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# Language and perception: How does learning a language shape reality?

ALÍCIA GUAL MIRÓ

UNIVERSITAT ROVIRA I VIRGILI

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# Language and perception: How does learning a language shape reality?

ALÍCIA GUAL MIRÓ

TUTORA: Dra. Marni Lynne Manegre

UNIVERSITAT ROVIRA I VIRGILI

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## ABSTRACT

This undergraduate thesis deals with the influence of language learning on the perception of the world. From *Sapir and Whorf's hypothesis*, many researchers like Boroditsky have questioned whether the languages spoken have an impact on the way people perceive reality around them. Therefore, many tests have been conducted regarding abstract entities such as space, time, gender, colour, eyewitness memory, as well as number and quantity. If speakers of different languages pay attention to different aspects, foreign language learning may entail traces of their first one(s). To prove it, 79 Erasmus and international students at URV during the academic year 2022-2023 were tested through an MS Forms questionnaire on the six different sections mentioned above. Results showed similar answers among participants in almost every question. It suggests that the level of proficiency and exposure to the target language (English) shape the influence it has concerning first languages. Moreover, cultural assumptions are conditioned by shared social media content and the current globalization.



**Keywords:** perception, linguistic relativity, Sapir and Whorf hypothesis, language learning, abstract entities.

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## 1. Introduction

"We dissect nature along lines laid down by our native language" (Whorf, 1956, p. 213).

Anthropological linguists Benjamin Whorf and Edward Sapir coined the *Sapir-Whorf hypothesis* (1929) after realizing that the Hopi tribe perceived time differently than theirs. The weak version of it, *linguistic relativity*, supported the idea that language shaped how humans understood the world, whereas the strong version, *linguistic determinism*, believed that language determined thought.

Later, other linguists discussed it and disagreed with the fundamentals. One of them, Noam Chomsky, defended the theory of *Universal Grammar* with some universal principles present in all languages, such as the question or negation formation structures. Moreover, George Yule introduced the idea of culture as another component, along with language and thought. Indeed, he argued that "if thinking and perception were totally determined by language, then the concept of language change would be impossible" (Yule, 2020, p. 316). Furthermore, Steven Pinker opposed the hypothesis and suggested that it was replaced by *neo-Whorfianism* in the 1990s, which defended a milder belief that language influenced people's perception of the world. From the beginning of the century, Lera Boroditsky has conducted studies on different speakers to acknowledge the influence of their first languages on their understanding of the world.

This thesis aims to conduct a cross-sectional study among international and Erasmus students at URV during the academic year 2022-2023 coming from multiple linguistic backgrounds. The quantitative data gathered are intended to prove to what extent the participants are influenced by their first(s) languages when tested in English. The

subsections that the thesis is based on are the following ones: space, time, gender, colour, eyewitness memory, as well as number and quantity.

### 1.1. Language and Time

According to Boroditsky (2010), time is "the most frequent noun in English" (LongNow, 2010, 26:40) despite being an abstract concept that we cannot physically perceive in any of our senses. Nevertheless, it is a universal idea that everybody is aware of and uses daily.

Boroditsky (2010) discussed the *poverty of the stimulus argument* by the Greek philosopher Plato. He believed that the information we could get from our environment was too little to make up such abstract concepts such as time. Therefore, instead of learning these concepts, we recollected them from "past incarnations of our souls" (LongNow, 2010, 27:49)**.** Moreover, Boroditsky presented the concept of *time-travel*, covered by the well-known linguist Chomsky (2000). He understood the spatial words used to describe time as an *analogy in place*, that is, time is like a path we are travelling on.

In that same talk, Boroditsky (2010) discusses that the way we approach time depends on space, cultural artifacts such as the writing direction, and metaphors in language, also understood as patterns. Regarding the writing direction, many languages in the world are written from left to right, but some of them such as Arabic, Hebrew, and Urdu, to name a few, follow the opposite direction. This feature can have an impact in the way we think regarding the direction of a timeline. Moreover, the abstractness of time has forced language to break it down through metaphors like *the future ahead* or *the past behind.* However, not all speakers conceive past and future in the same place. Núñez and

Sweetser (2006) showed how speakers of the Aymara language, an Amerindian language spoken near Chile, place the past in front of them (*nayra*) and the future behind them (*qhipa*). Since the reference point (now) is themselves, as in English, the closer to the speaker, the more recent the events occurred. According to Frankel and Warren (2022), Mandarin speakers think of past as in front of them (*front day* is the day before yesterday) and future as behind them (*back day* is the day after tomorrow).

This leads to a distinction worth mentioning, which is *ego-moving*, as opposed to *time-moving* (Boroditsky, 2018). Birner (1999) argues that English speakers understands time as "stuff" which we move in, like in *I'm approaching a deadline* (Boroditsky, 2018). On the other hand, Hopi speakers think of time as a never-ending cycle that can move towards them, as in *The deadline is approaching* (Boroditsky, 2018).

However, when dealing with future time, it is important to bear in mind that not all languages possess a grammatical flection to express the future. Frankel and Warren (2022) distinguished between *futured languages* such as English, Spanish, French, or Italian and *futureless languages* like German, Dutch or Chinese. The former requires either a unique inflection (e.g.: in Spanish, yo cant**o**, yo cant**aré**) or a modal verb (e.g.: in English, I sing, I **will** sing), whereas the latter shares the same form for present and future tense (e.g.: in German, ich singe, ich singe [morgen]). In 2013, Chen carried out a test on how speakers of *futureless* languages perceive the future. They turned out to engage more in activities focused on the future than those who separate the future and the present tense.

So far, time has been proven to be portrayed in a horizontal axis. Yet, Boroditsky (2001) carried out a study at the University of Stranford among bilinguals in English and Mandarin Chinese and their different perceptions of time. English speakers understand

time as horizontal and thus use terms like front and back. However, despite that Mandarin Chinese presents terms such as *front* (*quián*) and *back* (*hòu*), time through vertical metaphors is also portrayed like *up* (*shàng*) and *down* (*xià*). These can be translated as *earlier* and *later* in English, although it is not quite straightforward. So, they perceive last month as the *up month* and next month as the *down month* (Boroditsky, 2010).

Mykhailyuk and Pohlod (2015) talked about the difference in the unit measurement of time in different languages. For instance, English and Swedish speakers tend to measure time in terms of length and duration (short/long), as opposed to Spanish and Greek speakers, who understand it in terms of amount (big/little). Frankel and Warren (2022) narrated an experiment Athanasopoulos and Bylund (2017) carried out with Swedish and Spanish speakers. They were presented with a line growing and a container filling up. Swedish speakers believed that the more the line grew, the more time had passed by, whereas Spanish speakers were led by the filling container in order to measure time. Regarding bilinguals in both languages, if the word *tid* (Swedish for duration) appeared in the screen, they estimated time relying on the line, while if they read the word *duración* (Spanish for duration), they focused on the container instead.

The experiments listed before, among many others, have shown how different speakers are influenced by their languages when considering factors related to the course of time (signaling it, ordering things in timelines, measuring it, or estimate its length). Time is closely related to other features, like quantity as shown in the test conducted among Spanish and Swedish speakers (Athanasopoulos & Bylund, 2017). However, it is especially connected to space since we organize it within a spatial reference, be it horizontal or vertical.

### 1.2. Language and Space

Space can be perceived in a different way depending on what features a language tends to give more focus to. Boroditsky and Gaby (2010) present their experience with Kuuk Thaavorre, an Australian tribe from North Queensland. Its speakers use absolute terms in all contexts (e.g., north, south, east, and west), as opposed to relative terms (e.g., right and left). So, these speakers would utter expressions like "There is a dog trying to bite your east leg" (Boroditsky, 2010, 33:18). Thus, it helps them being better orientated since they need to indicate the exact direction they are heading to right after greeting someone. In fact, when they say hello, they are asking someone "which way are you going?" (Boroditsky, 2010, 34:10) and a possible answer could be "north-northeast in the far distance, how about you?" (Boroditsky, 2010, 34:14). On the contrary, it would be impossible for English or Dutch speakers, for instance, because they are just not used to thinking in that way. They use relative terms instead, and greetings do not entail any need of direction report. Regarding the influence of space on time, Kuuk Thaavorre speakers follow an east-west spatial axis regardless of their position.

Kuuk Thaavorre are not the only speakers that use absolute terms in their spatial utterances. According to Mykhailyuk and Pohlod (2015), Tzeltal, a language spoken in Mexico also has them. According to Brown (2012), Tzeltal portrays the *future up* and the *past down*, both referring to a hill. For instance, "alan k'ub-an-bil we'el-il" could be translated as "the meal was prepared *downhill*" (*alan*), which would be ahead of time (Brown, 2012 [example 21]).

Boroditsky (2006) talks about the example of English and Korean. English places something into containers as opposed to on surfaces. For example, a pen can be <u>in</u> a bag

but on a table. However, there is no such distinction in Korean. Instead, they pay attention to how attached something is to that space where it is to be found. They distinguish between *kitta*, which denotes a tight attachment (e.g., "a ring on a finger", Chang et al, 2015) and *nehta,* which is rather loose (e.g., "a ring on a table", Chang et al, 2015).

Chang et al. (2015) tested Korean speakers showing tight and loose fit animations to them. Both children and adults were asked to describe pairs of scenes with different relations depending on the object type and how attach it was to a certain surface. Hespos and Spelke (2004) discussed the sensitivity of children to innate spatial references, which is shaped by the language experience. In fact, tight terms are more commonly used than fit ones. However, Chang et al (2015) concluded that, even if someone is an expert due to language experience, it does not mean that the innate spatial references need to be thus changed.

### 1.3. Language and Colour

According to Mykhailyuk and Pohlod (2015), there are as many as 160 different colours on the colour spectrum, but not all languages have a name for each colour. Indeed, Birner (1999) stated that the colour spectrum is a continuous circle, but language is not, and thus it needs to break down the colour spectrum with names. Berlin and Kay (1969) presented their theory on *Basic Colour Terms* (BCT). Those are the ones expected to encompass a great number of objects, thus their potential universality. They are also supposed to be written in one word, and used by most speakers, so the terms belong to an average level and are not borrowings.

Berlin and Kay (1969) examined 20 languages and triggered their native speakers to write down the colour terms with the help of the Munsell colour system. It was

introduced in 1939 by Albert H. Munsell and classifies colours measuring them in scales of hue, value (brightness) and chroma (purity). Eleven terms were the most selected by native speakers of those languages. Berlin and Kay (1969) ordered those colours following a hierarchy based on six stages: stage I included terms for black and white; stage II was devoted to red, stages III and IV were for green and yellow, respectively; stage V covered blue; stage VI brown and stage VII, pink, purple, orange, and gray. The existence of a colour in a certain language implied the existence of those in previous stages as well.

However, the different perceptions of colours may make this organization inaccurate. If a language has fewer BTCs, each one might cover a larger part (*metacategory*) and need to be divided into categories that are smaller. According to Hardin (2013), warm or light would be more precise for white category, while dark or cool would fit more within black category (stage I). Wierzbiecka (2008) argued the universality of the concept of colour but ensured the existence of a universal *visual semantics*, as "all languages have a word for seeing" (Wierzbiecka, 2008, p. 408). She believed that colour is a *semantic molecule*, which means that it can be defined by *semantic atoms*, simpler concepts such as see or hear (Wierzbiecka, 2013).

Casaponsa and Athanasopoulos (2018) presented two languages, Dani of Irian Jaya (Papua New Guinea) and Bassa (Liberia/Sierra Leone), which have two colour categories: *dark*, which include cool colours such as black, blue, and green; and *light*, with colours like white, red, orange, and yellow. On the contrary, Warlpiri speakers from Australia have no word for colours. According to Wierzbiecka (2008), they employ reduplication of words translated as *looking like blood, ochre, grass, earth, or smoke* instead. Translations may not be accurate because the colours of their geographic location

are different from those of other points of view. That's why what may be perceived as a colour, they may perceive it as something that resembles something else, thus the use of *look like* in their translation into English. Languages with no colour concept as such do not present colour terms either because they just do not talk about colour in any way.

Yet, Himba (Namibia) and Berninmo (Papua New Guinea) have three BCTs: dark, light, yellow, and a metacategory: *grue* (blue and green) (Casaponsa & Athanasopoulos, 2018; Hardin, 2013). The term *grue* has historically been found in other languages such as Welsh (*glas*), Japanese, Chinese as well as in some North American and Mesoamerican Indian and African languages. Al-Rasheed et al. (2013) stated that some authors (Rosch, et al., 1978) distinguished between primary colours (from stage I to V) and non-primary colour categories. The latter can be either *composite*, uniting two terms to create a new one (e.g., blue and green create *grue*), or *derived*, in which the mix of two colours create a new one (e.g., red and yellow together make orange).

English speakers, in contrast, use more colour terms with eleven basic colour categories, corresponding with those in the Berlin and Kay (1969)'s stages. According to Al-Rasheed et al. (2013), Arabic also presents the same eleven BCTs. However, Russian, Turkish and Greek have twelve (Ak-Rasheed et al, 2013). He stated that apparently adding terms discerning between light and dark blue is the most common path to surpass the eleven BCTs. Based on the examples so far, the more technologically advanced a society with a certain language is, the more different colour terms will be found in it.

Researchers have long considered how the same colour for some speakers may represent two different colour terms for others. That's the case of Russian blues (Winawer et al, 2007), *goluboy* (light blue) and *siniy* (dark blue), which are equal to the single

category of blue in English. Likewise, Arabic presents three categories for blue: *azrock* (generic for blue), *samawee* (light blue) and *khuhlie* (dark blue) (Al-Rasheed et al., 2013). Casaponsa & Athanasopoulos (2018) stated that Greek (*ghalazio* and *ble)* and Turkish also distinguish between a darker and a lighter shade. Even Polish has three different colour terms for blue. They tested Greek native speakers in an English-speaking country and after some exposure, they eventually perceive both *blues* as the same colour category. It suggests that learning another language does shapes our perception of the world in terms of colour, in this case.

Birner (1999) also stated that *pink* is a colour name for *light red*, but it does not necessarily exist in all languages. Indeed, we put the same things into different groups, or categories, depending on the language. One of the most controversial cases is the snow words in the Arctic languages, which belong to the Inuit and Yupik language families. Robson (2013) referred to Franz Boas' introduction on the *Handbook of American Indian Languages* (Boas, 1911), where he claimed that these languages had many words for snow. Robson (2013) named Central Siberian Yupik with 40 terms for snow or Inuit dialect from Canada's Nunavik region with 53, among many others. Yule (2020) discussed that the formation of these words relied on habitual experiences of its speakers. Birner (1999) argued they are formed by composition and inflection from a root, which is the basis of many related words. In other words, they are polysynthetic. For instance, *utuqaq* is the ice that stays from one year to the other, while *auniq* is the one filled with holes (Robson, 2013).

### 1.4. Language and Number

According to Gelman and Butterworth (2005), natural numbers or *cardinals* are processed through the brain by the cognitive function of *numerosity*. It is based on implicatures, which refer to instances not explicitly mentioned but supposed by the speakers. An example of them can be having a set of four items, which implicates that there must be three for it to be possible. They further state that a given set can have an exact value, achieved through enumeration of the items with count words (e.g., one, two, three…). Besides, it can have an approximate value, especially if it is larger, using representations such as body parts.

Dehaene (1992) presented the *Triple Code Model*, which includes three representations regarding numerosity. A number is depicted visually with Arabic digits (e.g., 1,2,3…), it is portrayed with a verbal number word (e.g., one, two, three…), and its quantity is perceived by an analogue magnitude representation. Carey (2004) declares that two-year-old children can enumerate up to four in English, which is considered a small number range. Once they have memorized those count words, they can tell the difference between non-precise quantities although they are not familiar with other number words. However, they soon understand that these words follow a fixed order in which every number has a *unique successor* (Gelman & Butterworth, 2005, p.8) to represent a bigger object file number (each token of the set). Therefore, they infer successive number words and the concept of infinity, by repetition of adding.

Although most Western societies have a counting system, not all languages possess one. The English philosopher John Locke (Gelman & Butterworth, 2005) described the Brazilian tribe of the Tououpinambos as a tribe with a language that only

presents number names up to five. Languages spoken by the Mundarakú or the Piraha do not follow a number word sequence consistently either. The linguist Daniel Everett spent many years working with the Piraha tribe and concluded that "they survive just fine without them [numbers]" (Smithsonian Channel, 2012, 0:47). A test run by Gelman and Gallistel (2004) proved that their speakers were able to complete nonverbal tasks, just as numerate subjects, when presented with items up to eighty. Therefore, it brought these researchers to the conclusion that while a language can make the understanding and use of enumeration easier, it is not crucial for arithmetic tasks.

Jagatia (2019) stated that since the end of the 18th century, scientists have suggested that the language we count in can have an impact on our numeral skills. Taking number 92 as an example, Jagatia (2019) distinguished how *transparent* languages, which link the numbers and their names consistently, make counting easier for their speakers than *inverted* ones. While in French this number is expressed as *four twenties and twelve* (*quatre-vingt douze*), a German speaker would express it in the inverted order, *four and ninety* (*vierundneunzig*). Moreover, a contrast exists between Eastern and Western languages, so that in Mandarin Chinese, this number is represented as *nine ten two*. Jagatia (2019) also discusses the different counting system in old and modern Welsh. While the former was taught in the 1940s and represents 92 as *two on ten and four twenty*, the latter works exactly as Mandarin Chinese (an eastern approach).

Another feature which differs among languages is finger counting, what the Ancient Greeks would call *dactylonomy*. Since human beings have ten fingers in their hands, it makes sense that most number systems possess ten digits (Jagatia, 2021). Indeed, he states that the term *digit* is Latin for *digitus*, meaning finger or toe. However, different speakers use their fingers in a different order to count. Firstly, the *one-dimensional or*

*linear system* entails a one-to-one relationship, that is, a new number means a new finger (Jagatia, 2021). For instance, a European speaker may start with their left thumb and finish with their little finger, whereas a US or Canadian speaker would go from their index finger to their thumb. Moreover, in countries of the Middle East like Iran, people start in their right little finger instead; or in Japan, speakers put their fingers down to a closed fist. Finger counting has a huge cultural dimension, such as in the case of Bantu languages spoken in Tanzania. Their speakers symmetrically indicate numerals using both hands; for example, the index, middle, and ringer fingers of both hands are used to indicate the number 6.

Secondly, the *two-dimensional system* enables speakers to go beyond ten numbers. In India, each finger can stand for four numbers using the lines in-between the fingers, which means that one hand can be used to count to 20. In fact, merchants in Maharashtra (India) count to five using their left hand, while they track the number of sets of five already counted, being always multiples of five. Finally, the *symbolic system* changes the use of fingers with certain signs using more than one digit for number. For instance, in Chinese counting from one to five works just as an American or Canadian person would do. However, from six to ten, they use unique signs for each number. Similarly, ancient Romans reached the thousands with just ten fingers, using a complex system. Although some data has been gathered, more research in this field is yet to be conducted.

### 1.5. Language and Quantity

Languages express quantity in multiple ways, from the plural form to an indefinite measurement such as *few* or *little*. Research has been made regarding the perception of

quantity in another language with different number marking systems. As an example, Lucy (1992) compared English and Yucatec Maya speakers in terms of quantity reference. This language spoken in Mexico does not need over marks for plurality in nouns and verbs, but all noun phrases must indicate number with a *unitizer*. It would be the equivalent to express quantity with English mass nouns because they cannot mark plural with an affix (-s) but with some sort of sentence or modifier. For instance, *milk* would become *two cups of milk* instead of *two milks*. (Mazuka & Friedman, 2000, p.370).

When it comes to English, however, countable nouns are marked with grammatical number through plurality. Lucy (1992)'s test concluded that English speakers pay more attention to the shape, because of their number marking, whereas Yucatec speakers focus more on the material of the given item. Mazuka and Friedman (2000) argued that the participants of the set test came from different backgrounds and so the differences were influenced by the level of education instead.

In order to prove Lucy (1992)'s hypothesis wrong, Mazuka and Friedman (2000) tested Japanese and English speakers. Japanese, like Korean and Chinese, is similar to Yucatec Mayan in the sense that plural markings are impossible in inanimate entities, and they need to use suffixes as classifiers (*unitizers*). However, the participants were all similarly educated, and it brought about different results than the former test. Japanese and English speakers both focused on shape, which shows that the more formal the education level, the more attention is given to shape.

