Rethinking Linguistic Relativity: an Experimental Study among Croatian Speakers

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Rethinking Linguistic Relativity: An Experimental Study Among Croatian Speakers

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ABSTRACT

In recent years, research has been done in favour of neo-Whorfianism, an idea that language influences thought. Researchers like Boroditsky, Haertlé, Phillips, Sera, Berge and del Castillo Pintado have all contributed to the development of this field of study by conducting experiments on speakers of different languages like Spanish, German, English, French, and Polish. What they all have in common is the research done on the aspect of language that is grammatical gender and the role it has in the perception of inanimate objects and animals. Since their research did imply a correlation between a grammatical gender of a noun or the type of a noun (artificial or natural) and the perception of it in regards of its *femininity* and *masculinity*, I decided to replicate their studies by conducting an experimental study on the influence of language on thought among Croatian speakers (of English). Therefore, the focus of this paper is to further develop the research done by these researchers by replicating it on the Croatian speakers of English and exploring whether similar correlations would be found.

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1. INTRODUCTION

Behind every language there lies the same purpose – to share information, to express oneself; basically, to communicate. Although languages are generally similar in that each of them has a certain structure, vocabulary, and pronunciation rules, languages also differ from one another in various ways (Phillips and Boroditsky, 2003). For example, while the English sentence "I sang a song." expresses a past tense, the Croatian version of it, "*Pjevala sam pjesmu.*" gives information about the grammatical genders of the subject and the object (in both cases, feminine), along with the past tense verb form.

While using one's language, one must conform to its rules in order to use it correctly (Boroditsky, Schmidt, and Phillips, 2003). As a result, depending on the language that a person speaks, he or she pays attention to different aspects of the world. According to Haertlé, language thus has potency to affect a person's perception of time, movement, colour, spatial cognition, and can even influence one's memory (2017).

For instance, Boroditsky's research on the Kuuk Thaayorre, an Aboriginal community situated in Cape York, Australia, has found that, while speaking, the speakers use absolute cardinal directions (north, west, south, east) instead of the relative ones like *left* and *right* (2011). Actually, a common greeting of theirs is something along the lines of "Which way are you heading?". Since the language of the Kuuk Thaayorre forces its speakers to pay attention to their surroundings, a child from their culture will have significantly less trouble with staying oriented than an adult from Croatia, like me.

Findings from a different research carried out by Boroditsky, along with a student of hers, Caitlin M. Fausey, have suggested that speakers of different languages might recall the same events differently (2011). Such was the case with the English speakers who were more likely to remember the agents of accidents than the Japanese and Spanish speakers. Although,

when it came to remembering the agents of intentional actions, there was no difference between the three language groups of participants. This goes to show that language might actually have some impact on the way one thinks.

Many researchers were thus inspired to investigate the various ways in which languages influence their speakers. Therefore, it does not surprise that there has been some debate on whether a grammatical gender within language can affect the way people perceive inanimate objects. Although English does not have a grammatical gender system, in languages that do, each noun is assigned a feminine, masculine, neuter or vegetative gender (Phillips and Boroditsky, 2003). For example, Croatian has a feminine, masculine, and neuter gender, which means that each of the following nouns is associated to one of them: *mačka* (a cat) is feminine, *pas* (a dog) is masculine, whereas *stablo* (a tree) is neuter.

Since I would like to contribute to the field of linguistic relativity as researched by Boroditsky, Haertlé, and Sera, I tried to replicate their experiments on Croatian speakers and Croatian speakers of English. In this paper, I will first explain the origins of the idea that language determines thought. This will be followed up by a description of neo-Whorfianism. Subsequently, I will briefly describe research studies carried out by Boroditsky, Haertlé and Sera that served as a basis to my own study. Then, I will explain how I conducted three of my experiments, along with outlining my hypotheses, participants, procedures, limitations, and results. I will end the paper with a conclusion.

1.1 The Sapir-Whorf Hypothesis and neo-Whorfianism

The Sapir-Whorf hypothesis is an accepted truth of Linguistic Relativity according to which there is a direct relation between the content of a language and a culture, as well as between the structures of the two (Brala-Vukanović, 2013). Brala-Vukanović writes that there

are two principles to the said hypothesis. The first one, she notes, is more extreme in that it claims that language determines thought. Therefore, it is called the principle of linguistic determinism. The principle of linguistic relativity, on the other hand, asserts that speakers of different languages have both a different perception as well as thinking about the world, although they do not vary from each other cognitively.

Whorf has been criticized for his extreme claims. One of the arguments is that the only reason which seems to back up Whorf's hypothesis that speakers of different languages differ in their thinking is the fact that they express themselves differently (Dyke, 2021). Whorf seemed to be understanding a conceptual system and the language in which it is expressed to be equivocal in one instant and distinct in another. As a matter of fact, Dyke explains that experiments (those carried out by Pinker and Gopnik in 1994 and 2009, respectively) have provided arguments in favour of the claim that language does not determine conceptual schemes (2021).

There are, however; aspects of Whorf's work to be appreciated. George Lakoff, for instance, praised Whorf's "extraordinary and radical" idea that even those people who belonged to non-western cultures had the ability to reason (1987). In Whorf's times, Lakoff noted, only Americans and Europeans were believed to even have a culture, while other people were considered less intelligent, and their language primitive. Finally, Lakoff supported Whorf's assertion that "the way one uses concepts influences how one understands experience" (1987). Other linguists like Shultz, Lucy, and Lee maintained that Whorf's work was rejected by many simply because it was "ahead of its time" or misinterpreted (Subbiondo, 2017).

It does not surprise that many years later linguists ended up coming back to Whorf, giving rise to the weak version of Whorf's hypothesis. Dyke calls it the weak neo-Whorfianism because it greatly differs from Whorf's original ideas and arguments. Weak neo-Whorfianism aims to provide evidence in favour of the claim that language shapes or influences thought. This

is a rather general assertion, since all that would take to satisfy it is any kind of influence relation between a language and (an aspect of) the speaker's thought. According to Dyke, a variant of weak neo-Whorfianism is mostly accepted among scholars, though it is deemed as a hypothesis of no great significance. When it comes to its importance, the research that I will talk about subsequently as well as that of my own would beg to differ.

