ibidem, pg. 28

<sup>19</sup> Ijalba, Elizabeth, Loraine K. Obler & Shyamala Chengappa. 2006. ‘‘Bilingual Aphasia’’ in Tej K. Bhatia & William C. Ritchie (eds.), *The Handbook of Bilingualism*, Malden, MA: Blackwell Publishing, pg. 73.

<sup>20</sup> Ibidem, str. 74

As already mentioned before, Paul Broca<sup>21</sup> and Carl Wernicke<sup>22</sup> were the ones who paved the way to a common belief that the centers for language are located in the left hemisphere. However, as the research progressed, scientists discovered a small population of people whose language is located in the right brain hemisphere, not to mention that a group of left-handed people was found to have their language equally distributed in both brain hemispheres. One must mention the cases of aphasic children where the children miraculously recuperated because in a span of couple of years, the other hemisphere would take over the functions of the injured region which would lead to a complete recovery – unlike adult aphasia patients whose chances for recovery were poor. One might see that there is a long way to go in order to fully comprehend a bilingual brain, however, recent researches, such as the one from Paradis indicate that scientists are getting closer to better understanding the bilingual brain.

Michel Paradis, a linguist whose BAT tests are used today to assess the severity of a patient's aphasia (in Croatia as well) proposed a few hypothesis on neural aspect of language, as well as different patterns of its recovery. After Soares and Grosjean conducted a study in 1981 on Portuguese and English speaking children in which they observed a link between the left and right hemisphere of (English speaking) monolingual vs. the left and right hemisphere of (English – Portuguese speaking) bilingual children, they concluded that both monolinguals and bilinguals use the right hemisphere to an equal extent (there was a popular belief that bilinguals use the right hemisphere, which plays an important role in language processing, more than monolinguals). One may conclude that languages are not located in entirely different regions, one still can differ the neural aspects of language organization. Paradis makes a distinction

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<sup>21</sup> Broca, Paul. 1865. "Sur le siege de la faculte du langage articule" in Masson (ed.), *Bulletin de la Societe d'anthropologie de Paris*.

<sup>22</sup> Wernicke, Carl. 1874. *Der aphasische Symptomencomplex: Eine psychologische Studien auf anatomischer Basis* (The Aphasia Symptom-Complex: A Psychological Study on an Anatomical Basis), Breslau: M. Crohn und Weigert.

between two views – the extended and the dual system hypothesis<sup>23</sup>. The extended system is the one in which two languages form one system, and their elements have the same neural mechanisms and dual is the one in which both languages are located in the same area, but they are supported by different neural mechanisms.<sup>24</sup> Paradis makes a compromise between the hypotheses – ‘‘the languages are stored in a single extended system, but the elements of each language form separate subsystems within the larger system.’’<sup>25</sup> The extended and dual hypothesis by Paradis, which was mentioned in previous section, would explain the parallel (both languages recovering at the same time), as well as non-parallel (one language recovers faster, i.e. slower than the other) recovery patterns:

*‘‘Paradis (1977) pointed out that predicting recovery in the individual polyglot speaker is still not easy. He created a taxonomy of patterns of recovery influencing degree of impairment and language return in polyglots (...)’’*<sup>26</sup>

These patterns include:

- a) Differential (each language shows different damage and recovery at the same, i.e. different rate; parallel (languages may have similar damage and recovery rate);
  - b) Antagonistic (one language regresses, but the other progresses);
  - c) Successive (one language restores first, and then the other);
  - d) Selective (one or more previously known languages is left selectively damaged)
- and;

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<sup>23</sup> Paradis, Michel. 1977. ‘‘Bilingualism and aphasia’’. In H. Whitaker and H. A. Whitaker (eds.), *Studies in Neurolinguistics*, vol. 3. New York: Academic Press. pp. 65-121.

<sup>24</sup> Appel, Rene, Muysken, Pieter. 2006. ‘‘Language Contact and Bilingualism’’. Amsterdam: Amsterdam University Press, pg. 75.

<sup>25</sup> Ibidem, pg. 75.