### 1.6. Grammatical Gender across Languages

Grammatical gender is not a shared linguistic feature in all languages. Some can present two different genders: masculine, and feminine (e.g., Catalan, Spanish and

French) or common and neuter (e.g., Dutch); others may have three: masculine, feminine, and neuter (e.g., German, Greek and Russian); and many languages used to be gendered in the past but not anymore (e.g., English and Japanese). Boroditsky (2010) discussed the different agreements that grammatical gender brings about in Russian, her mother tongue. Like in Spanish or Catalan, adjective endings agree in gender, but in the case of Russian, also verb ending, number words, pronouns and possessives, and the phonology is different as well. For instance, the sentence "my chair was white" (мой стул был белым) in Russian is influenced by the fact that the main noun (chair) is masculine, and so all the other elements possess a specific form because of it.

Boroditsky et al. (2002) conducted a series of experiments among Spanish and German speakers to test whether the grammatical gender of a word in their native language affects their perception of it even when they are asked in English. These researchers presented 24 objects which had opposite grammatical genders in German and Spanish and participants were asked to relate them to proper names. For example, an apple (*der Apfel*), which is masculine in German, is more likely to be called Patrick than Patricia for a German speaker. Therefore, as they claimed, "objects do appear to have conceptual gender, and this gender is consistent with the grammatical gender assigned by language." (Boroditsky et al., 2002, p.69). To test this consistency further, German and Spanish participants were also asked to describe words with opposite genders using adjectives. For example, the word *sun* is masculine in Spanish and feminine in German. Therefore, Spanish speakers described it as powerful or threatening while German rather used adjectives such as warming or nourishing.

Moreover, to ensure that no cultural influence is involved whatsoever, Boroditsky et al. (2002) came up with a fictional language, Gumbuzi, which presented a distinction

between *soupative* and *oosative.* Native English speakers were shown 12 inanimate objects and they were associated with the distinctions mentioned. For instance, *soupative* entailed forks, pencils, and girls, while *oosative* included spoons, pens, and boys. When asked to describe a violin, for example, participants used adjectives such as beautiful or delicate when the word was feminine, but difficult or impressive when it was masculine. Yet, wooden was used in both scenarios, which entails that the material is not influenced by gender differences. Even in non-linguistic tasks, both Spanish and German participants, as well as English ones with Gumbuzi were influenced by the gender associations. Moreover, they kept comparing and looking for common features to match an (inanimate) object with a specific gender.

Boroditsky (2010) argued the cognitive consequences of gender with the association of ideas to it. Indeed, artistic representations may be influenced by the grammatical gender of the artists' native languages. For instance, justice is represented as a woman because it is feminine in Latin and hence, in many Romance languages, and so happens with liberty, for which the Liberty Statue is a clear example. Moreover, Michelangelo sculpted different parts of the day (dawn, day, dusk, and night). The words that were feminine in Italian (dawn and night) were portrayed as women, while the masculine nouns (day and dusk) were represented as men. Furthermore, Boroditsky (2010) argued that animated characters (animals or fruits) may be associated to a specific gender according to the grammatical gender of the specific word in one's first language.

Jakobson (1966) ran a test among Russian native speakers in which they had to personify the days of the week into males or females. Indeed, their choices matched the

grammatical gender of the days, that is, Monday, Tuesday and Thursday were perceived as males, while Wednesday, Friday, and Saturday as females.[1]

According to Boroditsky (2010), Hebrew is a quite gendered language and even the second person pronoun (you) is marked by gender. This feature helps children identify their gender earlier. However, English presents some distinction when it comes to gender in terms of the third person singular (he/she), but other languages such as Hungarian or Finnish possess no gendered pronouns. Yet, grammatical rules can have some influence regarding the grammatical gender. For instance, the French word giraffe (feminine) was incorporated in other languages such as Russian, in which it is masculine because the last phoneme pronounced is a consonant (/f/), while in German it is feminine because it ends with an *"e"*. All in all, grammatical gender tends to be arbitrary in relation to the biological one, but still has a major impact on how individuals perceive different things and describe them.

### 1.7. Language and Eyewitness Memory

Boroditsky (2010) discussed the role that (non-)agentive languages have on the perception of a given set of events. *Agentivity* is a grammatical feature that some languages, such as English, possess so the doer of the action specified by the verb needs to be overt. English, namely, does not have a wide range of conjugation variability and the lack of an overt subject may bring about confusion. On the contrary, languages such as Spanish offer other linguistic devices to depict eyewitness memory, for instance,

[1] According to Nikitina (2020), Sunday is neutral grammatical gender in Russian, and that is why it is not presented as an example for this distinction.

*pasiva refleja*. Its structure is based on the use of the pronoun *se*, preceding a transitive verb and it changes the focus from the person who carries out the action (agent) to the action itself. Therefore, English speakers tend to remember better who the author of a certain incident is than Spanish speakers do, according to Boroditsky (2010). That is because while in English someone would say "The man dropped his keys (accidentally)", in Spanish, it would be "se le cayeron las llaves", bringing all the focus to the action itself.

Fausey and Boroditsky (2011) conducted a study among English and Spanish speakers. In the past, participants from the same linguistic community were given descriptions from the same event from which they had to choose. However, in this study, participants from two different linguistic communities were asked to describe casual events and motion events represented in 16 videos. Half of them were intentional and the other half were accidental and the actor performing them was wearing a blue T-shirt in some of them and a yellow one in the rest. While Spanish and English speakers produced similar descriptions for intentional actions, accidental events were reported differently. Spanish speakers used rather intransitive, non-agentive expressions, whereas English speakers used transitive, agentive expressions for both actions. For instance, in English someone would say "The man dropped the var (by accident)", whereas in Spanish, it would be "se (le) cayó el jarrón". In the latter, the agent is not even explicitly mentioned.

In the second part of their study, Fausey and Boroditsky (2011) introduced a third actor with a different T-shirt to test participants on agent memory. Spanish speakers proved to not remember accidental agents as well as English speakers, but it was not that they generally had worse memory than them.

Park (2022) also distinguished between agentive (the agent and the result are connected) and non-agentive (the agent and the result are not connected) structures. The former ones included active (e.g., "The woman pushed the box") and passive ("The box was pushed [by the woman]") transitive constructions, while the latter included intransitive constructions ("The box moved"), in which the agent (the woman) was not implied anymore. Like Spanish, Korean language includes the manner performed by the verb within the same form (e.g., *subir, bajar*). They are *verb-framed languages*, as opposed to *satellite-framed* ones. An example of the latter is English, which needs another particle outside the verb form to specify its way of moving (e.g., *go up, go down*).

Park (2022) dealt with Korean and English speakers, who proved to put different attention to agentive events. Like Fausey and Boroditsky (2011) conclude about Spanish speakers, Korean ones give rather less importance to agentivity than English speakers in accidental events, and in this case, also intentional actions. This article quotes further studies (Luk, 2014; Okuno et al., 2020) which compared Japanese and English speakers on the same topic. They conclude that English speakers focus on the human agent and thus use transitive verbs to specify the object realized by this agent. On the other hand, Japanese speakers omit this agent and therefore employ intransitive structures to place the attention to the verb itself (*verb-framed language*).

### 1.8. Bilingualism

Boroditsky (2021) argued second language learning and bilingualism affects the perception in both languages. She discussed that we act and behave differently depending on the language and the associations that attach us to them. However, the shades of the first language (mother tongue) are always found in the second language and influence

plays an important role. Indeed, she mentioned three factors that help predict which language will have more influenced on the rest. They are primacy (the one learned first), recency (the one used closer to that moment) and frequency (the most often used in the linguistic environment).

Testing bilingualism is quite frequent (Paradis et al., 2011). Not only has bilingualism been extensively studied in spoken languages, Emmorey (2019) carried out a study among hearing people highly proficient in British Sign Language (BSL) and English. She concluded that the neural representation of semantic categories, that is, how the outside world is perceived, is the same across languages but changes across individual items. According to Emmorey (2019), sign languages and spoken languages have many differences, such as the channel in which the information is transmitted (visual vs auditory) or the simultaneity of sign languages which articulate units at the same time (movement and handshape locations). However, there are similarities among them, such as sharing the same developmental stages or the intelligibility of the historically unrelated languages (British and American Sign Language).

Evans et al. (2019) states that language filters the way we perceive the world, which is closely related to the idea of paying attention to different aspects of reality depending on the language used. They concluded that the channel is a key factor on the differences between spoken and signed languages. While words are decoded in speech-specific regions located in the auditory cortex, signs are processed in sign-specific regions in the visual cortex (Evans et al., 2019). When it comes to bilinguals, the representation of semantic images is similar across languages, but the individual words/ signs are influenced by the channel they have been transmitted, either heard or seen. It is also worth mentioning that sign languages possess their own grammar and syntax, quite different

from their oral counter partners. Like Chinese, Sign Languages do not have verb tenses and, as it was common in Latin, the verb form is to be found in the end of the sentence, even if it is finite.

### 1.9. Research Questions

Based on the theory gathered, my hypothesis is that language affects our perception of the world by paying attention to different aspects. Thus, when learning a second language, traces of the first one(s) can be noticed in terms of time, space, time, gender, colour, eyewitness memory, number, and quantity. The research questions are as follows.

- Regarding space, do the participants follow the same direction to organize a set of elements, or are they influenced by the writing direction of their first language(s)?
- Regarding time, do the participants understand events as *ego-moving* or *time-moving* (Boroditsky, 2018)? Is the future always portrayed ahead and the past behind?
- Regarding gender, are grammatical gender and biological gender connected? Is gender arbitrary? What about genderless languages like English?
- Regarding colour, are colours universal in that all languages of the participants possessed the same colour words?
- Regarding eyewitness memory, do the participants focus on the same factors when narrating an event?
- Regarding number and quantity, do the participants count similarly using their hands?

## 2. Method

After having done some literary research on the topic, more attention was paid to how speakers of different languages perceived different aspects of the world by paying attention to different things. A questionnaire using Microsoft Forms was created with several questions for each category (time, space, gender, colour, eyewitness memory and number). It was addressed to URV incoming Erasmus and international students of this academic year 2022-2023.

### 2.1. Participants

There was a total of 79 participants in this study, who are all students at URV. The participants were sourced through the International Center. Additionally, the students in the master programs of International Markets and Teaching English as a Foreign Language participated in this study. The participants consist of primarily international and Erasmus students speaking 21 different languages, belonging to 4 language families. They have the following linguistic backgrounds as their primary languages: within the Indo-European family, there are five different sub-families. Firstly, Romance languages (38) include Catalan, Spanish (6), French (8), Italian (13), Portuguese (3), and Romanian (1). Some of these speakers happen to be bilingual in Catalan and Spanish (4), Catalan and Italian (1), and French and Spanish (1). Moreover, another participant claimed to be bilingual in Spanish and Euskera, an isolated language. Secondly, Germanic languages (13) include three languages: English (7), German (4), and Dutch (2). The next two sub-families are Indo-Iranian, which include Urdu and Greek, with one participant each. Finally, Slavic languages (14) are four: Slovak (3), Russian (4), Serbian (2), and Polish (5).

The next one is the Altaic family, to which the Turkic sub-family belongs with two participants whose primary language is Turkish. The third one is the Sino-Tibetan family, which includes Chinese (4) and Burmese (2) languages. Finally, the last one is the Afro-Asiatic family with Arabic (3) and Hausa (1) speakers.

Additionally, participants were asked to specify their linguistic background in terms of foreign languages. All of them have some knowledge of English, key to answer this questionnaire. Table 1 shows the list of their foreign languages, ordered from the most to the least spoken.

**Table 1.** *Foreign languages spoken by the participants.*

| **Languages** | **Total** | **Native speakers** | **Beginners (A1-A2)** | **Intermediate (B1-B2)** | **Advanced (C1-C2)** | **Notes** |
|---|---|---|---|---|---|---|
| **English** | 71/79 (89.87%) | 7/79 | - | 30/71 (42.25%) | 36/71 (50.7%) | 5/71 have not specified their level |
| **Spanish** | 48/79 (60.76%) | 13/79 | 17/48 (35.42%) | 22/48 (45.83%) | 8/48 (16.67%) | 1/48 has not specified their level |
| **French** | 16/79 (20.25%) | 8/79 | 8/16 (50%) | 6/16 (37.5%) | 2/16 (12.5%) | - |
| **German** | 12/79 (15.19%) | 4/79 | 5/12 (41.67%) | 6/12 (50%) | 1/12 (8.33%) | - |
| **Catalan** | 6/79 (7.59%) | 5/79 | 4/6 (66.67%) | 2/6 (33.33%) | - | - |
| **Italian** | 4/79 (5.06%) | 13/79 | 1/4 (25%) | 3/4 (75%) | - | - |
| **Chinese** | 4/79 (5.06%) | 4/79 | 3/4 (75%) | 1/4 (25%) | - | - |
| **Russian** | 1/79 (1.27%) | 4/79 | - | 1/1 (100%) | - | - |
| **Dutch** | 1/79 (1.27%) | 2/79 | - | 1/1 (100%) | - | - |
| **Korean** | 2/79 (2.53%) | - | 1/2 (50%) | 1/2 (50%) | - | - |
| **Hebrew** | 2/79 (2.53%) | - | 2/2 (100%) | - | - | - |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Filipino** | 1/79 (1.27%) | - | - | - | 1/1 (100%) | - |
| **Thai** | 1/79 (1.27%) | - | - | 1/1 (100%) | - | - |
| **Japanese** | 1/79 (1.27%) | - | 1/1 (100%) | - | - | - |
| **Hungarian** | 1/79 (1.27%) | - | - | 1/1 (100%) | - | - |
| **Slovenian** | 1/79 (1.27%) | - | - | - | 1/1 (100%) | - |
| **Serbian** | 1/79 (1.27%) | 2/79 | - | - | 1/1 (100%) | - |
| **Bosnian** | 1/79 (1.27%) | - | - | - | 1/1 (100%) | - |
| **Croatian** | 1/79 (1.27%) | - | - | - | 1/1 (100%) | - |
| **Montenegrin** | 1/79 (1.27%) | - | - | - | 1/1 (100%) | - |
| **Latin** | 1/79 (1.27%) | - | - | - | - | The participant has not specified their level |

### 2.2.Materials

Microsoft Forms was used to carry out the questionnaire. The participants were sent a digital link to the consent form and the questionnaire. They used their own devices, either laptop, tablet, or mobile phone, to complete the questionnaire. The analysis of the data was done using Microsoft Forms software.

### 2.3.Procedure

Since the target audience was international students, the International Center of URV was contacted by email. They were asked whether they would forward the link to the students because I thought it was the easiest and more reliable way of reaching them.

Firstly, all the documentation had to be approved by the Ethics Committee for Research in People, Society, and the Environment (CEIPSA).[2] The first section was just background information, in which three different questions were included, such as their mother tongues and linguistic backgrounds.

Following, the participants were sent a consent form (see Appendix B for informed consent form) and they had to respond to questions in the questionnaire on their perceptions of space, time, gender, colour, eyewitness memory, as well as number and quantity (see Appendix A for the full questionnaire).

Once the data was collected, it was organized and coded using Microsoft Excel to determine the tendency for native speakers of a certain language to choose a specific answer and graphs were created accordingly by families of languages or languages per se (see Figure 1, Appendix C for the Excel data collection).

## 3. Results

### 3.1. Space

Following the sections of the questionnaire, space was the first one. In this case, languages were grouped by the different subfamilies (Indo-European, Altaic, Sino-Tibetan and Afro-Asiatic), without looking further on each one of them. Indo-European languages are the only ones that are gathered into five different groups (Romance, Germanic, Indo-Iranian, Greek, and Slavic) due to the language distance among them.

[2] The ethics file number is CEIPSA-2023-TFG-0003.

Figure 2 (see Appendix D) shows the different answers from the first question, which made the participants decide on how they would order a list of the months of the year. The vast majority, 60.79% (48/79) of the participants, would order them from top to bottom. However, Greek, Turkish and Germanic languages' speakers would generally prefer to order months from left to right. Only one participant, namely a Russian speaker (Slavic language), chose to order them from right to left.

The next question of the space section had participants decide on the order of a representation using arrows for the sentence "Mary gives flowers to Kate." Figure 3 (see Appendix E) shows that most of the participants, 74.68% (59/79), would order it from left to right. However, in the case of the Afro-Asiatic languages, the same number of participants (two) chose different options (from left to right and top down). Like the previous question, only one participant opted for ordering the months from right to left, but in this case, it was a Dutch speaker (Germanic language).

### 3.2. Time

The next section of the questionnaire belongs to time. Languages were again grouped as before. Participants were asked four different questions regarding their concept of time, namely in terms of ordering it within space. In the first two questions a change of date was brought up, so the participants had two days to choose from depending on the direction time travels in space according to their perception. In the first question, a party was moved three days forward from Wednesday, which can be either the previous Sunday or the following Saturday. Figure 4 (see Appendix F) shows that in almost all the languages, the participants were more likely to select the following Saturday. The only exception were German languages by only one number.

Following the same structure as before, the participants were presented another change of date, in this case a meeting that was moved forward two days from Tuesday. They were asked to select the new date as being Thursday or the previous Sunday. Figure 5 (see Appendix G) presents that almost all the participants chose Thursday. Only ten participants selected the previous Sunday.

The next two questions of the time section were devoted to the placement of past and future in relation to the present. In this case, the participants were presented with a range of numbers from zero to ten and were given the premise that five represented the present time. They were then assumed to place the past in one question and the future in the following one either in number zero or in number ten, as though they were absolute concepts. However, due to its relativity, every option given by the participants from zero to four was considered as zero (<5) as well as every option from six to ten was considered as ten (>5). As shown in Figures 6 and 7 (see Appendices H and I), all the participants placed the past *behind* five being the present time and the future *ahead* of it.

### 3.3. Gender

The third section is devoted to gender, and it is the longest one with 24 different items to be analysed. The first four are inanimate objects that have opposing genders at least in Spanish and German (Boroditsky et al., 2002). For each object, there are three different graphs that cover languages as such, instead of entire families. The first one includes Romance languages (Catalan, Spanish, French, Italian, Portuguese, Romanian,

Euskera[3]); the second one entails Germanic languages (English, German, and Dutch), as well as Urdu, Turkish, and Greek; the third one covers Slavic languages (Slovak, Russian, Serbian, and Polish), as well as Chinese and Burmese, plus Arabic and Hausa.

*Key* and *moon* are feminine in Spanish and masculine in German, while *bridge* and *sun* are masculine in Spanish and feminine in German. Figures 8, 9, and 10 (see Appendices J, K, and L) present that the three most chosen adjectives to describe a key were *metal* (67), *useful* (54), and *little* (33). On the contrary, *lovely* was not selected by any participant at all, followed by *heavy* (7), *serrated* (11) and *golden* (12). Moreover, Figures 11, 12, and 13 (see Appendices M, N, and O) reveal that *long* (58), *big* (47) and *strong* (58) were clearly the three most popular adjectives to describe a bridge. On the contrary, *fragile* (2), *pretty* (5) and *elegant* (12) were the least selected ones. However, a tendency for non-Romance languages speakers to choose *beautiful* is perceived. Yet, a Portuguese and a French speaker were the only two participants who chose *fragile*.

Figures 14, 15, and 16 (see Appendices P, Q, and R) show that *warning* (66), *powerful* (46) and *radiant* (33) were the most chosen adjectives to describe the sun. On the other hand, the least selected were *ethereal* (1), *threatening* (2) and *fierce* (4). Finally, Figures 17, 18, and 19 (see Appendices S, T and U) present that *bright* (48), *beautiful* (48) and *mysterious* (44) were the three most selected adjectives to describe the moon. On the contrary, *barren* (2), *huge* (9) and *clear* (9) were the three least chosen.

[3] Euskera does not present grammatical gender and it is an isolated language as well. It is classified within Romance languages because the only participant who speaks Euskera is bilingual in Spanish as well.

The next set of questions of this section is devoted to choosing whether ten animals and fruits were to be considered masculine or feminine if they were animated characters. Like the previous words, they have opposite grammatical genders at least in Spanish and German. On the one hand, Figures 20 and 22 (see Appendices V and X) show that *camel* and *snail* were both considered masculine by most of the participants. However, Greek, and Portuguese speakers preferred to label it as feminine respectively. On the other hand, Figures 21, 23, and 24 (see Appendices W, Y, and Z) present that *rabbit*, *sheep*, and *mouse* were classified as rather feminine by many participants. Both *rabbit* and *mouse* were considered masculine by almost all Romanic languages participants (*mouse* is feminine in French). Moreover, German participants were not quite sure about *camel* and *rabbit*.