1.2 Research in favour of neo-Whorfianism

Findings of the research conducted by Phillips and Boroditsky (2003) suggest that mental representations of the world are not universal. And how could they be when one's language has such potency that it can even influence the speaker's ideas about concrete objects? What Boroditsky and Phillips wanted to test was whether the grammatical genders assigned to objects within a certain language could influence its speakers. Since inanimate objects have no biological gender, language is the only sphere of life which gives information regarding gender.

Although there is a widespread belief that grammatical gender does not influence speakers, Phillips and Boroditsky argue that grammatical gender is not the only grammatical distinction which reflects some differences that can be noticed in the world (2003). One such distinction would be the plural inflection. Therefore, children who are acquiring a language might perceive grammatical gender as a distinction between different types of objects. As a matter of fact, even many philosophers of the past thought that essential features of objects were reflected in their grammatical genders. While learning a language, children could also come to similar conclusions.

Phillips and Boroditsky go on to argue that, since most children learn only one language as they are growing up, they have no opportunity to comprehend the "seemingly arbitrary nature of grammatical gender assignment" through comparative linguistics (2003). Moreover, the

authors note that when speaking a language which has grammatical gender, speakers must mark gender each time they pronounce a noun. The constant repetition of grammatical gender could result in semantic traces in one's mind, which is why the representation of *masculine* and *feminine* features, according to Phillips and Boroditsky, is of great significance.

With the hypothesis that grammatical gender of objects influences the mental representations that speakers have of said objects, Phillips and Boroditsky carried out an experiment on Spanish and German speakers in English (2003). The participants were asked to rate the similarity between the objects and animals depicted in unlabelled pictures and human females or males. The objects and animals used in the study were of opposite grammatical gender in Spanish and German. As the authors had predicted, greater similarity was found between people and objects of matching gender than between those of different gender. The findings suggested that Spanish and German speakers, depending on the grammatical gender of an object in their native language, perceive the object as similar to biological females and males. This implies that language that has grammatical gender influences its speakers' mental representation of objects.

According to Haertlé (2017), Ervin is one of the first people to research whether speakers of a language with grammatical gender associate the gender of a noun to stereotypically feminine or masculine traits. In her 1962 paper, Ervin described the study she conducted on speakers of Italian. As a matter of fact, she found that nouns referring to artifacts with masculine suffixes were more associated with *masculine* features, whereas those with feminine suffixes with *feminine* features.

However, Haertlé also writes that in 1990 Mullen came to a conclusion that English-speaking children more often associate natural objects to female grammatical gender, and artificial ones to male. One possible explanation of this might lie in the division of societal roles between men and women. Since women are recognized as people who nourish, the feminine

grammatical gender seems to be associated with natural nouns, whereas men are perceived as those who produce and use tools, so masculine grammatical gender is assigned to artificial nouns (Haertlé, 2017).

Further evidence in support of this claim was provided by Sera, Berge and del Castillo Pintado in their 1994 research on English and Spanish speakers. For the study, they chose pictures of objects (some of which had a natural gender) that participants were asked to classify as masculine or feminine. Since English does not have a grammatical gender, English speakers were not influenced by it, while the Spanish were. In a subsequent variant of the experiment, pictures were captioned with words – names of depicted objects (the gendered articles in Spanish included). The findings implied that in both language groups, participants were more likely to classify natural objects as feminine, even in cases where the grammatical gender in Spanish was masculine. This suggests that some kind of a "supra-language variable" influences how people classify objects as masculine or feminine (Haertlé, 2017).

Next, Sera, Berge and del Castillo Pintado did a follow-up experiment in which the participants were told that a film would be made with characters who would speak in human voice (1994). The participants therefore had to choose whether they would assign a male or a female voice to each of 30 images of objects, which included natural objects, as well as artifacts. It is noteworthy that the Spanish participants chose a voice depending on the grammatical gender of the noun (male voice was associated with nouns of masculine grammatical gender, female voice with feminine gender), and if not – male voice was more often assigned to artifacts than to natural objects.

In her own research, Haertlé aimed to support the claim that perception of objects is influenced by grammatical gender, hence she did a study on speakers of Polish and French (2017). Although one is Slavic and the other Romanic, both languages have a grammatical gender. Haertlé attempted to replicate the study done by Sera, Berge and del Castillo Pintado.

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Her hypotheses were that Polish and French speakers would assign *masculine* or *feminine* traits to an object in accordance with its grammatical gender in their language, respectively, and that *feminine* features would more frequently be associated with natural objects than with artifacts.

The participants were therefore asked to choose between a male or female voice for an object presented in the picture (without captions). The objects used in the study were of two types – natural and artificial. Similarly to Phillips and Boroditsky (2003), the nouns were of opposite grammatical genders in Polish and French, whereas those of neuter grammatical gender in Polish were not included. Female voice was more often associated with objects of feminine grammatical gender, while male voice to those of masculine. Since more than a half of French participants assigned a male voice to a banana (which is of feminine gender in French), Haertlé established that grammatical gender might not be the only variable influencing the speakers (2017). Her second hypothesis regarding the natural nouns and artifacts was not confirmed.

In her second experiment, Haertlé asked the same participants to assign three adjectives from a list to each of the presented artificial and natural nouns. The adjectives she chose had been described as stereotypically feminine or masculine by Bem (1993) and Kuczyńska (1992). The order of the nouns and the adjectives was different for each participant. Participants were generally more likely to assign a masculine trait to an object of male grammatical gender, and a feminine trait to an object of female grammatical gender, with some deviations among the French, such as ascribing feminine features to a 'palm tree'. All of the research described above influenced the three experiments I conducted. I will now talk more about them.