<sup>26</sup> Ijalba, Elizabeth, Loraine K. Obler & Shyamala Chengappa. 2006. ‘‘Bilingual Aphasia’’ in Tej K. Bhatia & William C. Ritchie (eds.), *The Handbook of Bilingualism*, Malden, MA: Blackwell Publishing, pg. 74.

e) Mixed (person uses a combination of all languages in order to communicate).<sup>27</sup>

He also says that ''individual cases have been reported of each of these types of recovery, with the first two being by far the most frequent.''<sup>28</sup> Studies have supported his claim, by pointing out that 40% of patients recover languages parallel, 32% recovered the first language better, and 28% recovered the second language better.<sup>29</sup>

## 5 Treatment

Since there are differences in a monolingual and a bilingual brain<sup>30</sup>, one might expect to see differences in aphasia as well. A monolingual aphasiac may retrieve the one language completely, which may not be the case with a bilingual aphasiac, since the degree of injury is determined by, e.g. the age of the L2 acquisition, the position of the injury, a person's efficiency at both languages, etc. If a person has parallel aphasia, the languages will recover equally well, however, if a person's aphasia is selective, i.e. one language recovers differently, it may pose a problem when it comes to recovering both languages equally well. There are certain tests that can be used in treating different types of aphasia, however, it is important to understand that the outcome of the treatment depends solely on the individual who has aphasia. As Cezza mentions in her paper: ''*Of the four language modalities, a trend has emerged depicting the expressive modalities (speaking and writing) improve only in the treated language, whilst*

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<sup>27</sup> Ibidem, pg. 74.

<sup>28</sup> Ibidem, pg. 75.

<sup>29</sup> Green, David. 2008. ''The neurocognition of recovery patterns in bilingual aphasia'' in Judy F. Kroll & Annette M. B. de Groot (eds.), *Handbook of Bilingualism: Psycholinguistic perspectives*, Oxford: Oxford University Press, pg. 518.

<sup>30</sup> When compared to a monolingual brain, the bilingual brain has certain areas such as syntax, phonology or orthography more active when performing a certain linguistic task; bilingual brains have more grey matter; the bilingual brain is better at multitasking, and '' a structural MRI study by Mechelli et al. (2004) showed that early and highly proficient bilinguals had the most extensive enlargement of the left inferior parietal cortex as compared to monolinguals'' (<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2643466/>)

*comprehension (listening and reading) can improve in untreated languages. (Pearce, 2005). Nevertheless, recent research has shown there is no general rule for language recovery that cases tend to follow.'*<sup>31</sup>

When it comes to treating a patient with a bilingual aphasia, the first step towards recovery occurs in the hospital, after determining that the aphasia is present. Treatments in Croatia are similar to those in other countries. Upon examination, the doctor asks about the symptoms and medical history and performs a physical exam. The neurologist, suspecting of aphasia, performs simple tests, which consist of following commands, answering questions, naming objects, and the spoken language. After that, the patient may be sent to a speech therapist, who will carry out additional tests for evaluation of speech and language skills. It is important to note that bilinguals must be tested in each of their language. The first meeting is the most difficult one, because the patient has difficulty finding words and explaining the purpose of the visit, because he feels the speech therapist will not understand him. It is up to the speech therapist to determine how the patient can and wants to communicate. During the first couple of meetings, the therapist is getting closer to the patient through textual material. The patient is at the beginning of the period of spontaneous improvement, which may last from one week to six months. During this period, his language should be constantly improving day by day. At each therapy session, the therapist is helping the patient comprehend what certain words mean and how to replace the missing words. It is therapist's duty to strengthen the patient's functional communication, i.e. his everyday communication. In doing so, it is necessary to engage the patient as much as possible, because without his help there is no real chance for improvement. It

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<sup>31</sup> Cezza, Marianne. 2012. "Recovery Patterns in Bilingual Aphasia: Influential Factors & Cross-Language Transfer", <https://mariannecezza.files.wordpress.com/2012/11/aphasia-recovery-patterns-lit-survey6.pdf>. Accessed on 2<sup>nd</sup> September 2016.