Regarding fruits, Figures 25 and 29 (see Appendices AA and EE) show that *apple* and *kiwi* are widely considered feminine, while Figures 26, 27, and 28 (see Appendices BB, CC, and DD) present that *lemon, avocado*, and *melon* are labelled as masculine. In most cases, Chinese speakers were not sure about the answer, and neither were those whose languages mark a certain word as neuter (e.g., Greek speakers in the case of *avocado*). Besides, *lemon*'s labelling as masculine only differed for one number regarding feminine. Indeed, Spanish, French, Italian, Portuguese, Serbian and Arabic speakers considered it masculine, whereas Catalan, German and Polish participants thought of it as feminine, all matching the grammatical gender of their languages.

The next set of questions present ten abstract entities that are meant to be represented in art either as a male or a female. Figures 30, 35, and 37 (Appendices FF, KK, and MM) portray that *death*, *war*, and *anger* are generally considered masculine, whereas Figures 31, 32, 33, 34, 36, 38, and 39 (Appendices GG, HH, II, JJ, LL, NN, and

OO) show that *justice, liberty, peace, life, hope, purity,* and *sadness* are labelled as feminine.

### 3.4. Colour

In this section, the participants were presented with two shades of a colour, and they had to specify whether they were the same colour or different ones and then wrote the name(s). The first colour was intended to be red. Figure 40 (see Appendix PP) shows that 50.63% (40/79) of the participants perceived both shades as different colours, whereas 46.84% (37/79) saw them as the same colour. There were 15 different colours names for these shades, being light and dark red the most popular. Moreover, burgundy and maroon were also named by some participants, among others specified in Table 2 (see Appendix QQ). The second colour was meant to be blue. Figure 41 (see Appendix RR) presents that 65.82% (52/79) of the participants believed the shades could be considered different colours. 32.91% (26/79) believed they belonged to the same colour instead. 16 different colours names have been gathered, again being light and dark blue the more common answer. Furthermore, purple was generally used as well, like others mentioned in Table 3 (see Appendix SS).

The next colour was intended to be green. Figure 42 (see Appendix TT) shows that 35.44% (28/79) of the participants considered these shades different colours, whereas 63.29% (50/79) believed they were the same colour. 11 different colours were depicted by the participants, mainly green and light and dark green. Moreover, English speakers suggested *moss, avocado and lime green*, while Spanish ones introduced *flag green and apple green* (Table 4, see Appendix UU). Yellow was the next colour. Figure 43 (see Appendix VV) presents that 48.1% (38/79) of the participants thought the shades

belonged to different colours while the 50.63% (40/79) considered them belonging to the same colour. 16 colours were offered by the participants, among them: *(light and dark) yellow, light and dark orange and mustard yellow* (Table 5, see Appendix WW).

The fifth colour was meant to be white. Figure 44 (see Appendix XX) shows that 87.34% (69/79) of the participants considered the two shades belonging to two different colours, while a 11.39% (9/79) believed they were the same colour. Eight different colour words were named, among them white and light grey. Moreover, Turkish speakers introduced *beige* (Table 6, see Appendix YY). Finally, the last colour was black. Figure 45 (see Appendix ZZ) presents that 46.84% (37/79) of the participants believed the two shades to be different colours whereas the 54.9% (41/79) considered them the same colour. Five different colour terms were indicated, such as *black and light and dark gray*. Moreover, the French and Spanish bilingual introduced *charcoal*, English speakers mentioned *granite*, and German ones *medium grey* (Table 7, see Appendix AAA).

### 3.5. Eyewitness Memory

The fifth section includes six questions regarding eyewitness memory. The first question presents a picture of a man taking a picture in a museum and, presumably as an accident, hits a vase next to him. Figure 46 (see Appendix BBB) shows that the vast majority of the participants of all languages would use the agent (the man) when describing the picture. Only six participants (two Italian, one Portuguese, one German, one Serbian, and one Chinese) would rather use a passive description without specifying the agent. Moreover, two others (one French and one Slovak) would include the reflexive pronoun *itself* to mark accidentality. The next question shows a picture of a balloon popping near a cactus. Figure 47 (see Appendix CCC) presents that most participants

would make the agent explicit. However, Romanian and Urdu speakers chose the passive option instead. Some French speakers, again, and Italian as well (one each) would describe it as an accident with the reflexive pronoun *itself*.

The third question portrays a picture of a girl with a broken arm in a doctor's office. Figure 48 (see Appendix DDD) shows that agentive language is the most dominant in most languages, except for Urdu, Hausa, and Italian speakers who would describe it using a passive construction. The fourth question depicts a scene of a pencil point breaking on a notebook as someone is writing. Figure 49 (see Appendix EEE) shows that most participants selected the passive structure, and many Romance languages speakers chose to use the reflexive pronoun (*itself*) as well. However, French, Turkish, Greek, Arabic, and Hausa speakers still preferred to use an agent.

The fifth question shows a hand with a post-it stuck to it. Figure 50 (see Appendix FFF) presents that passive construction was chosen by most participants. However, some Euskera, French, English, and Russian participants would describe it using the reflexive pronoun *itself*. The last question portrays a picture with a hand in the top and keys on the bottom of the image. Figure 51 (see Appendix GGG) shows that the agentive construction is the most selected option. However, most French and Spanish bilinguals, Urdu, Hausa, Russian, and Chinese speakers would rather use the reflexive pronoun *itself*.

### 3.6. Number and Quantity

The last section is devoted to number and quantity. The participants were presented with three pictures of different ways of counting to three with fingers. According to Figure 52 (see Appendix HHH), the ones who are more likely to start counting with their thumb are the speakers of Italian, French, Spanish and Catalan,

Romanian, German, Dutch, Slovak, Serbian, and Polish. On the contrary, Portuguese, English, Urdu, Greek, Arabic, and Russian speakers would rather start with their index finger. Yet, Chinese, Hausa and Euskera speakers tend to start with their little finger. Spanish speakers choose to start with their index finger and with their little finger equally. Likewise, Burmese and Turkish choose to start with their thumb and their index finger equally.

## 4. Discussion

My hypothesis supported that traces of the first language(s) could be noticed when learning a second language. It has been proved that indeed different languages make speakers focus on different aspects. However, the proficiency of the target language and perhaps the level of exposure to it may reduce the influence of the first language(s). In the following sections, each entity is discussed according to the results presented and the theoretical framework gathered.

### 4.1.Space

The first research question asked whether the participants followed the same direction to organize a set of elements. According to the results, when dealing with a list of elements, a vertical axis made it more visual and easier to understand. Mandarin Chinese speakers, for instance, have vertical metaphors in which *up* is something coming before (last month) and *down* after (next month) (Boroditsky, 2010). Nonetheless, when faced with a sentence representation mirroring the writing direction, participants were more likely to order it from left to right, as many of their first language(s) follow this direction. However, due to their proficiency in English, they have become used to this

writing direction even if their mother tongue(s) (Arabic, Hebrew…) follow the opposite direction. So, their mother tongue does not have an influence on them anymore.

### 4.2. Time

The second research question aimed to prove whether time was treated as *ego-moving* or *time-moving* (Boroditsky, 2018), that is, the individual moves toward time or time moves toward the individual. Most of the participants chose the date further in time, proving they understood time as *ego-moving.* Moreover, *time-moving* is characteristic of tribes such as the Kuuk Thaavorre in Australia (Boroditsky & Gabi, 2010) or the Hopi (Birner, 1999). Perhaps because their societies are not that technological-oriented and less selfish, they believe time is the element moving, instead of themselves. Besides, the second research question dealt with the placement of past and future. With no exceptions, it has been proved that all participants would place the future ahead and the past behind, as expressed in the linguistic metaphors. However, Amaya language (Núñez & Sweetser, 2006) and Mandarin Chinese (Frankel & Warren, 2022) express these metaphors oppositely, but no trace has been reported in the results of the questionnaire. It is such the influence of English in most participants that its time metaphors are already part of their cognition.

### 4.3. Gender

The third research question dealt with grammatical gender and its arbitrariness. *Key, bridge, sun*, and *moon* have opposing genders in at least two languages of the participants. It proved that grammatical and biological gender are not connected at all, although it can have some kind of influence in the way a specific element is described. The adjectives that are offered to the participants are supposed to have masculine and

feminine connotations, although it can be quite old-fashioned nowadays. For instance, *hard* or *heavy* may be portrayed as being more masculine, as opposed to *lovely, shiny,* or *tiny*. Although every entity presented two or sometimes, even three different grammatical genders (see Table 8, Appendix III), the most chosen adjectives were the same for the three groups of languages. In the case of key, for instance, one of the most selected adjectives is *metal*, which like wooden in Boroditsky et al.'s test (2002), proved that material applied to all genders. Moreover, *bridge's* chosen adjectives match with the idea that they are rather attributed to masculine connotations since this word is masculine in most Romance languages. Hence, non-Romance languages speakers were more likely to choose *beautiful*, but a Portuguese speaker chose *fragile*, since it is feminine in this language. Besides, *barren* was one of the least selected adjectives to describe moon perhaps because it is not common and may not be known by many learners of English.

Animals and fruits (see Tables 9 and 10, appendices JJJ and KKK) also present a clear majority for either masculine or feminine choices. Since most languages are gendered, hesitation (e.g., *I don't know* option) was chosen by few participants in all cases. Abstract entities represented in art (see Tables 11 and 12, appendices LLL and MMM) were extremely related to cultural connotations and to the fact that these nouns are mostly feminine in all Romance languages. This would explain why only three out of ten items (*death, war*, and *anger*) were widely considered masculine and they could be related to power and rather "masculine" attributes. Gender is therefore arbitrary and influenced by our subjective views of the world. Genderless languages need to relate on their cultural background and perhaps have some influence from the languages they are learning.

### 4.4. Colour

The fourth research question has to do with the universality of the colour words. Results have shown that red, blue, and white are considered the ones which differ the most. It is consistent with the fact that light red is considered pink in some languages (Birner, 1999); blue presents different names for different shades, like in Russian (Winawer et al, 2007); and Inuit languages have different words for snow (Boas, 1911). Moreover, some consistencies have been found with the languages and their choice between different colours and the same colour: Chinese, Portuguese, and Romanian participants always selected different, whereas Arabic and English chose the same colours. However, with colour white, English speakers were more likely to perceive it as different colours.

### 4.5. Eyewitness Memory

The fifth research question asked whether the participants focused on the same factors when narrating an event. Results have shown that if the agent is a third person singular, that is, someone else, participants were more likely mention them, creating agentive structures. That is the case for *the man*, *the cactus*, and *the girl*. However, first personal singular agents (I) tended not to be mentioned by the speakers, preferring a passive or reflexive structure instead. A difference between agentive and non-agentive language was not that notable, although Romance languages speakers were more likely to use reflexive pronouns or passive structures than non-Romance languages participants.

### 4.6. Number and Quantity

The last research question dealt with how the participants counted using their hands. The combinations presented were the following: thumb, index and middle finger;

index, middle and ring finger; or little, ring and middle finger. According to Jagatia (2019), the first combination was characteristic of European speakers, which matches the first language of the participants that have chosen this option: Italian, French, bilinguals in Catalan and Spanish, Romanian, German, Dutch, Slovak, Serbian, Polish… Besides, US and Canadian speakers normally start from their index finger, and this is consistent with the English participants, who most of them may come from the United States. Indeed, Russian speakers may be influenced from their location. However, Urdu, Arabic and Greek participants were not expected to choose this option. Instead, the third one, starting from the little finger, like Chinese and Hausa people did. This is common in Middle East countries, although the Euskera participant also went for it. Furthermore, most of the Portuguese participants may be from Brazil, just like Spanish ones come from Latin American. Therefore, they were more likely to count starting from their index finger.

### 4.7. Limitations of the Study and Suggestions for Future Research

The questionnaire tried to mirror previous studies with pictures and a range of different options to choose from. However, results cannot be as reliable as though the test had been conducted in person and met each participant's needs. Moreover, the number of native speakers from each language was not the same, although various languages were examined. Besides, some questions could be subjective, and participants relied on external factors.

After presenting these results and connecting them with the theoretical framework, further research needs to be conducted in some specific areas. One is the *foreign language effect*, which is linked to the decision-making systems depending on

someone's first and target language. It is related to the perception of the world being different according to the language used, and it even entails acting differently according to it. Moreover, all languages dealt with in this thesis are spoken since the participants were believed to be hearing or at least native speakers of an oral language. However, there are more than 500 different Sign Languages worldwide, adding many elements to the cognition analysis. As they all possess their own syntax, storytelling should be an essential difference between them and between oral languages. Although users of Sign Languages tend to write following the structure of the spoken language of their area, their natural Sign Language may impact how they perceive the world outside.

## 5. Conclusions

Languages are humans' most powerful tools, distinguishing us from other species. Going back to *Sapir and Whorf's hypothesis*, tests have proved that the languages we speak do influence our perception of the world in some way. However, English has lately become the lingua franca thanks to the globalization and internationalization of the citizens of the world. As times have changed, not all the results from Boroditsky's tests have been achieved in this questionnaire. Indeed, the significant exposure to the same content on social media or the participants' daily use of English and proficiency may have had some influence on the common patterns results have portrayed. Yet, the first language(s) of someone is always perceived in any learning process. In fact, the more languages we learn, the more points of view will enrich our cultural and linguistic knowledge.

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## Appendix A. Questionnaire

**Language and perception questionnaire**

Hello! I'm Alícia Gual and I'm a fourth-year student of the English Degree at URV. I'm working on my final degree project (TFG) about how learning a foreign language shapes theway we perceive the world. I would be glad if you could answer the following questions thatwon't take you long. If you have any enquiries, don't hesitate to contact me: alicia.gual@estudiants.urv.cat. Thank you so much!

* Mandatory

**Background information**

Please answer the following questions

1- Which is your mother tongue/ first language(s)?

Catalan Spanish English French German Italian Arabic Berber Greek Turkish Polish Chinese Japanese Hindi

2- If it doesn't appear in the list above, please specify which one(s) here.

3- Which other language have you studied or do you speak? Indicate thelanguage level of beginner (A1/A2), intermediate (B1/B2), or advanced(C1/C2). *

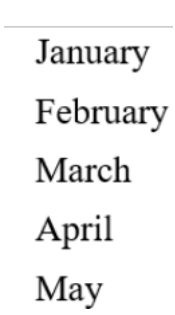
**Perception of space**

Please answer the following questions.

4- Which order feels more natural to you? *


from left to right

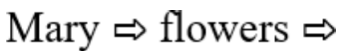
from right to left



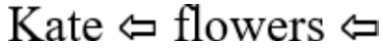

top down


bottom up

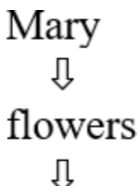
5- Which representation is more logical in the following sentence? Mary gives flowers to Kate.*



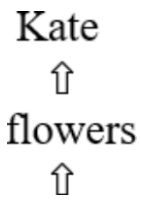

from left to right




from right to left




top down




bottom up

**Perception of time**

Please answer the following question.

6- If next Wednesday's party has been moved forward three days, when is the party now? *

Saturday/Sunday

7- If next Tuesday's meeting has been moved forward two days, when is themeeting now? *

Thursday/ Sunday

8- If number five is the present time, where would you place the PAST? (Select0 or 10) *

1 1 2 3 4 5 6 7 8 9 10

Select 0 Select 10

9- If number five is the present time, where would you place the FUTURE?(Select 0 or 10) *

0 1 2 3 4 5 6 7 8 9 10

Select 0 Select 10

**Perception of gender**

Please answer the following questions.

10- Choose which three adjectives you would use to describe the following object: Key*

Select 3 options.
heavy lovely hard useful serrated metal little golden tiny shiny

11- Choose which three adjectives you would use to describe the following object: Bridge*
Select 3 options.
strong beautiful pretty fragile elegant peaceful towering long big dangerous

12- Choose which three adjectives you would use to describe the following element: Sun*
Select 3 options.
radiant nourishing warming distant golden enormous powerful ethereal threatening fierce

13- Choose which three adjectives you would use to describe the following element: Moon*
Select 3 options.
round silvery cool clear huge mysterious quiet bright barren beautiful

14- How would the following animals and foods sound like if they were characters in a cartoons series? *

| | High voice ("feminine-like") | Low voice ("masculine-like") | I'm not sure |
|---|---|---|---|
| Camel | | | |
| Apple | | | |
| Rabbit | | | |
| Lemon | | | |
| Snail | | | |
| Avocado | | | |
| Sheep | | | |
| Melon | | | |
| Mouse | | | |
| Kiwi | | | |

15- How would you represent the following abstract concepts if they were to be sculptures? *

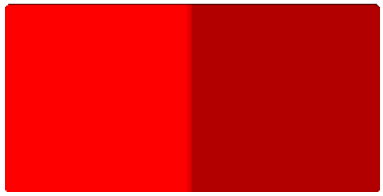
| | As a man | As a woman | I'm not sure |
|---|---|---|---|
| Death | | | |
| Justice | | | |
| Liberty | | | |
| Peace | | | |
| Life | | | |
| War | | | |
| Hope | | | |

Anger
Purity
Sadness

**Perception of colour**[4]
Note: Are you colour-blind? If yes, move to the next section. If no, please answer the following questions.

16- Are these shades of the same colour or are they different colours? *

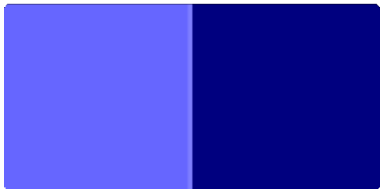
Same colour
Different colours
I'm not sure



17- What colour(s) would they be? *

18- Are these shades of the same colour or are they different colours? *

Same colour
Different colours
I'm not sure



19- What colour(s) would they be? *

20- Are these shades of the same colour or are they different colours? *

Same colour
Different colours
I'm not sure

21- What colour(s) would they be? *

22- Are these shades of the same colour or are they different colours?

Same colour
Different colours
I'm not sure



23- What colour(s) would they be? *

24- Are these shades of the same colour or are they different colours? *

Same colour
Different colours
I'm not sure



25- What colour(s) would they be? *

[4] Pictures retrieved from *Color-Hex*.

26- Are these shades of the same colour or are they different colours? *

Same colour
Different colours
I'm not sure

27- What colour(s) would they be? *

**Perception of agentivity**[5]
Please answer the following questions

28- How would you describe the following picture? *

The man broke the vase.

The vase broke.

The vase broke itself.

I don't know how to describe it.

29- How would you describe the following picture? *

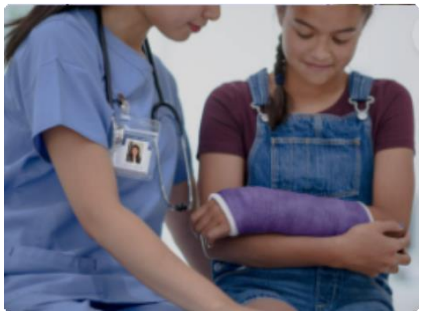
The cactus popped the balloon.

The balloon popped.

The balloon popped itself.

I don't know how to describe it.

30- How would you describe the following picture? *



The girl broke her arm.

Her arm broke.

Her arm broke itself.

I don't know how to describe it.

31- How would you describe the following picture? *

I broke my pencil point.

My pencil point broke.

My pencil point broke itself.

I don't know how to describe it.

[5] Pictures retrieved from *Getty Images.*

32- How would you describe the following picture? *

I stuck the post-it on my hand.

The post-it stuck on my hand.

The post-it stuck itself on my hand.

I don’t know how to describe it.

33- How would you describe the following picture? *

The man dropped the keys.

The keys fell.

The keys fell themselves.

I don’t know how to describe it.

**Perception of number/quantity**

Please answer the following question

34- Which image represents better the way you would count to three using one hand.

Thumb-index finger-middle finger

index finger-middlefinger-ring finger

little finger-ring finger-middle finger

## Appendix B. Informed Consent Form

**Title of** Bachelor's Thesis**:** How learning a foreign language changes the way weperceive the world, especially in relation to space and time, quantity, and colour perception. CEIPSA-2023-TFG-0003.