2. RETHINKING LINGUISTIC RELATIVITY AMONG CROATIAN SPEAKERS: AN EXPERIMENTAL STUDY

Like Polish, Croatian has feminine, masculine, and neuter gender. So, with the assumption that language influences thought, I conducted three experiments among Croatian speakers (of English). In the first experiment, I wanted to check whether the adjectives described by Bem (1993) and Kuczyńska (1992), that were later laid out and used by Haertlé in her second experiment on Polish and French speakers (2017), would be understood as depicting stereotypically masculine or feminine traits by Croatian speakers.

I conducted the first experiment on two groups of participants. In the first group, I asked Croatian speakers to classify the 24 adjectives listed by Haertlé and subsequently translated in Croatian by me as masculine or feminine. In the second group, I asked Croatian speakers of English to do the same in English.

In my second experiment, I accompanied the adjectives from the first experiment either with a natural or artificial noun of neuter grammatical gender in Croatian. What I was interested in finding out was whether the participants would perceive the nouns as *masculine* or *feminine* based on the adjective that the noun was accompanied by or based on the type (artificial or natural) of noun that I used.

The third experiment I conducted also had two groups, one group solved the questionnaire in Croatian, and the other in English. In the questionnaires, the participants were first asked to assign a female or a male voice to each of the 20 nouns, accompanied by pictures. Half of the nouns were of feminine grammatical gender in Croatian, and half of masculine. Furthermore, for each gender half of the nouns were artificial, and half natural. Later, the participants were instructed to accompany each of the 20 nouns by three adjectives (from experiment one).

2.1 Experiment One

In my first experiment I intended to compare the perception of Croatian speakers and Croatian speakers of English on the 24 adjectives listed and used by Haertlé in her 2017 research. In the Table 1 below you can see the adjectives and their translation in Croatian. Please note that in Croatian adjectives must express a grammatical gender, so I wrote them all in neuter.

Table 1: Translation of 24 adjectives used by Haertlé in Croatian

Adjectives in English	Adjectives in Croatian
cold	*hladno*
strong	*snažno*
strict	*strogo*
ambitious	*ambiciozno*
independent	*neovisno*
impressive	*impresivno*
ruling	*vladajuće*
courageous	*hrabro*
dominating	*dominirajuće*
resistant	*otporno*
active	*aktivno*
enterprising	*poduzetno*
weak	*slabo*
passive	*pasivno*
gentle	*nježno*
warm	*toplo*

shy	*stidljivo*
aesthetic	*estetsko*
delicate	*delikatno*
charming	*šarmantno*
dependent	*ovisno*
submissive	*pokorno*
beautiful	*lijepo*
fragile	*krhko*

2.1.1 Participants

In the first experiment, there were two groups of Croatian speakers. The first one counted 41 members who completed the questionnaire in Croatian, while the second one had 59 participants who filled out the form in English.

In the first section of the questionnaire, I asked for the participants' personal information. The first group was on average 23,37 years old. With the majority of women, the first group counted only 26,83 % of men, and 73,17 % of women. 85,36 % of participants were students, 12,19 % were employed and 2,44 % were young unemployed people. Since Croatian is their mother tongue and the questionnaire they filled out was in Croatian, there was no need to take into account how long they spoke the language.

The second group was on average 25,86 years old. This was also tested in the first section of the questionnaire. Out of 59 participants, 57,6 % of them were female, 40,7 % male, and 1,7 % non-binary. With an average of 17,42 years of contact with English, 59,3 % of the participants were students, 33,9 % working people, 3,4 % high school students, 1,7 %

unemployed and another 1,7 % retired. As many as 86,4 % of people claimed they spoke English on a daily basis, 10,2 % on a weekly, and 3,4 % on a monthly basis. The most popular place for contact with the English language was the Internet, chosen by 98,31 % of people, followed by movies, music and films (94,92 % of people). Out of 35 students, for 33 (55,93 % of all participants) university and its assignments also served as a place of encounter with English. Finally, 45,76 % of people spoke English while working.

2.1.2. Materials and Procedure

The questionnaires were conducted online, using the platform called Google Forms. This made it possible for participants to simply access the questionnaire via a link and fill out the form without a time limit. The participants were not aware of the existence of another group. They were simply asked to classify each of the listed adjectives either as *feminine* or *masculine*. Subsequently, I analysed the results by comparing the classification of adjectives based on their *femininity* and *masculinity* as done by these two groups and as laid out by Haertlé (2017).

2.1.3. Limitations

Had there been a greater number of participants, the results could have been much clearer. Although I had participants ranging from high school students to retired people, I believe more research should be done within each category of age and status to get more insight on the influence of language on thought among different groups of Croatian speakers.

Also, since participants were explicitly told to classify adjectives as feminine and masculine, they were influenced to think of the adjectives in terms of their *femininity* and *masculinity*.

Finally, due to the global pandemic cause by the COVID-19 virus, the experiments had to be conducted online, so I could not have complete control over the participants and the conditions that they solved the questionnaires in.

2.1.4. Hypothesis

Taking into consideration the fact that with progression of time and with the uprisal of new ideologies, the mental classifications of certain *masculine* and *feminine* traits expressed by adjectives might change, I did not expect all of the adjectives used by Haertlé (2017) in her research to be classified in the same way by participants of my experiment. I did, however; expect there to be correspondence between the results of the two groups of participants.

2.1.5. Results

In most cases, Croatian speakers made similar distinctions between the adjectives like Haertlé, based on how *feminine* or *masculine* they are. As a matter of fact, 79,17 % of adjectives in Croatian were in concord with Haertlé's list. On the other hand, 70,83 % of the adjectives written in English were perceived as referring to the same grammatical gender as in the classification used by Haertlé in her experiment.