is also important to work with the patient's relatives. They provide information about the patient's communication before the disease: how he talked or what he liked to read and how much. It is important to evaluate the patient's oral skills in that point of time to figure out the type of aphasia. It is then necessary to make a customized program for the patient, and to decide what should be stimulated to make the patient feel better. If the patient has a paralyzed right arm or left hand, he would not even want to try to write at the beginning of rehabilitation. And if he does not want to, he should not be forced. The most important thing at the beginning of the therapy is to earn a patient's trust, because his cooperation is crucial for his rehabilitation. It is advisable for the therapist to start with the things the patient already knows and to keep in mind that it is a giant task for him to complete. It is important to encourage the patient to watch TV and read newspaper. If the patient is not able to read the newspaper, he should at least flip through the pages. It is necessary to adequately assess patient's abilities. One must take into consideration that a language does not only consist of a lexicon and a syntax, but it carries the culture of people speaking the language. When assessing the severity of a patient's aphasia, not many tests have taken this into consideration, however, the aforementioned Michel Paradis has constructed a BAT (bilingual aphasia test) which proved to be very helpful to speech therapists when prescribing the most efficient treatment, because it focuses on every patient individually.

### **5.1. Bilingual Aphasia Test**

The BAT consists of three parts – A, B and C. Part A enables the speech therapist an insight to the patient's bilingual and linguistic background. The Croatian version of the BAT Part A is titled 'Podaci o dvojezičnosti'<sup>32</sup> and it consist of questions such as 'Koji ste jezik govorili

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<sup>32</sup> History of bilingualism



kući kao dijete?’<sup>33</sup>, ‘Na kojemu je jeziku bila nastava kad ste krenuli u školu?’<sup>34</sup>, ‘Kojim je jezikom govorio Vaš otac?’<sup>35</sup>, etc.

Part B concerns with the individual language assessment, or, in Croatian ‘Podaci o znanju hrvatskoga jezika’<sup>36</sup> and consists of questions such as ‘S koliko ste godina naučili pisati hrvatski jezik?’<sup>37</sup>, ‘Prije bolesti, jeste li kući govorili hrvatski?’<sup>38</sup>, the later parts of this section consist of understanding speech and object touching (e.g. the therapists tells the patient to touch the ring on his left hand and looks for a response), the verbal auditory discrimination (the therapist reads a word, e.g. ‘bird’ and shows the patient four different pictures. If there really is a bird on the picture, the patient must point to it), syntactic comprehension (similar to the previous, the patient is presented with pictures, the therapist reads a group of sentences, such as, ‘dječak drži djevojčicu’<sup>39</sup>, ‘djevojčica drži dječaka’<sup>40</sup>, ‘on je drži’<sup>41</sup>, ‘ona ga drži’<sup>42</sup>, ‘ona ih drži’<sup>43</sup> and the patient needs to point to the picture that expresses the meaning of the sentence), semantic categories, synonyms, antonyms, etc.

Part C is primarily focused on language pairs, e.g. Croatian-English bilingualism. It consists of word recognition, translation of words, translation of sentences and grammaticality judgments (in which the patient needs to evaluate sentences such as ‘On čeka za tramvaj’<sup>44</sup> and correct them if they are wrong. The sentences in Croatian language are not the same, i.e.

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<sup>33</sup> As a child, what language did you speak at home?

<sup>34</sup> When you started school, what was the language of instruction?

<sup>35</sup> What was your father’s native language?

<sup>36</sup> Croatian background

<sup>37</sup> How old were you when you learned to write Croatian?

<sup>38</sup> Did you speak Croatian in your daily life before your illness?

<sup>39</sup> The boy holds the girl

<sup>40</sup> The girl holds the boy

<sup>41</sup> He holds her

<sup>42</sup> She holds him

<sup>43</sup> She holds them

<sup>44</sup> He waits after a tram

translated to English, i.e. each language has different sentences). Other languages that come in pair with Croatian in part C of the BAT are: French, German and Italian, i.e. Croatian-French bilingualism, Croatian-German bilingualism and Croatian-Italian bilingualism.

After the test, the therapist inserts the answers to a computer program which then calculates the severity of the patient's aphasia. The therapist can then, based on the results, focus on the things that the patient requires in order to achieve the best results. It is important to mention that this is a new approach in treating patients in Croatia, since there have seldom been cases of patients with bilingual aphasia to this day, however, due to migrations, learning languages in schools and media, there will be more cases of bilingual aphasia since there will be more bilinguals.