**Principal researcher's contact details:** Alícia Gual Miró – alicia.gual@estudiants.urv.cat +34646898381-43202 (Reus)

INFORMATION ON PERSONAL DATA PROTECTION

**Data** The data controller is the Universitat Rovira i Virgili with Tax Identification NumberQ9350003A and based at Carrer de l'Escorxador, s/n, 43003, Tarragona.

**Purpose**

To participate Bachelor's Thesis under the terms described in the participant informationsheet. If the study intends to publish, disseminate and reuse the results obtained, including personal data, the personal data will be used for these purposes provided that the interested party has given their consent.

**Rights**

The individuals concerned can exercise their right to access, rectify, remove, move, limitor oppose the processing of their data in writing to the General Registry of the URV at the same address as the URV, or in person at the General Registry of the URV or telematically in accordance with the instructions at https://seuelectronica.urv.cat/registre.html.

**Further information**

Individuals can find additional information about the processing of personal data in theBachelor's Thesis at the URV and about their rights at the URV's Processing Registry, which is published at http://seuelectronica.urv.cat/rgpd, where they will also find the Privacy Policy of the URV. They may also find this information on the Participant's Information Document.

1.- Please enter your name and identity card number. *

2.- - I have read the copy that I have received of the participantinformation document regarding the study.

- I have been able to ask and have received answers to my personal questions regarding the study and my participation in it.
- I understand that I am participating in this study in accordancewith the specifications in the participant information document and in accordance with the answers that I have received to my questions and I understand the risks and benefits that this entails.
- I accept that my participation is voluntary and I freely agree toparticipate in the study.

- I understand that I can withdraw at any time from participatingin the study and that my withdrawal will not affect me negatively in any way.

- Once the research has been completed, the data obtained maybe of interest to other related studies. In this regard, the following options are offered: *

NOT TO AUTHORISE the use of the data in other related research projects.

3.- Please indicate the date and your location (city). *

4.- By writing your name in the space below and submitting this form, you agree to participate in this study.

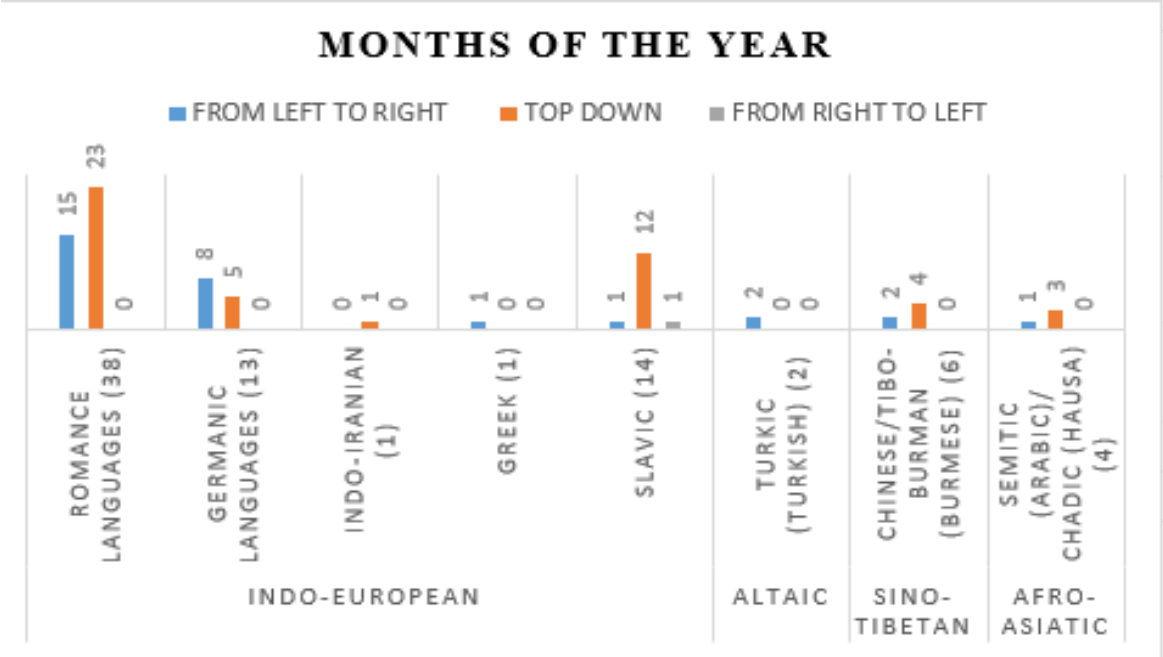
## Appendix C

**Figure 1.** *Piece of the Excel document with the data from the participants.*

| Which is your moth | Which other langua | Which order feels n | Which representati | If next Wednesday' | If next Tuesday's m |
|---|---|---|---|---|---|
| Catalan;Spanish; | English C2<br>French B2<br>German A1 | from left to right | from left to right | Saturday | Thursday |
| English; | Filipino - C1 | top down | from left to right | Saturday | Thursday |
| English; | Spanish C1 | top down | from left to right | Sunday | Sunday |
| English; | Spanish (B2) | from left to right | from left to right | Sunday | Sunday |
| English; | Spanish, B2 | from left to right | from left to right | Saturday | Thursday |
| Catalan;Spanish; | French (A2 level), Chin | from left to right | from left to right | Saturday | Thursday |
| Turkish ; | English C2 | from left to right | from left to right | Saturday | Thursday |
| French; | English (C1/C2)<br>Spanish (B1/B2) | top down | from left to right | Sunday | Sunday |
| Hindi ; URDU | English intermediate | top down | top down | Saturday | Thursday |
| Italian; | English intermediate | top down | from left to right | Saturday | Thursday |
| Greek; | English (B2), Spanish ( | from left to right | from left to right | Saturday | Thursday |
| French; | English C1 | top down | top down | Saturday | Thursday |
| Chinese ; | English C2/Spanish(A2 | top down | top down | Saturday | Thursday |