As far as the comparison of the results in English and Croatian is concerned, 83,33 % (20 out of 24) of adjectives were classified as depicting the same *feminine* or *masculine* trait. The four exceptions deviating from this general similarity in the perception of the traits conveyed by the adjectives were found with the adjectives: *active* (*aktivno*), *weak* (*slabo*), *charming* (*šarmantno*), and *dependent* (*ovisno*) which were classified as *masculine* in the English group, and *feminine* in the Croatian group.

The deviations from Haertlé's classification included the adjectives: *ambitious* (*ambiciozno*), *independent* (*neovisno*), and *impressive* (*impresivno*), which were in both languages comprehended as *feminine*, although Haertlé listed them as stereotypically *masculine* traits. *Passive* (*pasivno*) was in both groups of Croats viewed as a *masculine* trait, which differs from Haertlé's list where it is classified as a *feminine* feature. However, on average, 66,66 % of adjectives were classified in the same way in all three cases; in Croatian, in English and in Haertlé's classification. The results can be seen in Appendix 1.

2.1.6. Discussion

Upon closer look at my results, I noticed that adjectives like *ambitious*, *independent*, and *impressive*, have stronger collocations with *woman* than with *man*, based on an online tool called Google Books Ngram Viewer. This could be the reason why, despite their being listed as *masculine* traits by Haertlé, the participants of the study classified them as *feminine*. On another note, *charming* was classified as *feminine* in Croatian, but, probably due to its being a stronger collocation with *man*, in English it was classified as a *masculine* trait.

In most cases there was a correspondence between the results, meaning that most of the adjectives listed by Haertlé in 2017 (and originally by Bem in 1993 and Kuczyńska in 1992) still stand to represent the same traits in terms of gender. I find this an important piece of information, since language is known to change and evolve with time, meaning that words are bound to acquire new meaning and / or lose their original meaning. However, these findings imply that adjectives: *cold* (*hladno*), *strong* (*snažno*), *strict* (*strogo*), *ruling* (*vladajuće*), *courageous* (*hrabro*), *dominating* (*dominirajuće*), *resistant* (*otporno*), and *enterprising* (*poduzetno*) still stand to represent *masculine* traits. Just the same, the following adjectives still seem to refer to stereotypically *feminine* traits: *gentle* (*nježno*), *warm* (*toplo*), *shy* (*stidljivo*),

aesthetic (*estetsko*), *delicate* (*delikatno*), *submissive* (*pokorno*), *beautiful* (*lijepo*), and *fragile* (*krhko*).

Even more importance I would put on the fact that there was a strong correspondence between the results in both languages. This implies that thinking of an adjective in a certain way in one language might also influence the perception of that same adjective in a different language.

2.2 Experiment Two

In the second experiment, all adjectives from experiment one, except for the four that varied in their results between groups one and two, were paired with a word of neuter grammatical gender in Croatian. Eleven of them were natural, and nine artificial nouns. In the Table 2 below, you can see the adjective + noun pairs both in English and Croatian, along with the classification of artificial and natural nouns. In this case, participants were not told anything directly about the *femininity* or the *masculinity* of the pairs. Instead, as Sera, Berge and del Castillo Pintado did in their 1994 research study, I told the participants that a film was being made in which inanimate objects would possess a human voice. Therefore, with their input, participants thought that they would be helping in choosing the appropriate voice for a children's film's characters.

Table 2: Adjective + noun pairs in English and Croatian used in the second experiment, along with a classification of nouns

Adjective + noun pair in English	Adjective + noun pair in Croatian	Artificial or natural noun
a submissive chicken	*pokorno pile*	natural
a cold duckling	*hladno pače*	natural
an ambitious monster	*ambiciozno čudovište*	natural

a strong pig	*snažno prase*	natural
a ruling computer	*vladajuće računalo*	artificial
an independent place	*neovisno mjesto*	artificial
a strict letter	*strogo pismo*	artificial
an impressive cub	*impresivno mladunče*	natural
a beautiful playground	*lijepo igralište*	artificial
a gentle elevator	*nježno dizalo*	artificial
a courageous cello	*hrabro violončelo*	artificial
a warm child	*toplo dijete*	natural
a fragile calf	*krhko tele*	natural
a dominating foal	*dominirajuće ždrijebe*	natural
a shy staircase	*stidljivo stubište*	artificial
a resistant lamb	*otporno janje*	natural
an enterprising light	*poduzetno svjetlo*	artificial
an aesthetic eyeshadow	*estetsko sjenilo*	artificial
a delicate kitty	*delikatno mače*	natural
a passive creature	*pasivno biće*	natural

2.2.1 Participants

The experiment was conducted on two groups of students of English language and literature at the Faculty of Humanities and Social Sciences of Rijeka whose mother tongue was Croatian. Group one counted 23 participants, while group two equalled 20.

As far as the first group is concerned, 73,9 % of participants were women, 21,7 % were men, and 4,3 % non-binary. With the average of 22,65 years, the group had an average of 15,7 years of experience with English language. Students responded that they predominantly used English on a daily basis (91,30 %), with only 8,7 % of students using it on a weekly basis. All of the students claimed that they mostly used English while doing their university assignments, surfing the Internet, reading books, listening to music or watching films. Some (21,7 %) also thought it worth mentioning that they were in contact with English while working.

In the second group, 80 % of participants were women and 20 % men, with an average of 21,6 years of age. The average of the years of experience with English amounted to 15,2 years. Only 5 % of the participants used English on a weekly basis, with the rest of participants (95 %) claiming that they used it on a daily basis. All participants responded that their experience with English was due to exposure to the Internet, university, books, music, and films.

2.2.2 Materials and Procedure

Two anonymous questionnaires were constructed online, on the platform called Google Forms, each of them consisting of two sections. The first one regarded the personal information that I considered relevant for the study, such as gender, age, status (student, working person, unemployed person, etc.), years of experience with English, frequency of usage of English, and the situations which make the usage of English possible for speakers.

In the second (and the main) section of the questionnaire, participants were told that a children's film was being made in which both animate and inanimate objects would have the ability to speak. They were therefore asked to assign either a male or a female voice to each "character".