**Image 1. BAT (Croatian version)**



**Image 2. BAT (Croatian version – stimulus book)**

## **5.2 Reported case studies**

Anecdotal evidence: After contacting the Special Hospital for Medical Rehabilitation Krapinske Toplice (Specijalna bolnica za medicinsku rehabilitaciju Krapinske Toplice) and talking to Professor of Speech Language Pathology Sanja Habus, she sent me a description of one of her cases in which a man from Buje who has, after cutting a tree in the woods, suffered a head trauma on the 7<sup>th</sup> of February 2015. He sustained a cerebral contusion, a traumatic SAH (subarachnoid hemorrhage), a subdural hematoma, a parietal bone impression fracture accompanied with a parenchymal compression.

Her patient is a male, bilingual in Croatian and Italian. His native tongue is Croatian, however, he uses Italian in his everyday life, since he works as a teacher of Italian.

The patient is administered for rehabilitation on the 24<sup>th</sup> of March 2015. Upon arrival, he cannot move, does not understand and does not perform simple tasks if the instructions are given in Croatian, but when the instructions are given in Italian, he manages to perform simple tasks with an uncertainty (e.g. Simple tasks - close your eyes, raise your hand, open your mouth ...). His speech production in Croatian is nonexistent, however in Italian he constructed neologisms. Upon arrival he was diagnosed with a global aphasia. The rehabilitation was conducted in Croatian (the speech therapist does not speak Italian), however, the patient's wife helped with the translations to Italian (she was an interpreter during their sessions). At the beginning of the speech therapy sessions, the therapist was using a naming therapy in which she presented the patient with a couple of images and the patient was required to name what he sees. He was also required to name the days of the

week, months, etc. She then moved on to more complex tasks that involved reading and counting. He was trying to repeat words in Croatian. Because his right dominant side was plegic, he had to relearn how to write with his left hand.

The patient is still in continuous speech therapy treatment, he was discharged from the hospital on the 18<sup>th</sup> of August 2015, however, he still comes to outpatient speech therapies. She is currently working with the patient on his Broca's aphasia. His comprehension is quite good; he uses shorter sentences when speaking but generally manages to communicate with people from his surroundings. His rhythm and speaking pace is still damaged. According to his wife, his Italian has significantly improved. He can write shorter sentences without anyone's help, but with omissions, substitutions and grapheme inversion, however, he is self-aware of his mistakes and tries to correct them.

There have been other, non-documented cases<sup>45</sup>, on the web of bilingual people with Croatian being one of the languages spoken, however, speaking to Mrs. Habus, she has informed me that these cases are rare and that she herself only had two or three in her entire carrier.

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<sup>45</sup> There was a case in which a woman from Pitomača went with her husband on a vacation in Dalmatia where they had a car accident after returning home. The woman woke up in a hospital speaking in chakavian instead of her native kaikavian (probably because she was constantly hearing chakavian while on her vacation). Another case reports a 4 year old who spoke Croatian with his grandmother and cousins, but Italian with his parents. After suffering a severe head trauma, he was mute for a month but he could understand words in Italian. His Croatian was badly damaged, however, after his grandmother started nursing him, he gradually started to recover it. He expressed himself well in Italian, however, his Croatian was highly impeded but correct. Six months after his injury, the diagnosis showed that he had retrieved Italian completely, however his Croatian was still not well. Three years after the trauma he was tested for the last time and diagnosed as having recovered both languages completely.

## **6 Conclusion**

In this day and age, bilingualism is becoming more and more a topic of interest for many scientists. Times are changing and so is the number of languages people speak. It is not uncommon for people today to speak more than one language, especially in Croatia where children learn a second language from an early age, and because in defining bilingualism one does not differentiate between a dialect and a language, one might conclude, based on the research, that there are a lot of bilingual individuals in Croatia, however, there are not many cases of bilingual aphasia. The treatment in Croatia is the same as in the world – it begins in the hospital where an expert determines the aphasia. The patient is then sent to a speech therapist who, before beginning the treatment, must take into account that the patient has difficulty finding words and explaining the purpose of the visit, because he feels the speech therapist will not understand him. After the initial conversation, a patient is presented with BAT (bilingual aphasia test) which serves to determine the patient's bilingual background, his native language proficiency and his bilingual proficiency. So far, there have been four bilingual tests for Croatian language: English-Croatian, German-Croatian, French-Croatian and Italian-Croatian. This test has proven to be efficient in valuating patient's condition pre- and postmorbid.

As the treatment of bilingual aphasic patients is further understood and developed, it is likely that the changes in the afore treatment for Croatia will undergo further development as well.

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