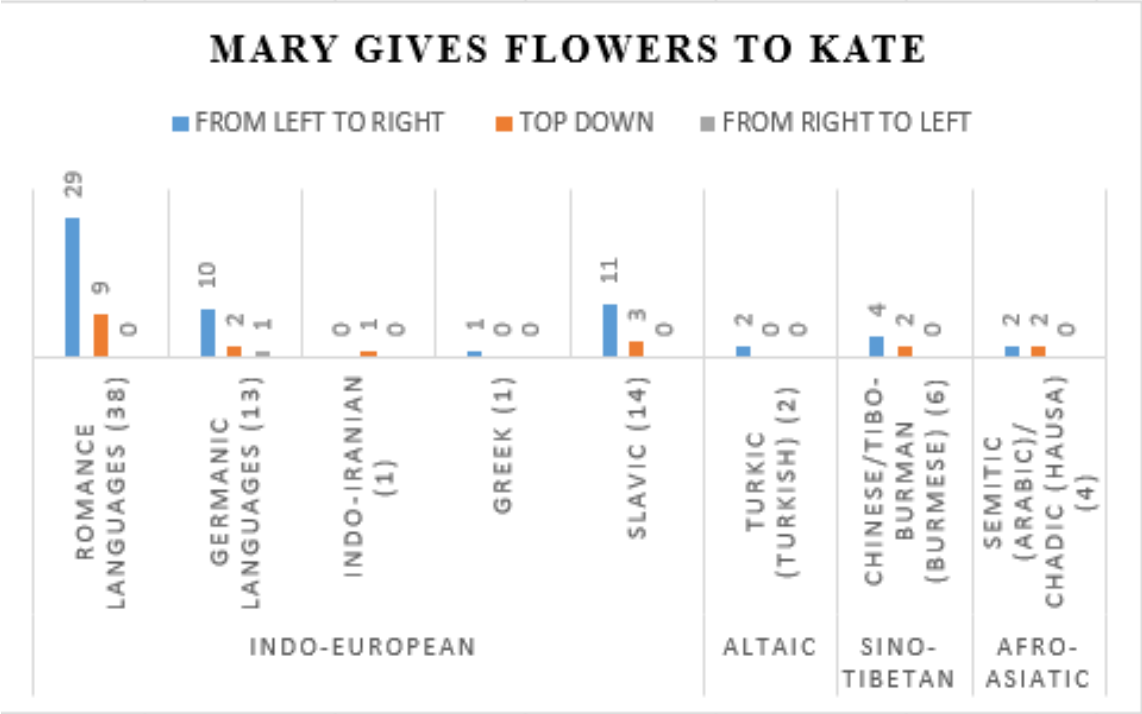
## Appendix D

**Figure 2.** *Spatial representation of the months of the year.*



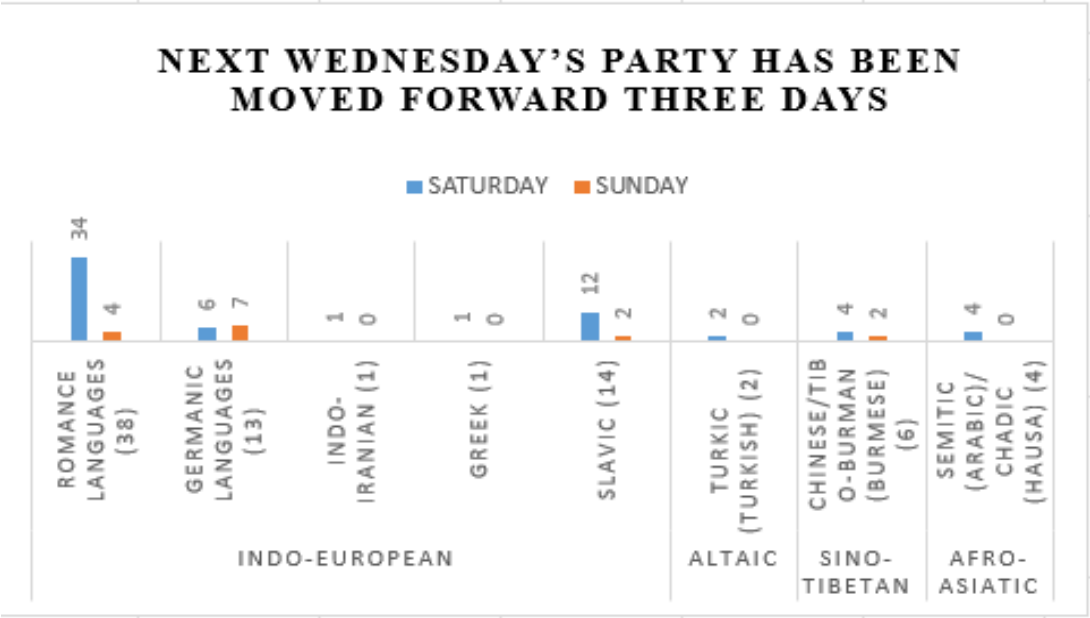
## Appendix E

**Figure 3.** *Spatial representation of a sentence.*



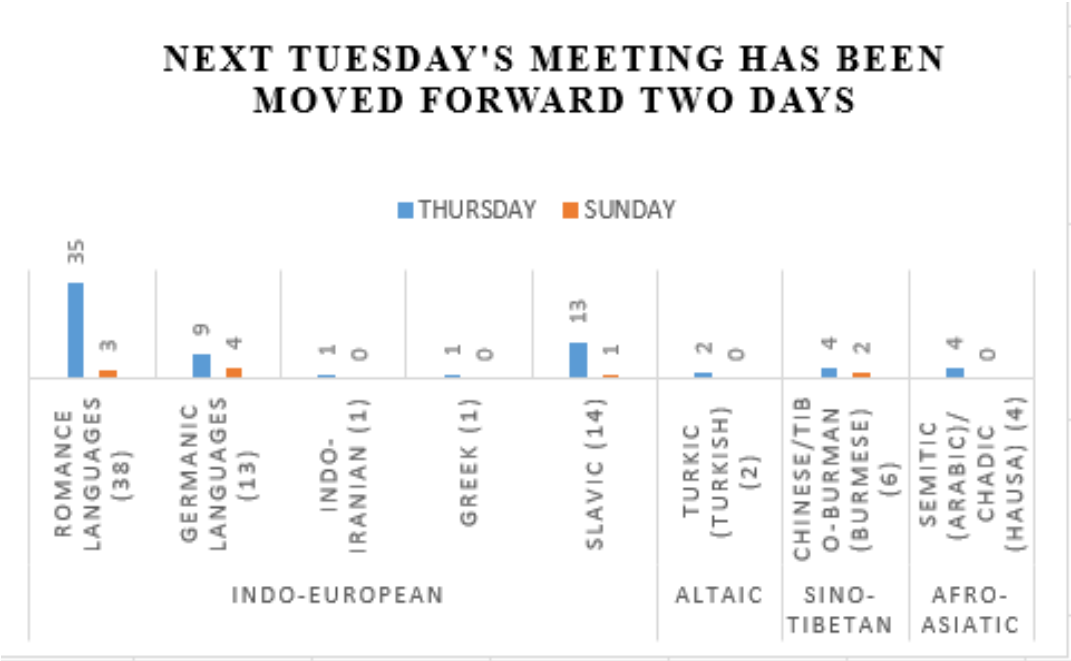
## Appendix F

**Figure 4.** *Time representation of a change of date (I).*



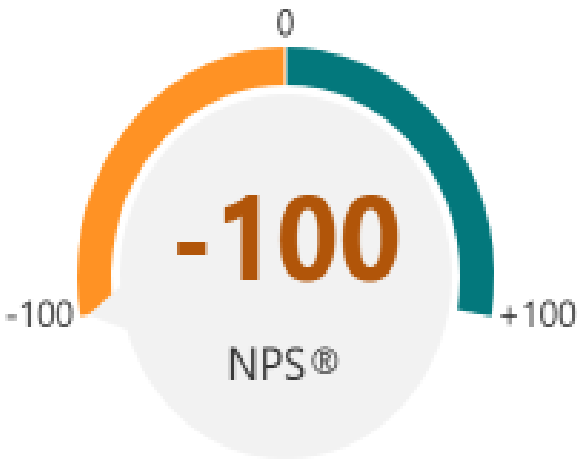
## Appendix G

**Figure 5.** *Time representation of a change of date (II).*



## Appendix H

**Figure 6.** *Placement representation of the past.*

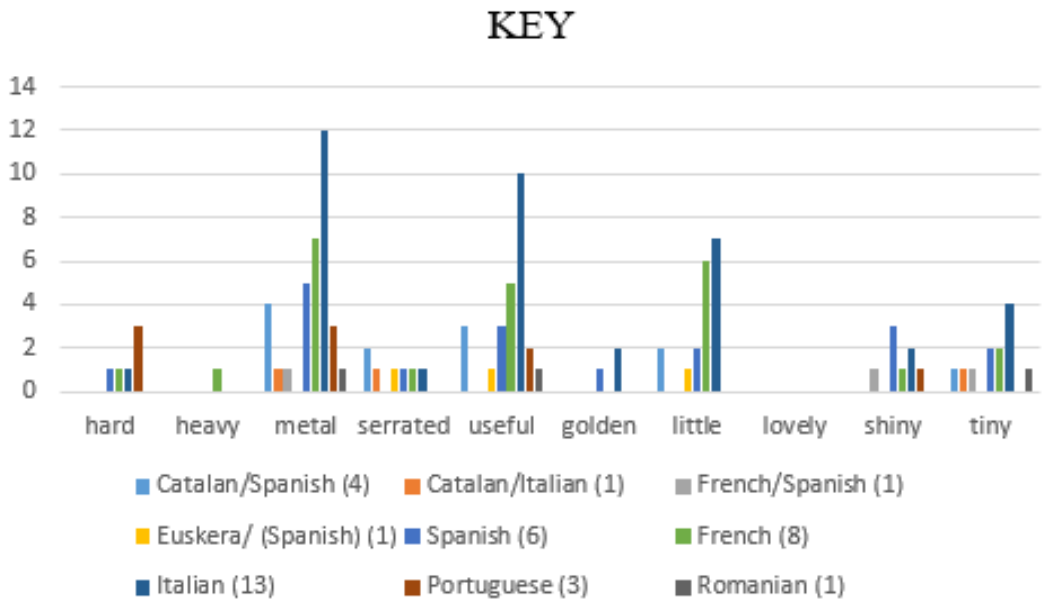


## Appendix I

**Figure 7.** *Placement representation of the future.*

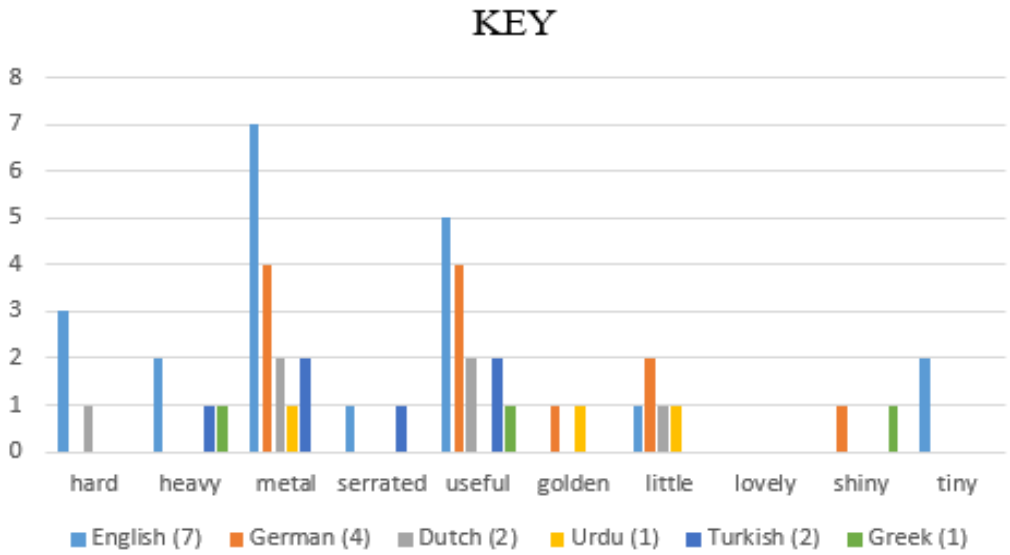
## Appendix J

**Figure 8.** *Adjectival representation of key (I).*



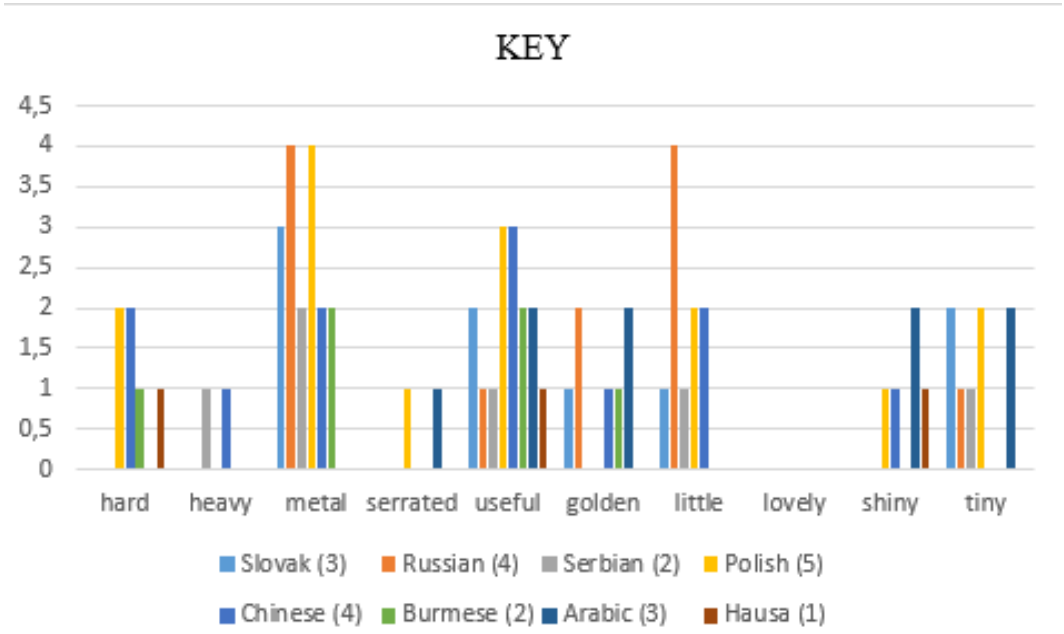
## Appendix K

**Figure 9.** *Adjectival representation of key (II).*



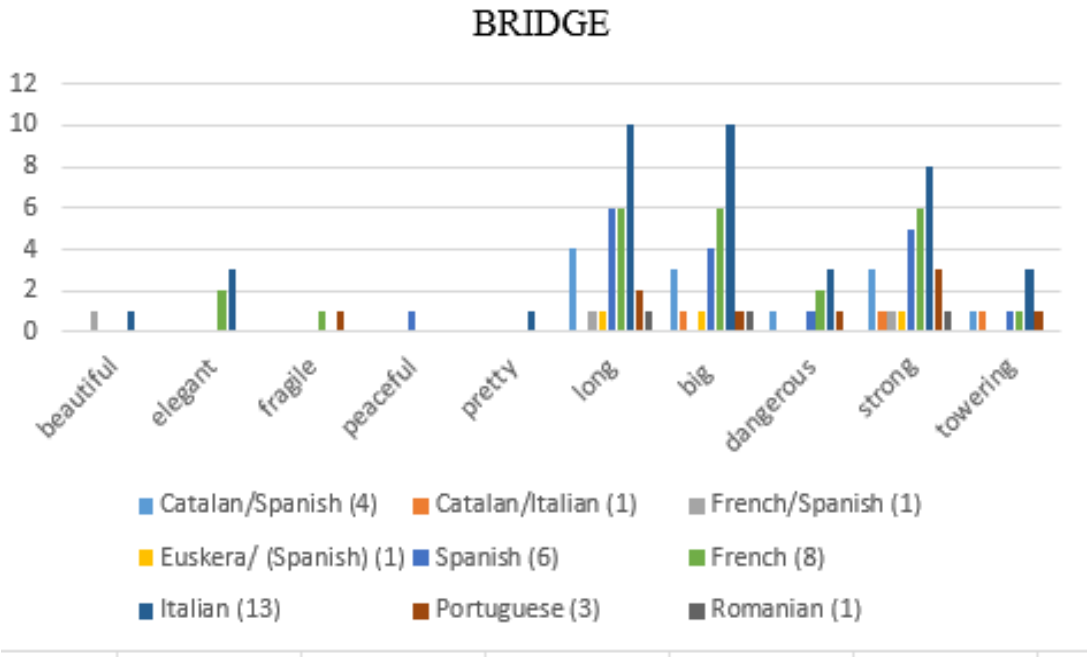
## Appendix L

**Figure 10.** *Adjectival representation of key (III).*



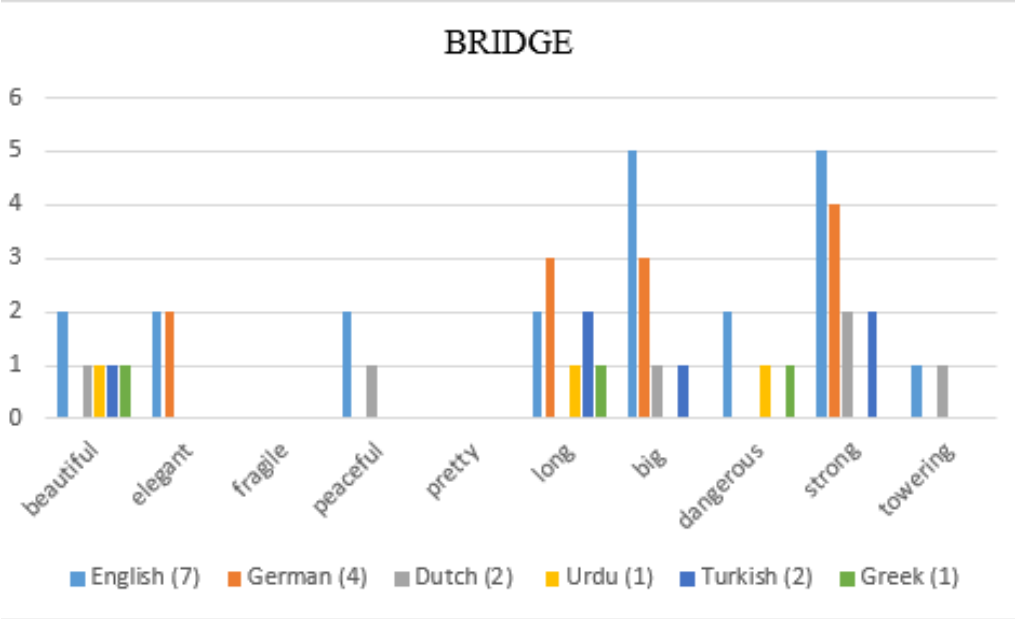
## Appendix M

**Figure 11.** *Adjectival representation of bridge (I).*



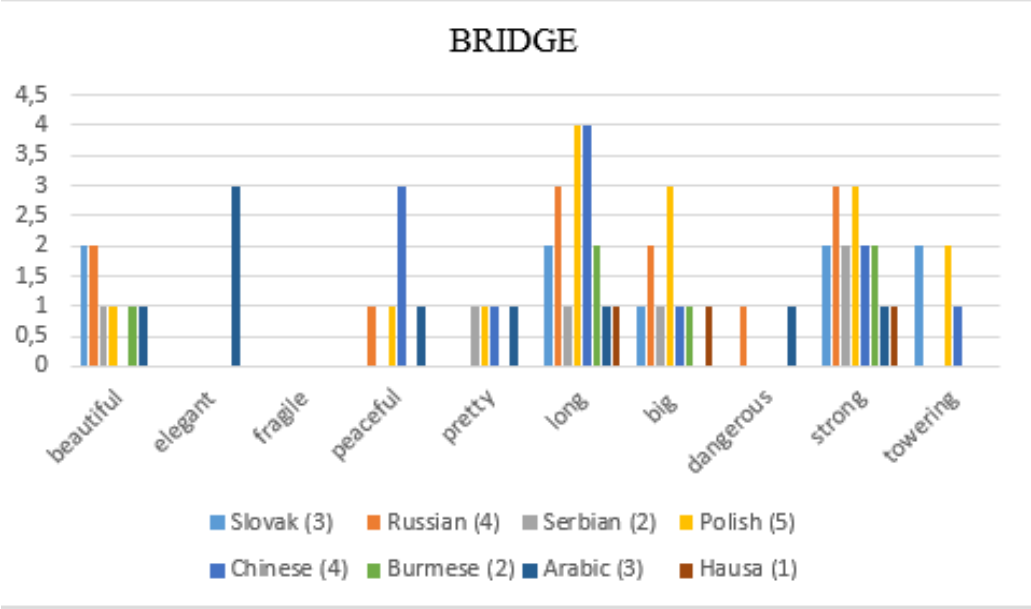
## Appendix N

**Figure 12.** *Adjectival representation of bridge (II).*



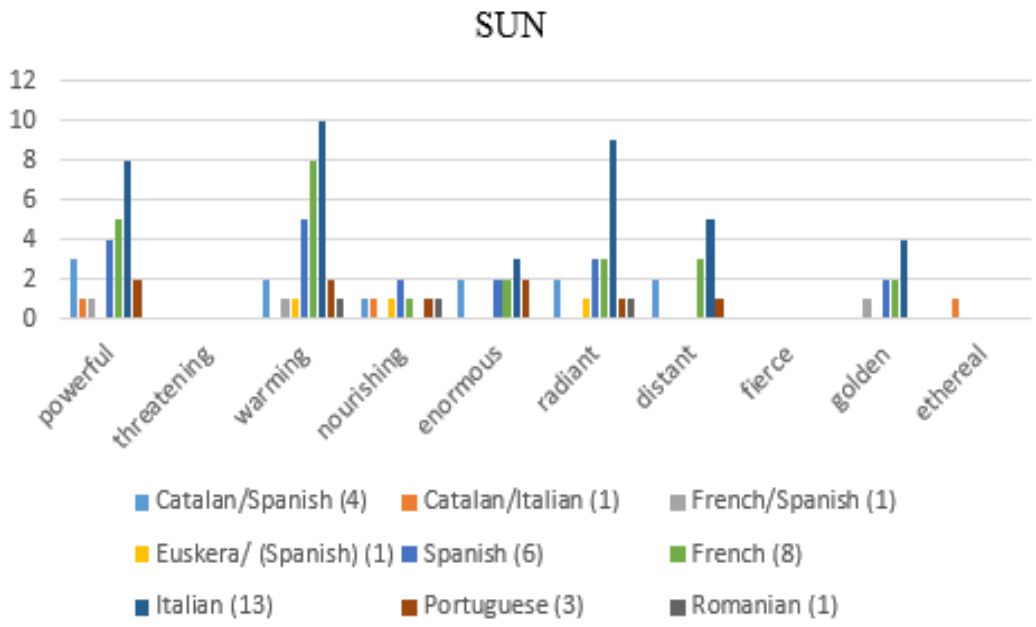
## Appendix O

**Figure 13.** *Adjectival representation of bridge (III).*



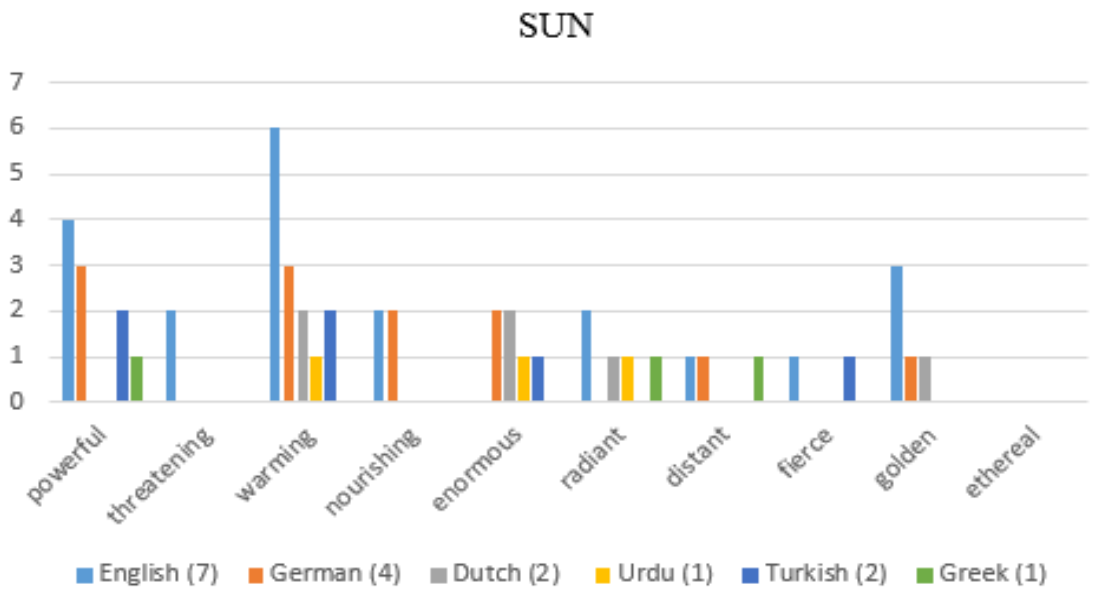
## Appendix P

**Figure 14.** *Adjectival representation of sun (I).*



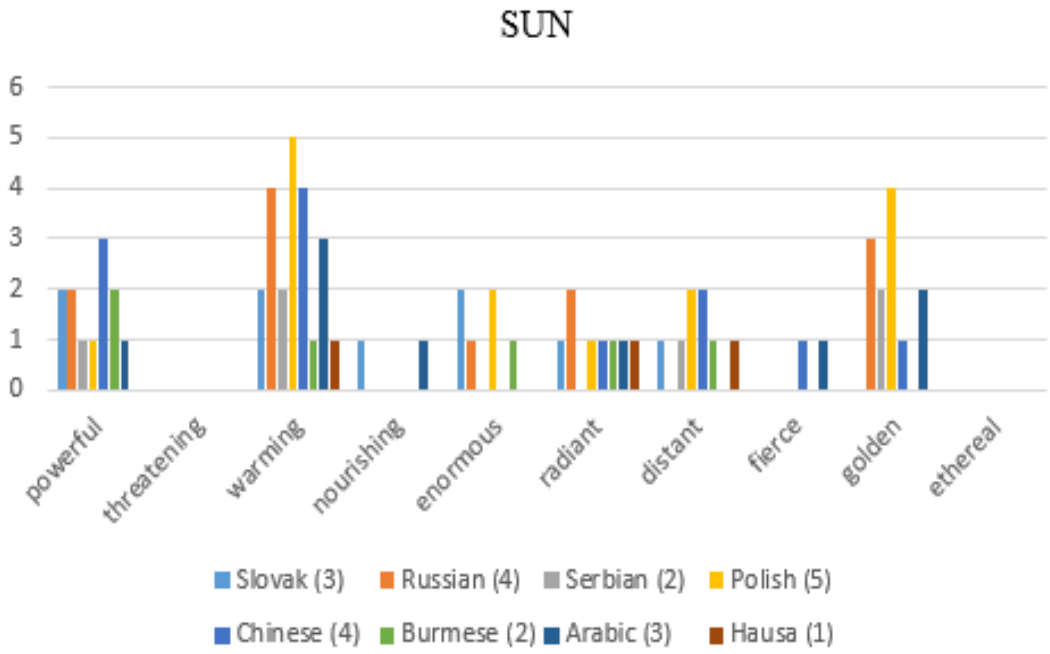
## Appendix Q

**Figure 15.** *Adjectival representation of sun (II).*



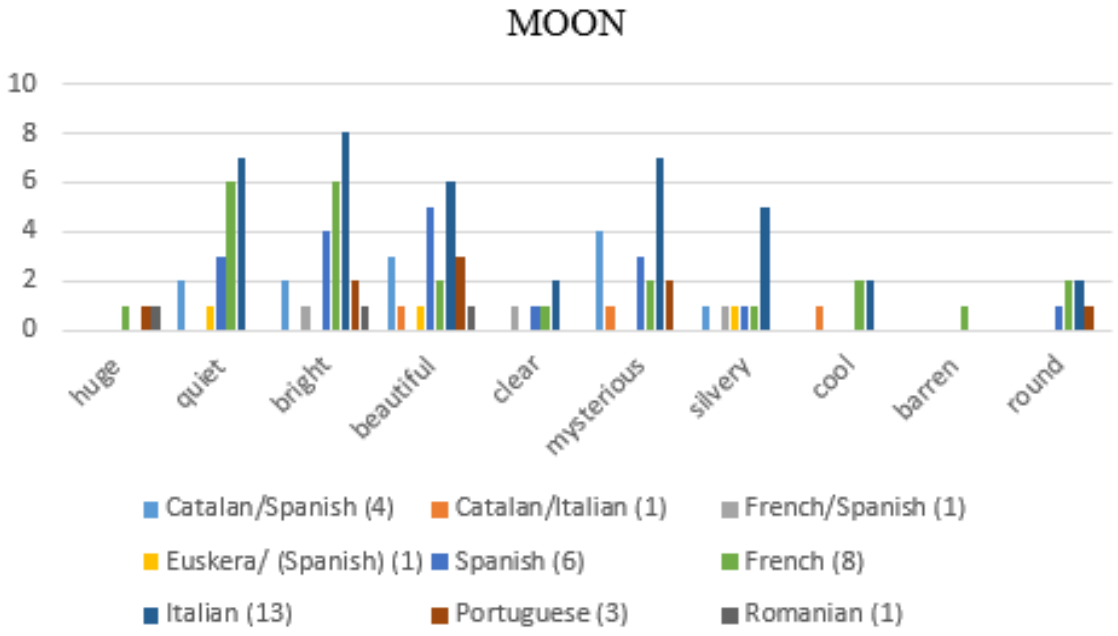
## Appendix R

**Figure 16.** *Adjectival representation of sun (III).*



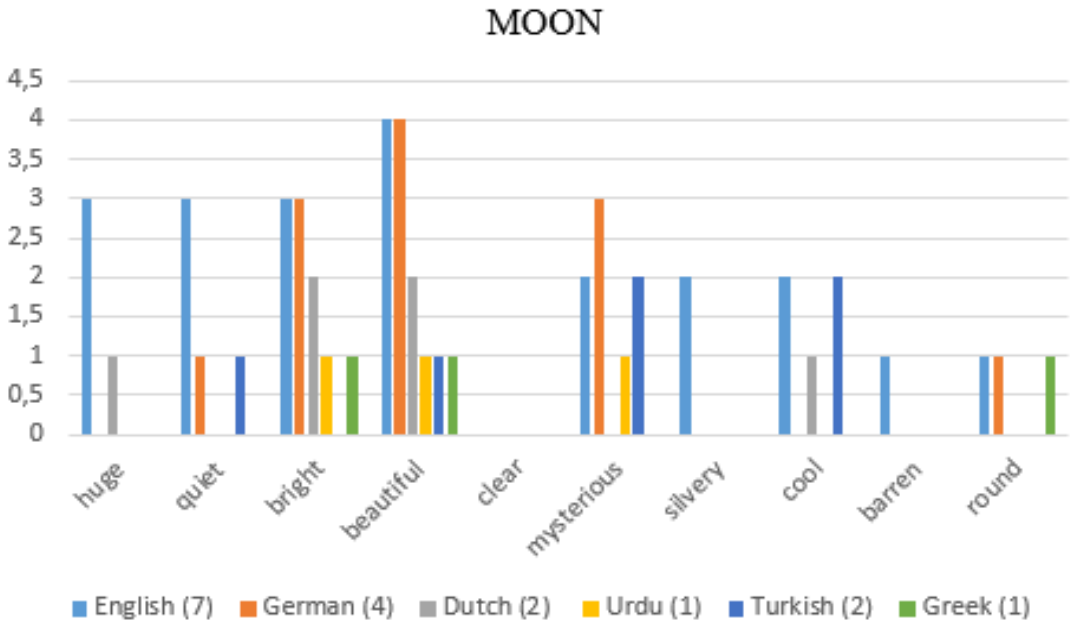
## Appendix S

**Figure 17**. *Adjectival representation of moon (I).*



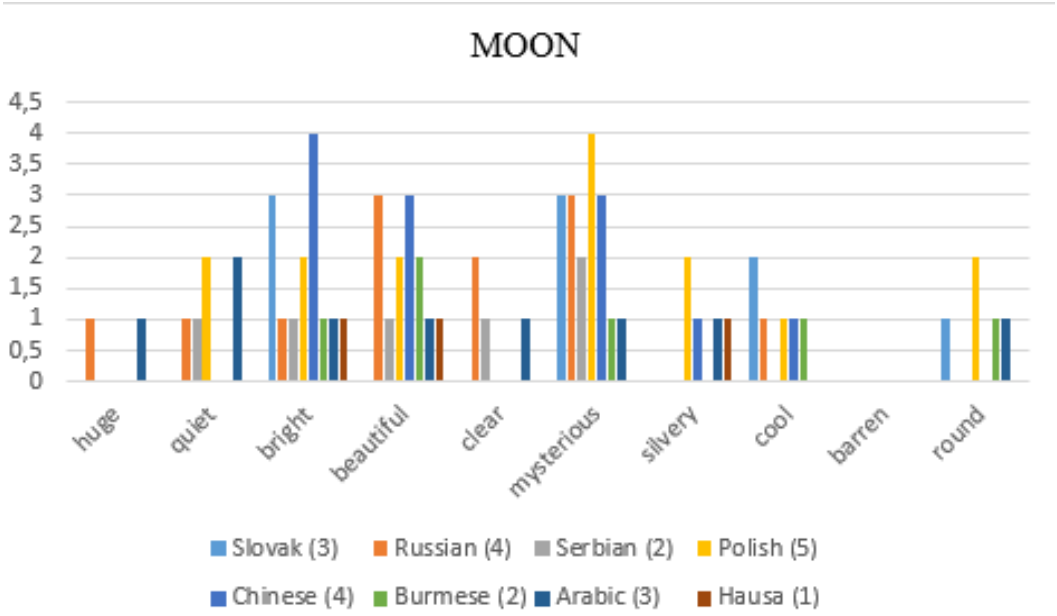
## Appendix T

**Figure 18.** *Adjectival representation of moon (II).*



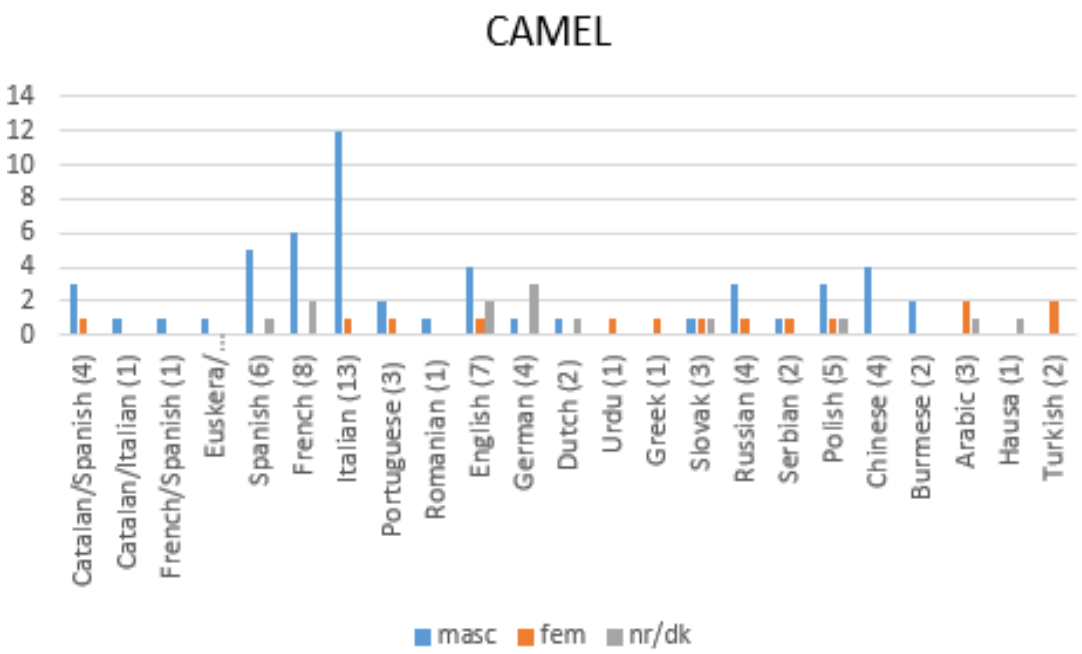
## Appendix U

**Figure 19.** *Adjectival representation of moon (III).*



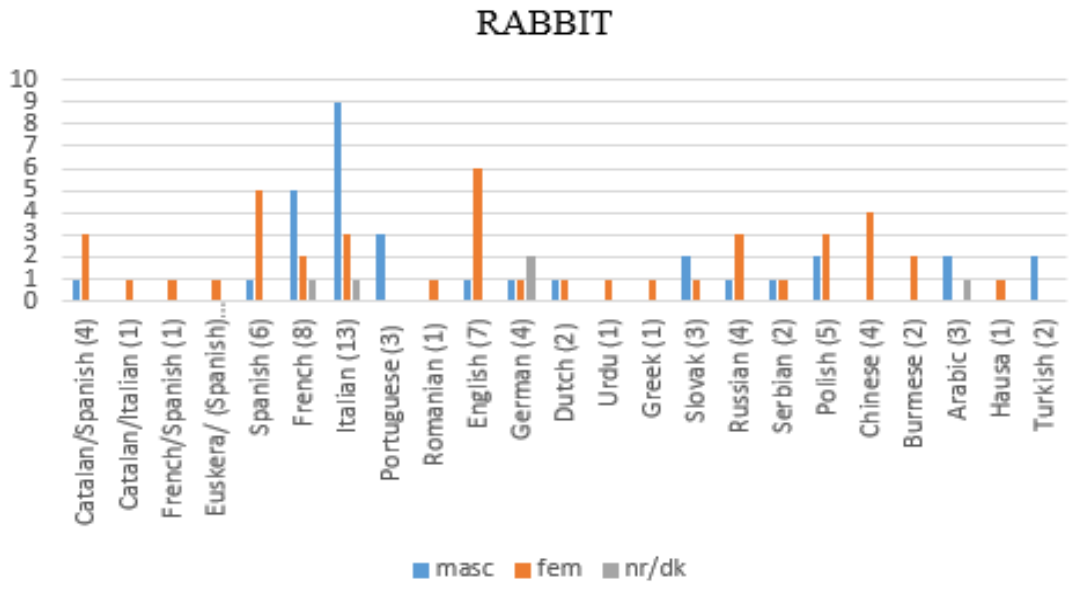