Each pair was listed one after another, with the first group having the first half written in English and the second half in Croatian, while the second group first had adjective + noun pairs in Croatian, and then in English. After each pair, participants could simply choose either a male or a female voice.

Participants filled out the form voluntarily, by accessing it via link sent by me. There was no time limit for solving the questionnaire.

2.2.3 Hypothesis

Since I paired 20 adjectives from the first experiment with a different noun of neuter grammatical gender in Croatian, I supposed that the voice associated to objects would be based on the *femininity* or *masculinity* of adjectives preceding the nouns. In the cases where voice would differ from the first assumption, I expected the female voice to be assigned to natural nouns, and the male voice to artificial nouns. Above all, I assumed that there would be correspondence between the results in Croatian and English.

2.2.4. Results

The results differed from what I expected them to be in that only in 45 % of instances was the same voice assigned in both languages. In 88,88 % of these cases the voice ascribed to an adjective + noun pair was in accordance with the *masculinity* or *femininity* of the adjectives as laid out by Haertlé. Only in 11,11 % of these instances is there a deviation from the results of the first experiment.

When it comes to the results in English, in 75 % of cases, there was similarity between the gender assigned to a noun + adjective pair (by choosing a voice) and Haertlé's list of *feminine* and *masculine* adjectives. Moreover, in 70 % of cases there was a concurrence with

the results of experiment one. In 20 % of cases female voice was assigned to natural nouns. However, in these cases, there was also concurrence with Haertlé as well as with the findings of experiment one.

In the results in Croatian, there was less correspondence with Haertlé, with 55 % of adjective + noun pairs being assigned a voice that was in concord with the *femininity* or *masculinity* of adjectives as laid out by Haertlé. Also, there was a 60 % correspondence between the results of this experiment and experiment one. However, Haertlé's results, results of experiment one and of experiment two were in concord 50 % of the time.

Unlike the findings in English, the results in Croatian seem to show a greater correspondence with the type of the noun (artificial or natural) and the voice assigned to it, with 50 % of cases of concord between the two variables. In four of these cases, the type of noun seemed to be the only variable influencing participants to choose one voice over the other. It was the case with artificial noun + adjective pairs *an **independent** place*, *a **beautiful** playground*, *a **shy** staircase*, and a natural noun + adjective pair *a **resistant** lamb*. While the first three were ascribed a male voice, despite being accompanied by a typically *feminine* adjective, the latter was assigned a female voice more frequently, despite the presence of a stereotypically *masculine* adjective *resistant*. The results can be seen in Appendix 2.

2.2.5 Discussion

Arguments in favour of the hypothesis that the voice of a character would be influenced by the *femininity* or *masculinity* of the adjective accompanying the noun were provided more often in English (with 70 % correspondence with the results of the first experiment) and a bit less frequently (55 %) in Croatian. This implies that the mental concepts of *femininity* or *masculinity* can influence how one perceives inanimate objects or animals.

No further evidence was provided to support the claim that in those cases where an adjective describing a noun would not impact the voice assigned to it, the type of noun would, since the concurrence only with the type of noun and no other variables was found just in four pairs in Croatian.

The third hypothesis, that the results in English would be similar to those in Croatian, was not confirmed, since the results were in concord only in 45 % of instances.

2.3 Experiment Three

In the third experiment, which was carried out about a month after the second, the participants of one group were again exclusively students of English language and literature at the Faculty of Humanities and Social Sciences in Rijeka, while the second group was aiming at Croatian speakers in general (although students majorly prevailed). Participants were once again told a children's film was being made in which even inanimate objects or animals could speak, so they had to first choose between a female and a male voice for each character, and subsequently add three features to each character. In the Table 3 below, you can see the nouns used in this study, along with their classification and translation in Croatian.

Artificial noun of feminine grammatical gender in Croatian		Natural noun of feminine grammatical gender in Croatian		Artificial noun of masculine grammatical gender in Croatian		Natural noun of masculine grammatical gender in Croatian	
English	Croatian	English	Croatian	English	Croatian	English	Croatian
a doll	*lutka*	*a banana*	*banana*	*a key*	*ključ*	*a moon*	*mjesec*
a shovel	*lopata*	*a cherry*	*višnja*	*a telephone*	*telefon*	*a cloud*	*oblak*
a marionette	*marioneta*	*a cat*	*mačka*	*a clock*	*sat*	*a dog*	*pas*
a lamp	*lampa*	*a giraffe*	*žirafa*	*a car*	*auto*	*a monkey*	*majmun*
a house	*kuća*	*a river*	*rijeka*	*a bridge*	*most*	*an onion*	*luk*

2.3.1 Participants

The study was conducted on two groups of participants. The group of English students at the University counted 41 participants. Out of 41, a vast majority (85,4 %) were women, 12,2 % were men, and 2,4 % non-binary. Their average age was of 21,95 years, while, on average, they were in contact with or speaking English for 16,07 years. All students confirmed their mother tongue to be Croatian. Since they all (100 %) responded that they used English at the university or while doing university-related assessments, on the Internet, while reading books, listening to music or watching movies, some (31,7 %) at work and 65,9 % in communication with other people, I concluded they were fitting participants for the aim of my study.

The second group of participants consisted of 34 people, also predominantly of women (85,3 %), with only 14,7 % men. The average of their age amounted to 21,88 years and all of them confirmed that Croatian was their mother tongue. The majority (88,2 %) of the participants were students, with 8,8 % of working people and 2,9 % of high school students.

2.3.2 Materials and Procedure

I constructed two similar questionnaires on the same online platform as in experiments one and two. Both questionnaires consisted of three sections, the first one regarding participants' personal information to be analysed on group level. In the second section, participants were told, as in experiment two, that a children's film was being made with inanimate objects or animals as characters. So, they had a list of "characters" (natural or artificial nouns of masculine or feminine grammatical gender in Croatian) accompanied by images, and they had to choose an appropriate voice for each – male or female. The order of the characters was different for each participant.

In the third section, each character from the previous section had to be ascribed three characteristics that would best fit them. The list of characteristics consisted of the 20 adjectives from experiment one. The order of the characters was once again different for each participant.

2.3.3 Limitations

As noted in the previous experiments, most of the participants were students, so a survey on a larger group of people of different ages and from different walks of life should be conducted.

2.3.4 Hypothesis

My hypothesis was that participants would assign a female voice to nouns of feminine grammatical gender in Croatian, and a male one to those of masculine. If not, the voice associated with a noun would probably be influenced by the type (artificial or natural) of the noun. I assumed both language groups would have similar results.

Moreover, I expected nouns of feminine grammatical gender to be most often assigned adjectives that were classified as *feminine* by Croatian speakers in experiment one, and the nouns of masculine grammatical gender to be assigned *masculine* features. Once again, I expected similar results in both language groups.

2.3.5 Results

My results generally confirmed my hypotheses. First of all, in the English group, 70 % of nouns of feminine grammatical gender were assigned female voice, while all nouns of masculine grammatical gender were assigned male voice. Similarly, in the Croatian group, 80 % of nouns of feminine and 100 % of masculine grammatical gender were assigned female and

male voice, respectively. Both in English and Croatian, a deviation was found with artificial nouns *a shovel / lopata* and *a marionette / marioneta* which were assigned male voice despite being of feminine grammatical gender in Croatian, and with *a lamp / lampa,* which was assigned male voice in English, and female in Croatian (it is an artificial noun of feminine grammatical gender). This was also the only difference between the results in English and Croatian, since 95 % of nouns were given the same voice in English and Croatian. This deviation confirms my hypothesis that the only deviation from the noun's gender in the participants' native language would be impacted by the noun type.

Since 80 % of nouns of feminine and 60 % of nouns of masculine grammatical gender were in English mostly associated with *feminine* and *masculine* traits, respectively, as well as the 70 % of nouns of feminine and 80 % of nouns of masculine grammatical gender in Croatian, this also provided arguments in favour of my hypothesis. Although there were deviations from the general tendency, even in most of them, there was still correspondence between the two language groups, resulting in a correspondence between the groups of 85 %, based on whether a noun was associated with a *feminine* or a *masculine* feature. The results can be seen in Appendix 3.

2.3.6 Discussion

The fact that all nouns of masculine grammatical gender in Croatian were attributed male voice in both Croatian and English goes to show that the gender of a noun may actually have some impact on how an object is perceived in terms of its *masculinity* or *femininity*. Interestingly enough, the only nouns that deviated from the generally expected results were artificial nouns of feminine grammatical gender which were actually assigned male voice. This also supports the claim that a type of noun might influence whether a speaker will perceive an object as *masculine* or *feminine.*

Although most of the nouns were then assigned a typically *feminine* or *masculine* trait depending on their grammatical gender in Croatian, it could be argued that there were also some other variables influencing participants to choose a characteristic. For example, choosing a feature *cold* for *a key*, or *gentle* for *a cloud* or for *a dog* could also simply refer to their physical characteristics, since a key, for instance, is made of metal and it is often cold. Similarly, *a house* is of feminine gender, but its structure makes it *strong* and it keeps the warmth inside. Therefore, it does not surprise that *a house* was mostly described as *strong* and *warm,* in both languages.

3. CONCLUSION

While language plays a crucial role in people's everyday life in that it helps people communicate, it has also been suggested that it has the ability of influencing its speakers' thoughts. This means that depending on a language that one speaks, he or she might perceive the world differently. Although a similar idea has had its origins in the Sapir-Whorf hypothesis, Whorf's claim that language determines thought was deemed as too extreme by many. As years went by, however; the seeds of his ideas gave rise to the weak neo-Whorfianism or the assumption that language influences thought.

Many researchers like Boroditsky, Phillips, Sera, Berge, del Castillo Pintado and Haertlé have contributed to the field with their research on speakers of various languages. All of them studied the role of grammatical gender as well as the type of nouns (artificial and natural) and whether these grammatical distinctions might impact one's perception of inanimate objects or animals.

Their findings on German, Spanish, Polish, and French speakers suggested that there was either a correlation between a grammatical gender of a noun and the speaker's perception of it in terms of its *femininity* or *masculinity*, or this correlation was based on the type of noun. Natural nouns would thus more frequently be associated with the *feminine* grammatical gender, while the artificial ones with the *masculine*.

In my research, a replication of sort of the research conducted by researchers introduced above, I aimed to prove the influence of language on thought among Croatian speakers (of English). I first examined whether the stereotypically *feminine* and *masculine* adjectives listed by Haertlé were considered to be referring to the same *feminine* or *masculine* traits by Croatian speakers both in Croatian and in English. The results suggested that this was mostly true, with a few deviations.

Secondly, I paired up 20 adjectives each with a noun of neuter gender in Croatian to see whether an adjective standing beside it, or the type of noun would influence the speakers' perception of the noun in terms of its *masculinity* and *femininity*. Since the voice assigned to nouns was in most cases influenced by an adjective accompanying it, this suggests that there was no influence on the speakers' perception of the noun based on its type.

Thirdly, I asked participants to assign female or male voice to 10 nouns of feminine and 10 of masculine grammatical gender, half of them natural, half artificial, and then to attribute three characteristics to each. My findings showed that the grammatical gender or a type of noun might influence the speakers' perception of an inanimate object or an animal, but other variables might also play a role.

To conclude, since grammatical gender of nouns could be understood as a distinction between different types of objects by children who are acquiring a language and since the repetition of the noun's grammatical gender could leave semantic traces in the speakers' minds, the language that one speaks might actually, as suggested in my research study, influence how speakers perceive inanimate objects and animals. From a broader perspective of the field of linguistic relativity, this implies that there might, in fact, be an influence relation between language and the speaker's mind.