## Appendix V

**Figure 20.** *Gender representation of camel.*



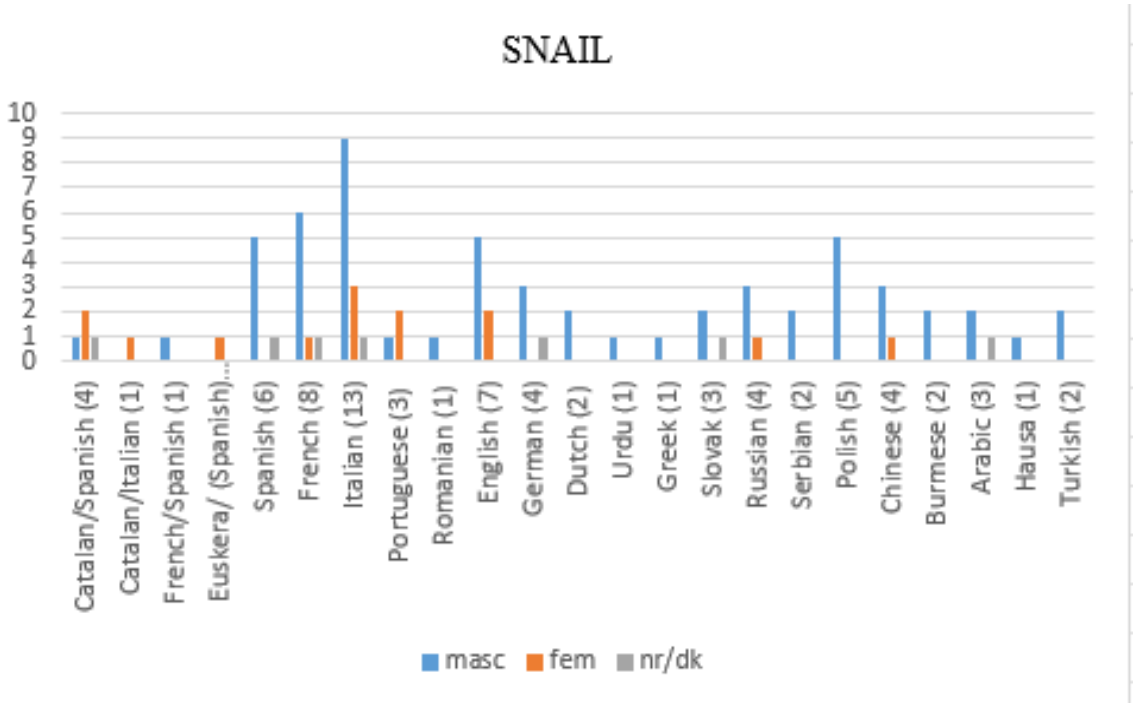
## Appendix W

**Figure 21**. *Gender representation of rabbit.*



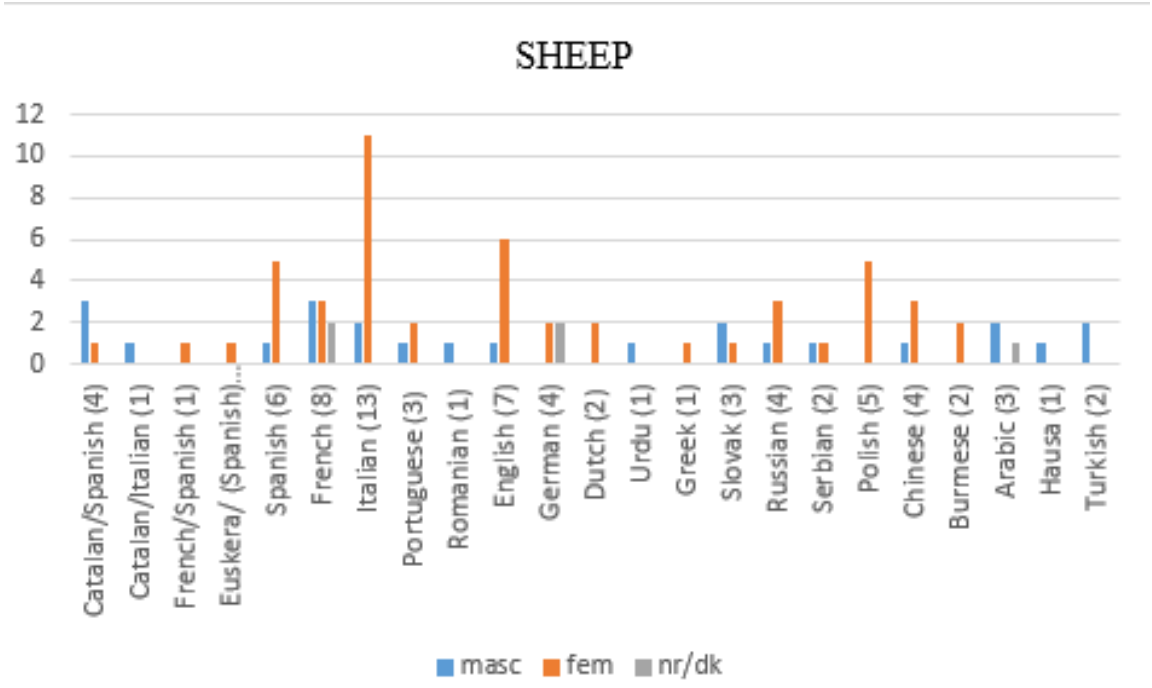
## Appendix X

**Figure 22.** *Gender representation of snail.*



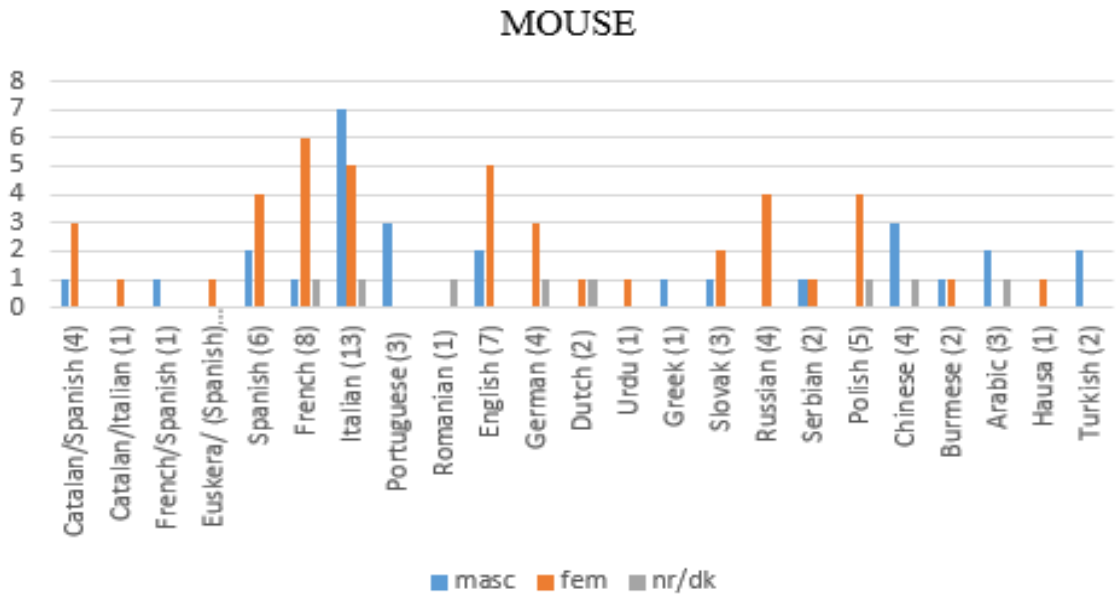
## Appendix Y

**Figure 23.** *Gender representation of sheep.*



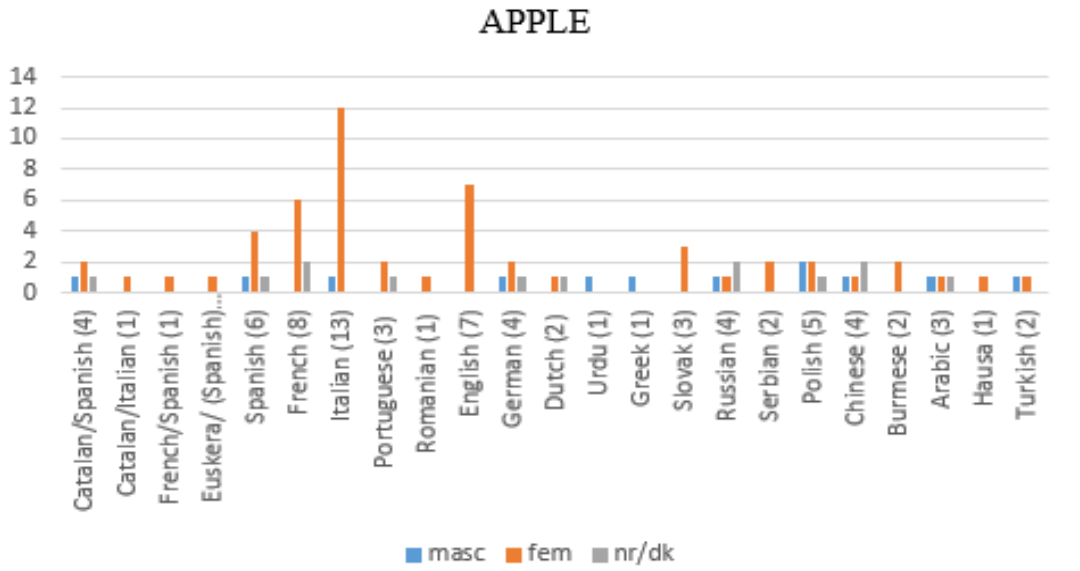
## Appendix Z

**Figure 24.** *Gender representation of mouse.*



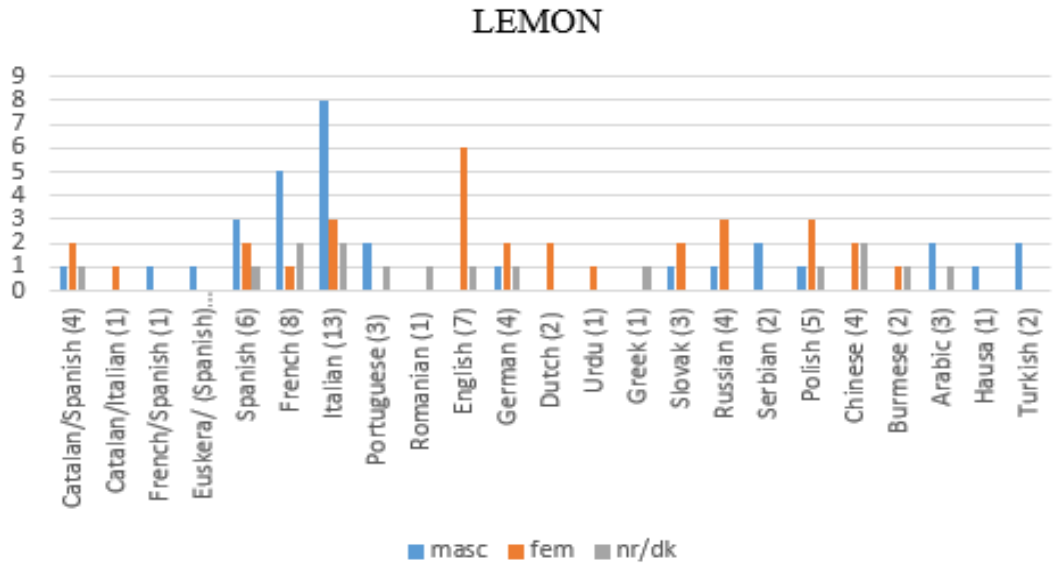
## Appendix AA

**Figure 25**. *Gender representation of apple.*



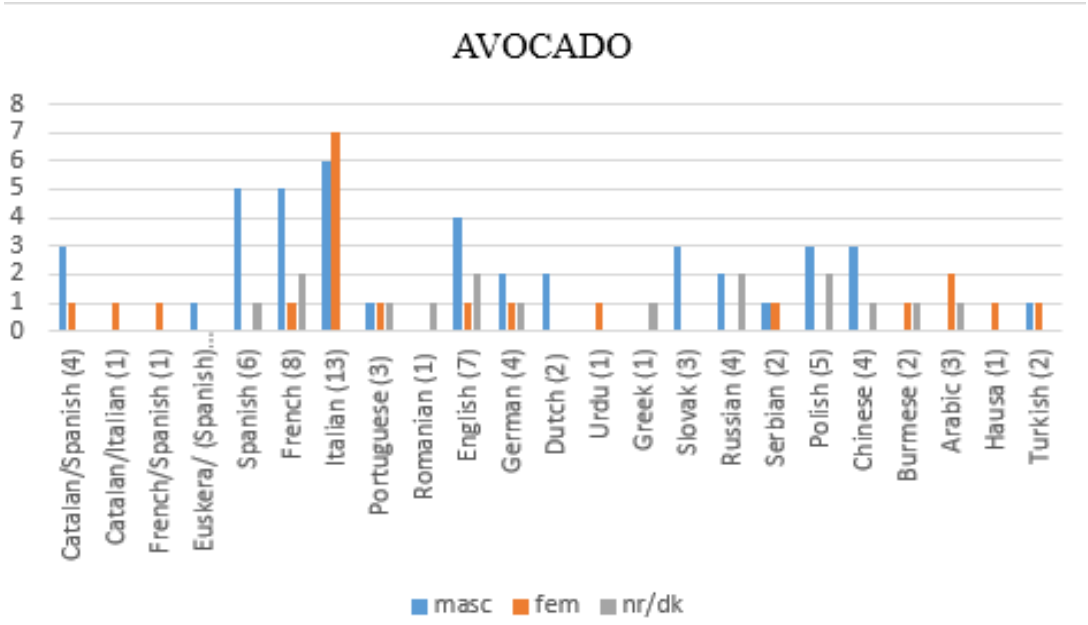
## Appendix BB

**Figure 26.** *Gender representation of lemon.*



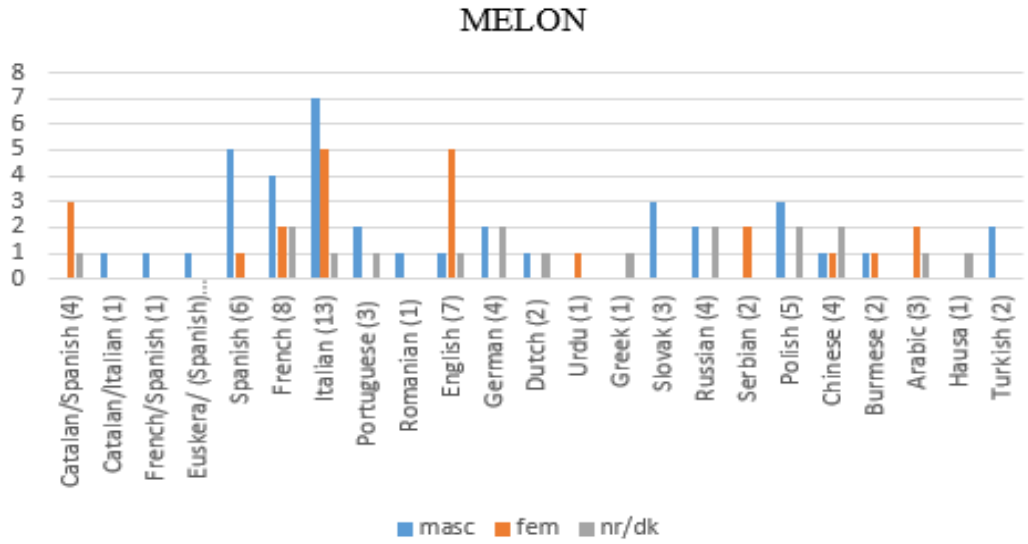
## Appendix CC

**Figure 27.** *Gender representation of avocado.*



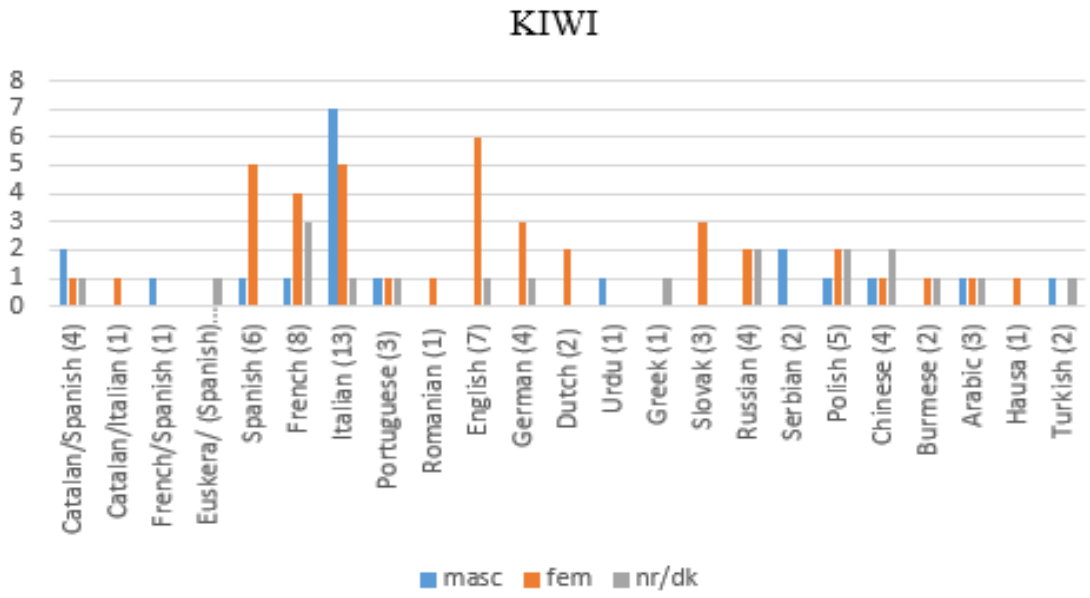
## Appendix DD

**Figure 28.** *Gender representation of melon.*



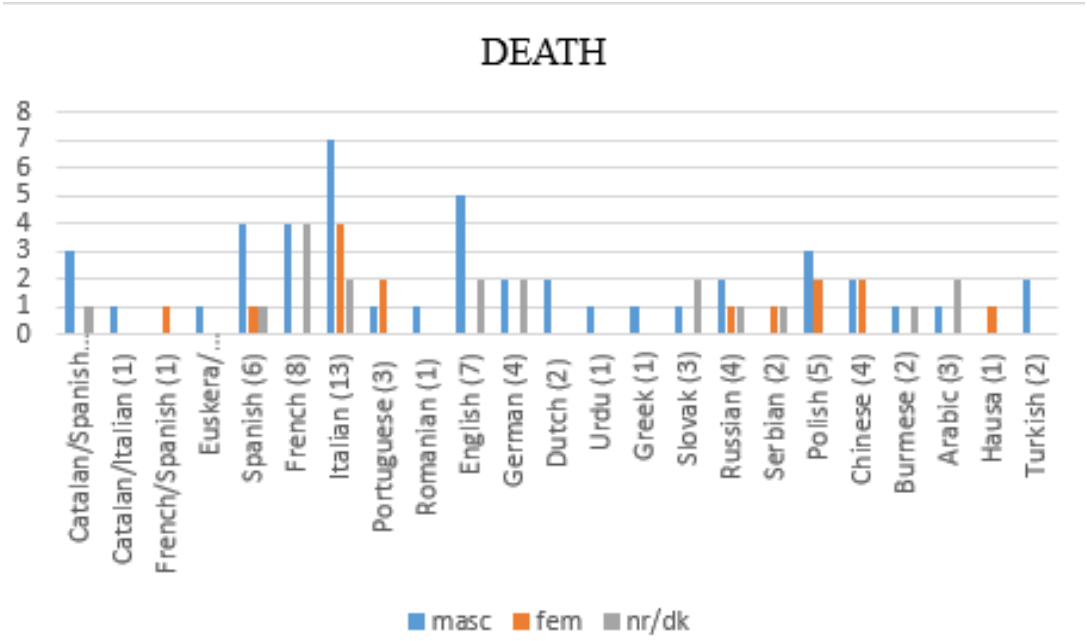
## Appendix EE

**Figure 29.** *Gender representation of kiwi.*



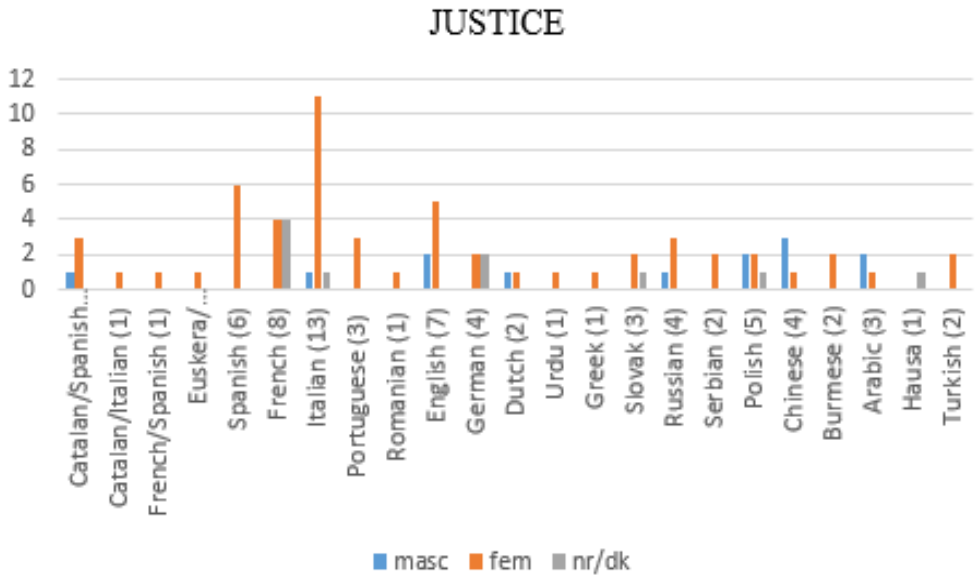
## Appendix FF

**Figure 30.** *Gender representation of death.*



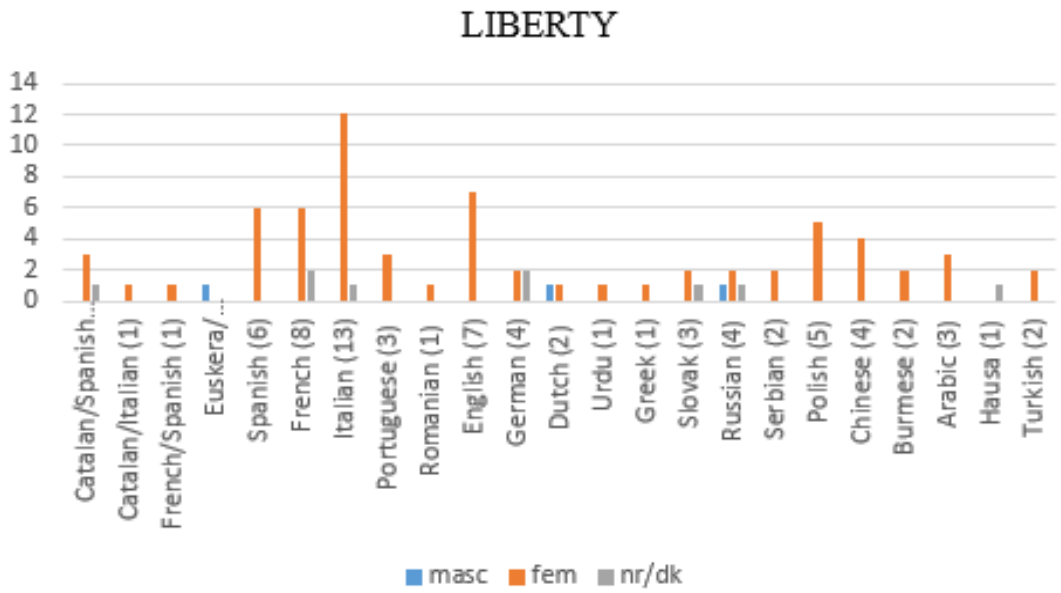
## Appendix GG

**Figure 31.** *Gender representation of justice.*



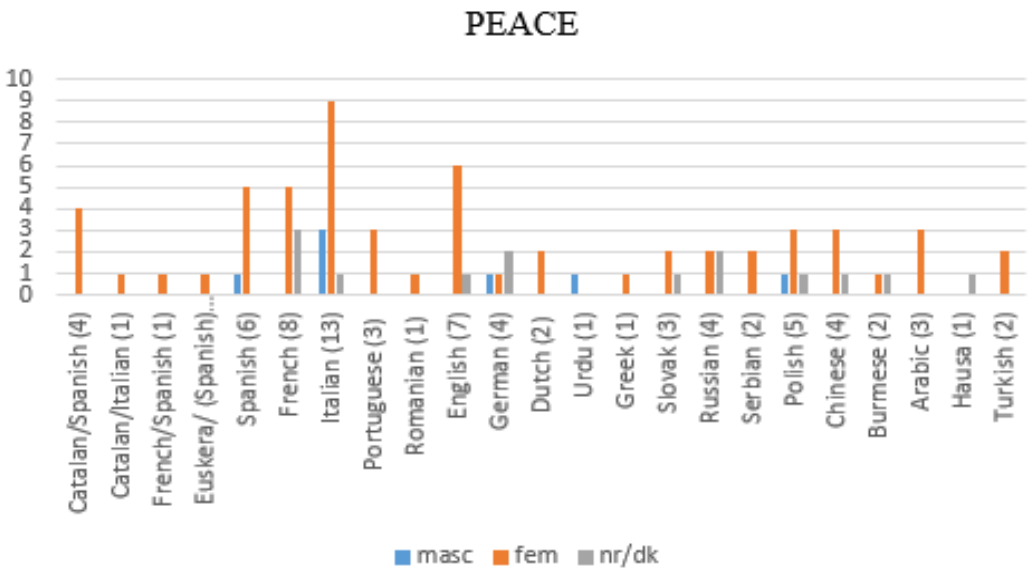
## Appendix HH

**Figure 32.** *Gender representation of liberty.*



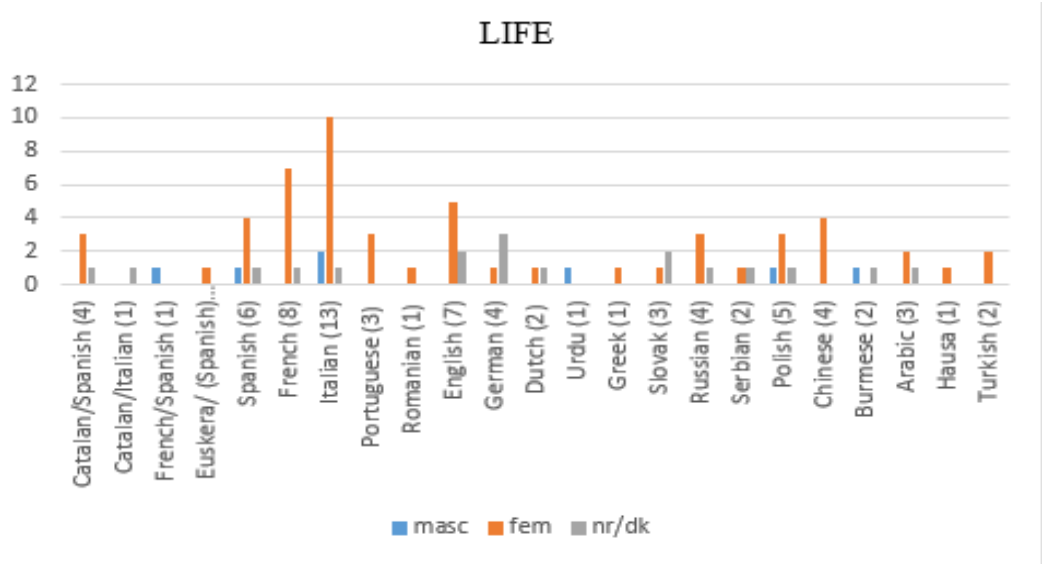
## Appendix II

**Figure 33.** *Gender representation of peace.*



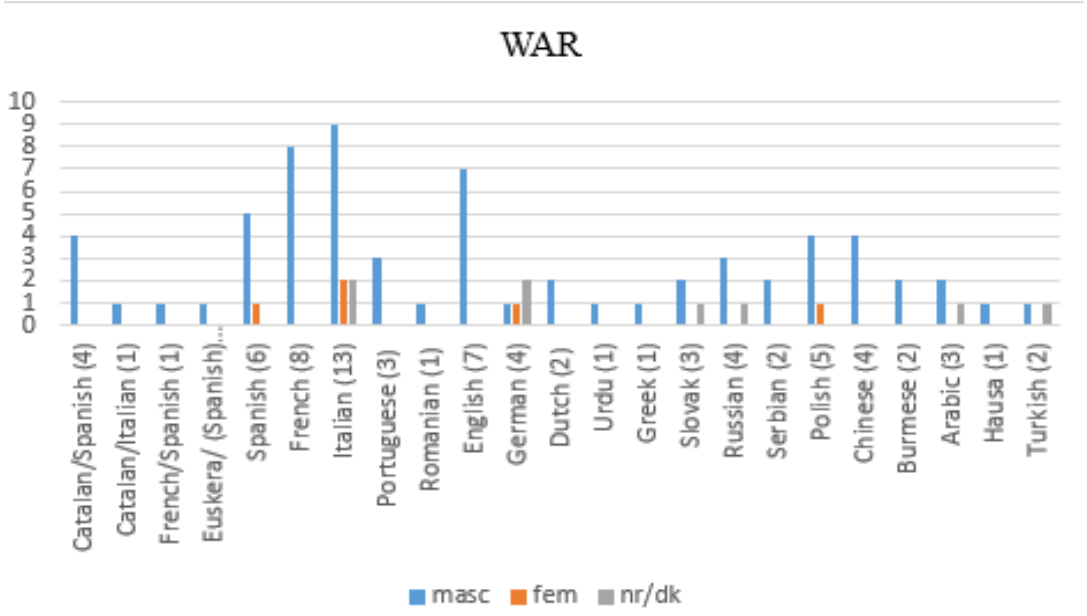
## Appendix JJ

**Figure 34.** *Gender representation of life.*



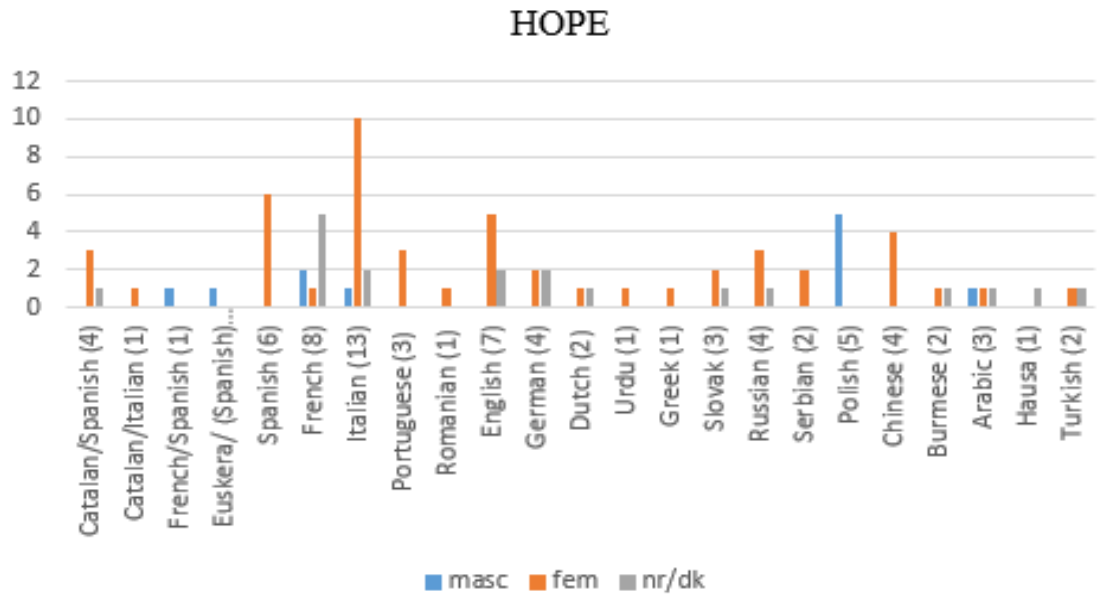
## Appendix KK

**Figure 35.** *Gender representation of war.*



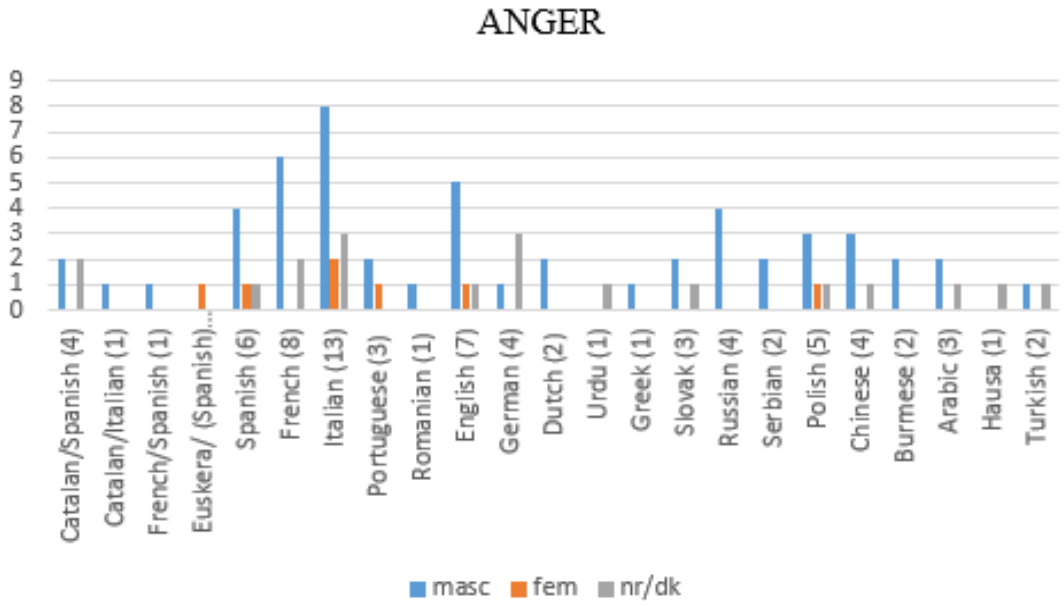
## Appendix LL

**Figure 36.** *Gender representation of hope.*



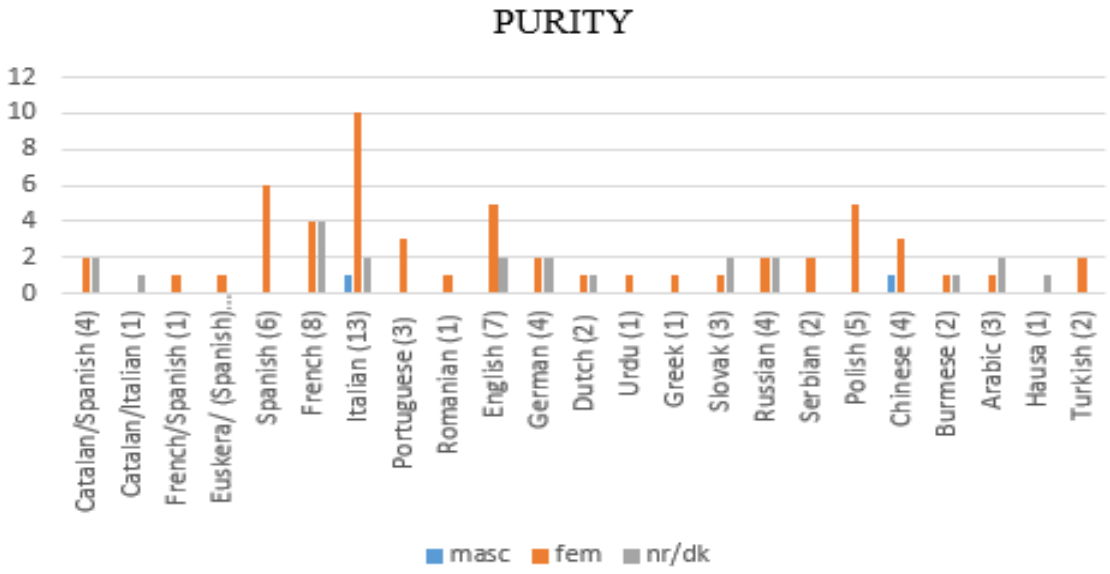
## Appendix MM

**Figure 37.** *Gender representation of anger.*



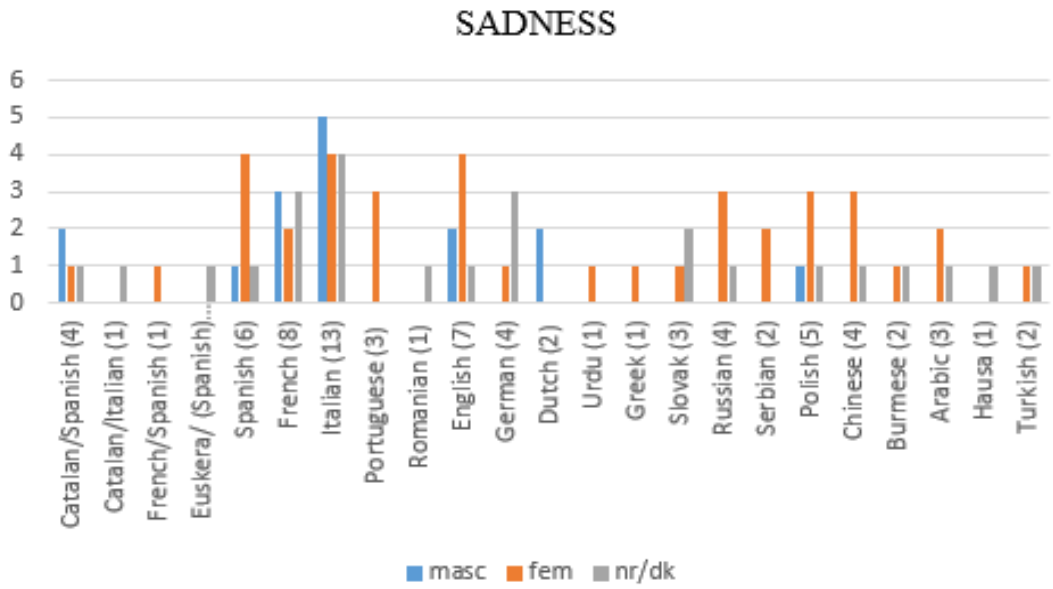
## Appendix NN

**Figure 38.** *Gender representation of purity.*



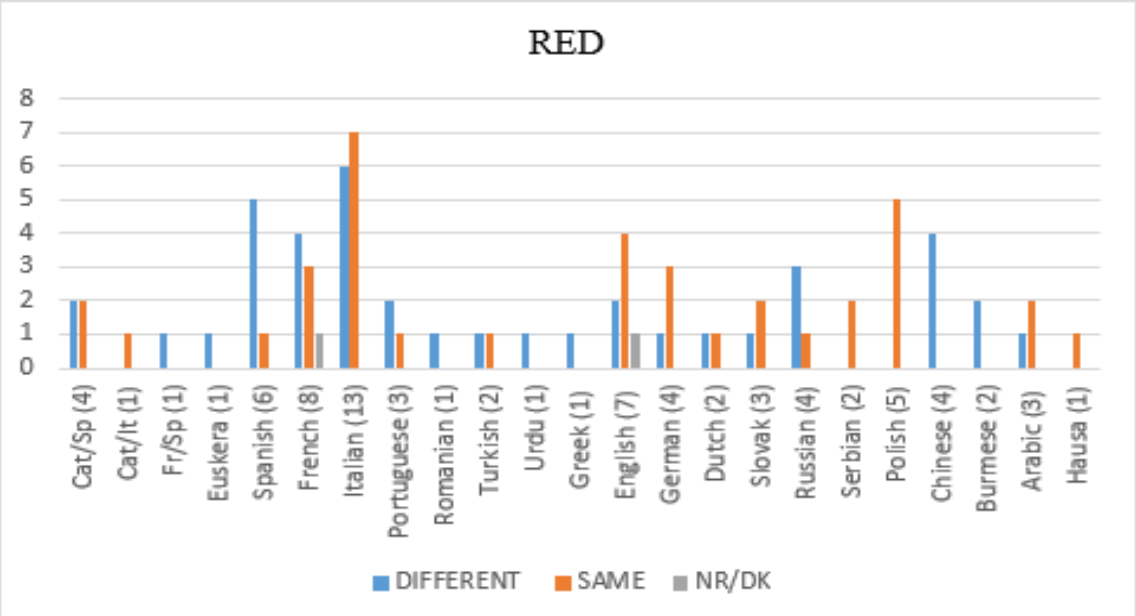
## Appendix OO

**Figure 39.** *Gender representation of sadness.*



## Appendix PP

**Figure 40.** *Colour representation of red.*



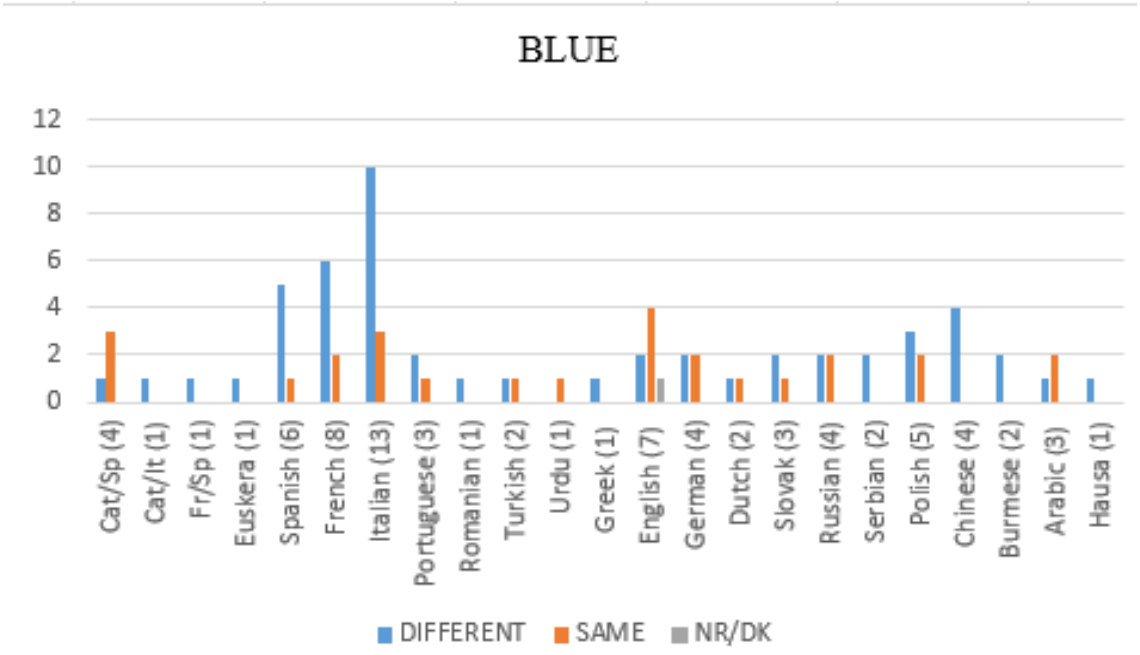
## Appendix QQ

**Table 2.** *Colour names for red.*

| NAMES | LANGUAGES |
|---|---|
| Red | Catalan/Italian; Serbian; Polish; Hausa |
| Light/Dark red | Euskera; Spanish; French; Italian; Romanian; Turkish; English; German; Dutch; Slovak; Chinese |
| Burgundy | Catalan/Spanish; Spanish; French; Italian; Portuguese; Greek; English |
| Bordo | Russian |
| Scarlet | French/Spanish; Russian |
| Maroon | Spanish; Urdu; English; Burmese |
| Wine | Spanish |
| Bordeaux | French; Italian |
| Carmine | Burmese |
| Mahogany | Arabic |
| Magenta | Italian |
| Crimson | English |
| Garnet | Chinese |
| Reddish-brown | Spanish |
| Orange-red | Urdu |

## Appendix RR

**Figure 41.** *Colour representation of blue.*



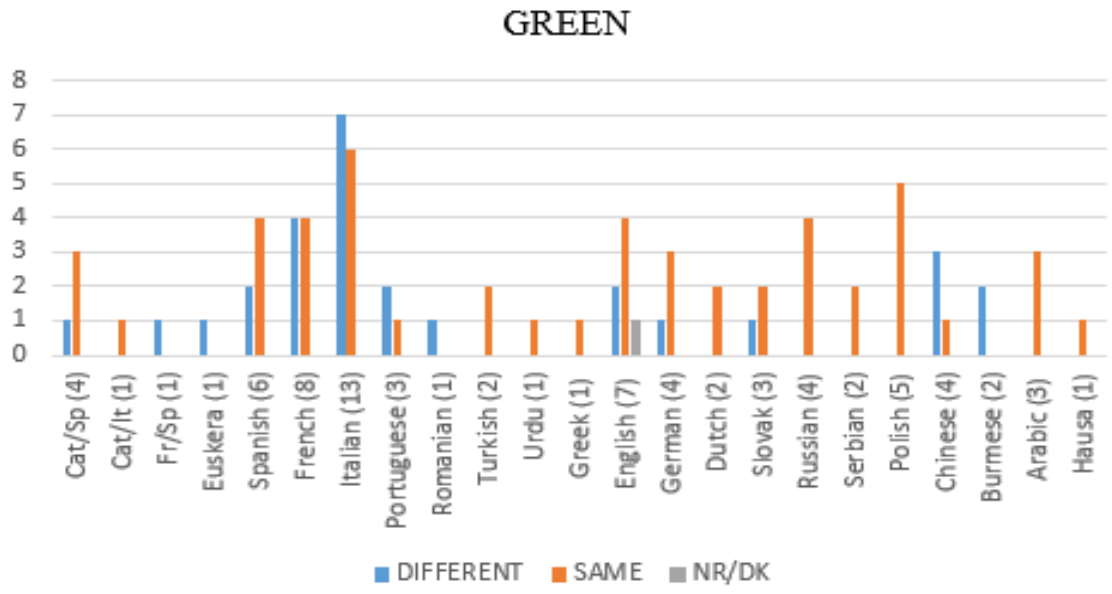
## Appendix SS

**Table 3.** *Colour names for blue.*

| NAMES | LANGUAGES |
|---|---|
| Blue | Catalan/Spanish; Dutch |
| Light/Dark blue | Catalan/Italian; Euskera; French; Italian; Romanian; Turkish; English; German; Russian; Chinese; Burmese |
| Sky blue | French/Spanish; Italian; Burmese |
| Navy blue | French/Spanish; French; Portuguese; Polish |
| Magenta | Euskera |
| Lila/lilac | Spanish; Italian; English |
| Baby blue | Spanish |
| Purple | Spanish; French; Greek; English; German; Slovak; Russian; Serbian; Polish; Chinese; Arabic; Hausa |
| Aubergine | Spanish |
| Cyan blue | Spanish |
| Indigo blue | Spanish; Italian; Slovak |
| Violet | Italian; Polish |
| Royal blue | Urdu; English |
| Aqua blue | Urdu |
| Periwinkle | English |
| Ocean blue | Burmese |

## Appendix TT

**Figure 42.** *Colour representation of green.*



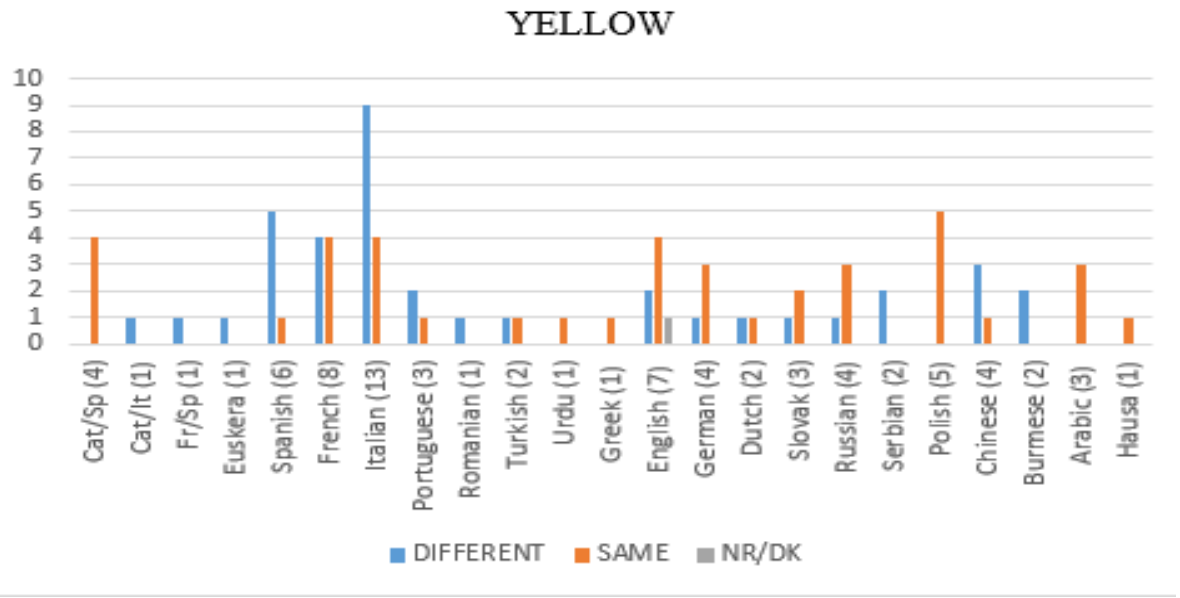
## Appendix UU

**Table 4.** *Colour names for green.*

| NAMES | LANGUAGES |
|---|---|
| Green | Catalan/Spanish; Catalan/Italian; Turkish; Urdu; Greek; Dutch; Russian; Serbian; Polish; Arabic; Hausa |