Although the results of my research did help me come to certain conclusions, I believe more research should be done in this field, with more participants, as well as with different approaches, in order to get clearer and more applicable results.

4. APPENDIX

Appendix 1: Femininity and masculinity of 24 adjectives in contrast with Haertlé

	Adjective	Results in English	Results in Croatian	According to Haertlé
1)	cold / hladno	masculine 41 (69.5 %); feminine 18 (30.5 %)	masculine 34 (82.9 %); feminine 7 (17.1 %)	masculine
2)	strong / snažno	masculine 38 (64.4 %); feminine 21 (35.6 %)	masculine 36 (87.8 %); feminine 5 (12.2 %)	masculine
3)	strict / strogo	masculine 36 (61 %); feminine 23 (39 %)	masculine 29 (70.7 %); feminine 12 (29.3 %)	masculine
4)	ambitious / ambiciozno	feminine 32 (54.2 %); masculine 27 (45.8 %)	feminine 34 (82.9 %); masculine 7 (17.1 %)	masculine
5)	independent / neovisno	feminine 40 (67.8 %); masculine 19 (32.2 %)	feminine 28 (68.3 %); masculine 13 (31.7 %)	masculine
6)	impressive / impresivno	feminine 37 (62.7 %); masculine 22 (37.3 %)	feminine 29 (70.7 %); masculine 12 (29.3 %)	masculine
7)	ruling / vladajuće	masculine 39 (66.1 %); feminine 20 (33.9 %)	masculine 33 (80.5 %); feminine 8 (19.5 %)	masculine
8)	courageous / hrabro	masculine 40 (67.8 %); feminine 19 (32.2 %)	masculine 28 (68.3 %); feminine 13 (31.7 %)	masculine
9)	dominating / dominirajuće	masculine 42 (71.2 %); feminine 17 (28.8 %)	masculine 31 (75.6 %); feminine 10 (24.4 %)	masculine
10)	resistant / otporno	masculine 33 (55.9 %); feminine 26 (44.1 %)	masculine 25 (61 %); feminine 16 (39 %)	masculine
11)	active / aktivno	masculine 40 (67.8 %); feminine 19 (32.2 %)	feminine 21 (51.2 %); masculine 20 (48.8 %)	masculine
12)	enterprising / poduzetno	masculine 37 (62.7 %); feminine 22 (37.3 %)	masculine 23 (56.1 %); feminine 18 (43.9 %)	masculine
13)	weak / slabo	masculine 35 (59.3 %); feminine 24 (40.7 %)	feminine 28 (68.3 %); masculine 13 (31.7 %)	feminine
14)	passive / pasivno	masculine 35 (59.3 %); feminine 24 (40.7 %)	masculine 24 (58.5 %); feminine 17 (41.5 %)	feminine

15)	gentle / nježno	feminine 38 (64.4 %); masculine 21 (35.6 %)	feminine 38 (92.7 %); masculine 3 (7.3 %)	feminine
16)	warm / toplo	feminine 41 (69.5 %); masculine 18 (30.5 %)	feminine 34 (82.9 %); masculine 7 (17.1 %)	feminine
17)	shy / stidljivo	feminine 42 (71.2 %); masculine 17 (28.8 %)	feminine 36 (87.8 %); masculine 5 (12.2 %)	feminine
18)	aesthetic / estetsko	feminine 45 (76.3 %); masculine 14 (23.7 %)	feminine 36 (87.8 %); masculine 5 (12.2 %)	feminine
19)	delicate / delikatno	feminine 44 (74.6 %); masculine 15 (25.4 %)	feminine 36 (87.8 %); masculine 5 (12.2 %)	feminine
20)	charming / šarmantno	masculine 34 (57.6 %); feminine 25 (42.4 %)	feminine 28 (68.3 %); masculine 13 (31.7 %)	feminine
21)	dependent / ovisno	masculine 33 (55.9 %); feminine 26 (44.1 %)	feminine 21 (51.2 %); masculine 20 (48.8 %)	feminine
22)	submissive / pokorno	feminine 37 (62.7 %); masculine 22 (37.3 %)	feminine 32 (78 %); masculine 9 (22 %)	feminine
23)	beautiful / lijepo	feminine 48 (81.4 %); masculine 11 (18.6 %)	feminine 39 (95.1 %); masculine 2 (4.9 %)	feminine
24)	fragile / krhko	feminine 33 (55.9 %); masculine 26 (44.1 %)	feminine 38 (92.7 %); masculine 3 (7.3 %)	feminine

Appendix 2: 20 nouns of neuter gender paired with adjectives and the type of noun

	Expression	Results in English	Results in Croatian	Type of Noun
1)	a submissive chicken / pokorno pile	feminine 56.5 % (13), masculine 43.5 % (10)	masculine 60 % (12), feminine 40 % (8)	natural
2)	a cold duckling / hladno pače	masculine 56.5 % (13), feminine 43.5 % (10)	masculine 65 % (13), feminine 35 % (7)	natural
3)	an ambitious monster / ambiciozno čudovište	masculine 69.6 % (16), feminine 30.4 % (7)	masculine 55 % (11), feminine 45 % (9)	natural
4)	a strong pig / snažno prase	masculine 73.9 % (17), feminine 26.1 % (6)	masculine 95 % (19), feminine 5 % (1)	natural
5)	a ruling computer / vladajuće računalo	feminine 65.2 % (15), masculine 34.8 % (8)	masculine 60 % (12), feminine 40 % (8)	artificial

6)	an independent place / neovisno mjesto	feminine 65.2 % (15), masculine 34.8 % (8)	masculine 60 % (12), feminine 40 % (8)	artificial
7)	a strict letter / strogo pismo	feminine 82.6 % (19), masculine 17.4 % (4)	50 / 50 (10/10)	artificial
8)	an impressive cub / impresivno mladunče	masculine 65.2 % (15), feminine 34.8 % (8)	feminine 60 % (12), masculine 40 % (8)	natural
9)	a beautiful playground / lijepo igralište	feminine 65.2 % (15), masculine 34.8 % (8)	masculine 55 % (11), feminine 45 % (9)	artificial
10)	a gentle elevator / nježno dizalo	feminine 56.5 % (13), masculine 43.5 % (10)	feminine 65 % (13), masculine 35 % (7)	artificial
11)	a courageous cello / hrabro violončelo	feminine 55 % (11), masculine 45 % (9)	masculine 69.6 % (16), feminine 30.4 % (7)	artificial
12)	a warm child / toplo dijete	feminine 75 % (15), masculine 25 % (5)	feminine 60.9 % (14), masculine 39.1 % (9)	natural
13)	a fragile calf / krhko tele	feminine 55 % (11), masculine 45 % (9)	masculine 60.9 % (14), feminine 39.1 % (9)	natural
14)	a dominating foal / dominirajuće ždrijebe	masculine 65 % (13), feminine 35 % (7)	masculine 56.5 % (13), feminine 43.5 % (10)	natural
15)	a shy staircase / stidljivo stubište	feminine 70 % (14), masculine 30 % (6)	masculine 65.2 % (15), feminine 34.8 % (8)	artificial
16)	a resistant lamb / otporno janje	masculine 55 % (11), feminine 45 % (9)	feminine 56.5 % (13), masculine 43.5 % (10)	natural
17)	an enterprising light / poduzetno svjetlo	feminine 60 % (12), masculine 40 % (8)	masculine 65.2 % (15), feminine 34.8 % (8)	artificial
18)	an aesthetic eyeshadow / estetsko sjenilo	feminine 90 % (18), masculine 10 % (2)	feminine 87 % (20), masculine 13 % (3)	artificial
19)	a delicate kitty / delikatno mače	feminine 95 % (19), masculine 5 % (1)	feminine 73.9 % (17), masculine 26.1 % (6)	natural
20)	a passive creature / pasivno biće	masculine 90 % (18), feminine 10 % (2)	masculine 73.9 % (17), feminine 26.1 % (6)	natural

Appendix 3: The voice assigned to each of 20 nouns (half of them feminine, half of them masculine, half natural, half artificial) and the *femininity* or *masculinity* of the most popular trait ascribed to each

Noun		Grammatical Gender According to the Chosen Voice		Most Popular Trait in Terms of *Femininity* and *Masculinity*	
		English	Croatian	English	Croatian
1)	a doll / lutka	feminine 73,2 % (30), masculine 26,8 % (11)	feminine 70,6 % (24), masculine 29,4 % (10)	feminine	feminine
2)	a shovel / lopata	masculine 80,5 % (33), feminine 19,5 % (8)	masculine 67,6 % (23), feminine 32,4 % (11)	masculine	masculine
3)	a marionette / marioneta	masculine 61 % (25), feminine 39 % (16)	masculine 55,9 % (19), feminine 44,1 % (15)	feminine	feminine
4)	a lamp / lampa	masculine 56,1 % (23), feminine 43,9 % (18)	feminine 58,8 % (20), masculine 41,2 % (14)	feminine	feminine
5)	a house /kuća	feminine 75,6 % (31), masculine 24,4 % (10)	feminine 79,4 % (27), masculine 20,6 % (7)	masculine	masculine
6)	a banana / banana	feminine 63,4 % (26), masculine 36,6 % (15)	feminine 52,9 % (18), masculine 47,1 % (16)	feminine	feminine
7)	a cherry / višnja	feminine 87,8 % (36), masculine 12,2 % (5)	feminine 91,2 % (31), masculine 8,8 % (3)	feminine	feminine
8)	a cat / mačka	feminine 82,9 % (34), masculine 17,1 % (7)	feminine 91,2 % (31), masculine 8,8 % (3)	feminine	feminine
9)	a giraffe / žirafa	feminine 75,6 % (31), masculine 24,4 % (10)	feminine 79,4 % (27), masculine 20,6 % (7)	feminine	feminine
10)	a river / rijeka	feminine 92,7 % (38), masculine 7,3 % (3)	feminine 82,4 % (28), masculine 17,6 % (6)	feminine	masculine
11)	a key / ključ	masculine 68,3 % (28), feminine 31,7 % (13)	masculine 73,5 % (25), feminine 26,5 % (9)	masculine	masculine
12)	a telephone / telefon	masculine 70,7 % (29), feminine 29,3 % (12)	masculine 58,8 % (20), feminine 41,2 % (14)	feminine	masculine
13)	a clock / sat	masculine 87,8 % (36), feminine 12,2 % (5)	masculine 76,5 % (26), feminine 23,5 % (8)	masculine	masculine

14)	a car / auto	masculine 75,6 % (31), feminine 24,2 % (10)	masculine 91,2 % (31), feminine 8,8 % (3)	masculine	masculine
15)	a bridge / most	masculine 78 % (32), feminine 22 % (9)	masculine 79,4 % (27), feminine 20,6 % (7)	masculine	masculine
16)	a moon / mjesec	masculine 51,2 % (21), feminine 48,8 % (20)	masculine 73,5 % (25), feminine 26,5 % (9)	feminine	feminine
17)	a cloud / oblak	masculine 70,7 % (29), feminine 29,3 % (12)	masculine 82,4 % (28), feminine 17,6 % (6)	feminine	feminine
18)	a dog / pas	masculine 85,4 % (35), feminine 14,6 % (6)	masculine 82,4 % (28), feminine 17,6 % (6)	feminine	masculine
19)	a monkey / majmun	masculine 85,4 % (35), feminine 14,6 % (6)	masculine 91,2 % (31), feminine 8,8 % (3)	masculine	masculine
20)	an onion / luk	masculine 80,5 % (33); feminine 19,5 % (8)	masculine 73,5 % (25), feminine 26,5 % (9)	masculine	masculine

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