| Light/dark green | Euskera; Spanish; French; Italian; Romanian; English; German; Slovak; Chinese; Burmese |
| Forest green | French/Spanish |
| Olive green | French/Spanish; Portuguese |
| Flag green | Spanish |
| Apple green | Spanish |
| Bottle green | Italian |
| Moss | English |
| Avocado | English |
| Lime green | English |
| Grass green | Chinese |

## Appendix VV

**Figure 43.** *Colour representation of yellow.*



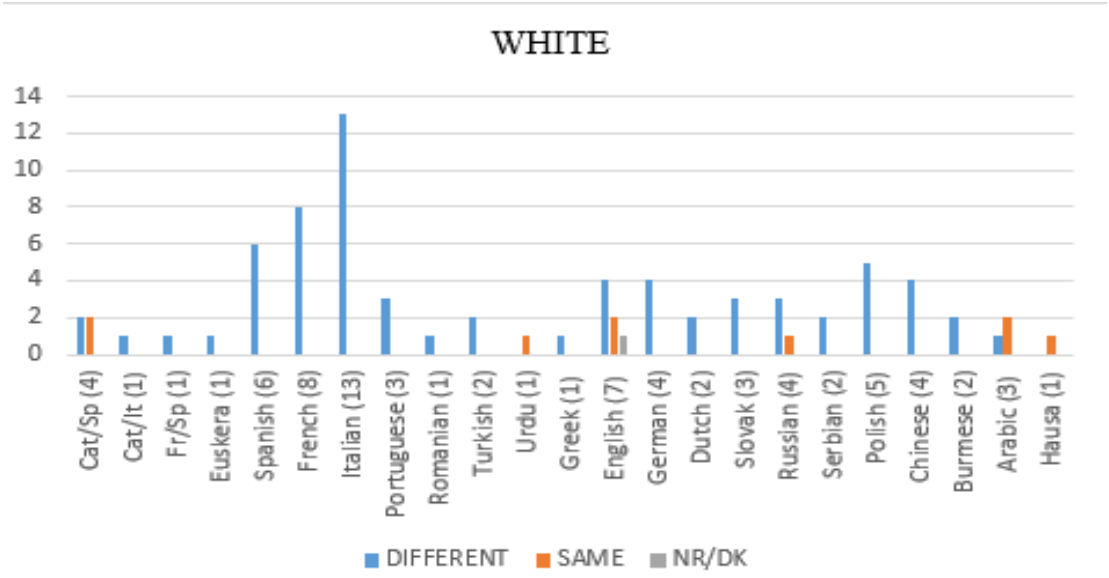
## Appendix WW

**Table 5.** *Colour names for yellow.*

| NAMES | LANGUAGES |
|---|---|
| Yellow | Catalan/Spanish; Euskera; Greek; Polish; Arabic; Hausa |
| Light/dark yellow | French; Italian; English; German; Chinese; Burmese |
| (light/dark) Orange | Catalan/Italian; Spanish; French; Italian; Turkish; English; Slovak; Russian |
| Lemon yellow | French/Spanish; Spanish |
| Buff | French/Spanish |
| Mustard yellow | Euskera; Spanish; Portuguese; Urdu; English |
| Egg yellow | Spanish |
| Gold | Spanish; Italian; Dutch |
| Ocra/Ochre | Italian; Serbian |
| Senape | Italian |
| Canary yellow | Italian |
| Melon yellow | Italian |
| Fluorescent yellow | Romanian |
| Orangy yellow | Romanian |
| Marigold | English |
| Egg york | Burmese |

## Appendix XX

**Figure 44.** *Colour representation of white.*



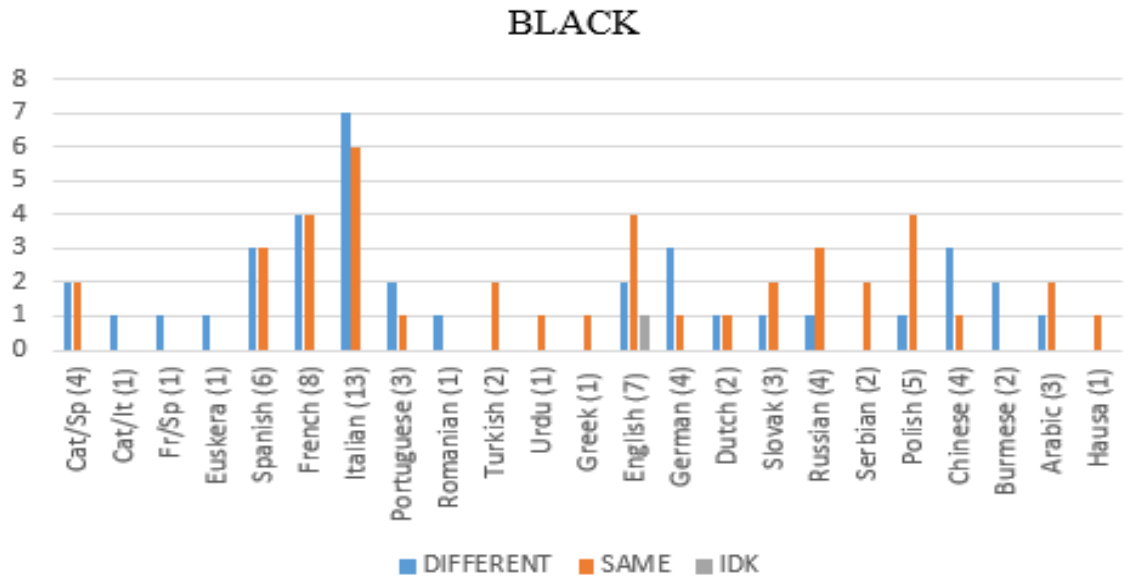
## Appendix YY

**Table 6.** *Colour names for white.*

| NAMES | LANGUAGES |
|---|---|
| White | Catalan/Spanish; Catalan/Italian; French/Spanish; Euskera; Spanish; French; Italian; Portuguese; Romanian; Turkish; Urdu; Greek; English; German; Dutch; Slovak; Russian; Serbian; Polish; Chinese; Burmese; Arabic; Hausa |
| (light) Gray | Catalan/Spanish; Catalan/Italian; French/Spanish; Euskera; Spanish; French; Italian; Portuguese; Turkish; Greek; English; German; Dutch; Slovak; Russian; Serbian; Polish; Chinese; Arabic |
| Dirty white | Romanian |
| Beige | Turkish |
| Greyish white | Urdu |
| Pure | Chinese |
| Pale gray | Chinese |
| Off-white | Hausa |

## Appendix ZZ

**Figure 45.** *Colour representation of black.*



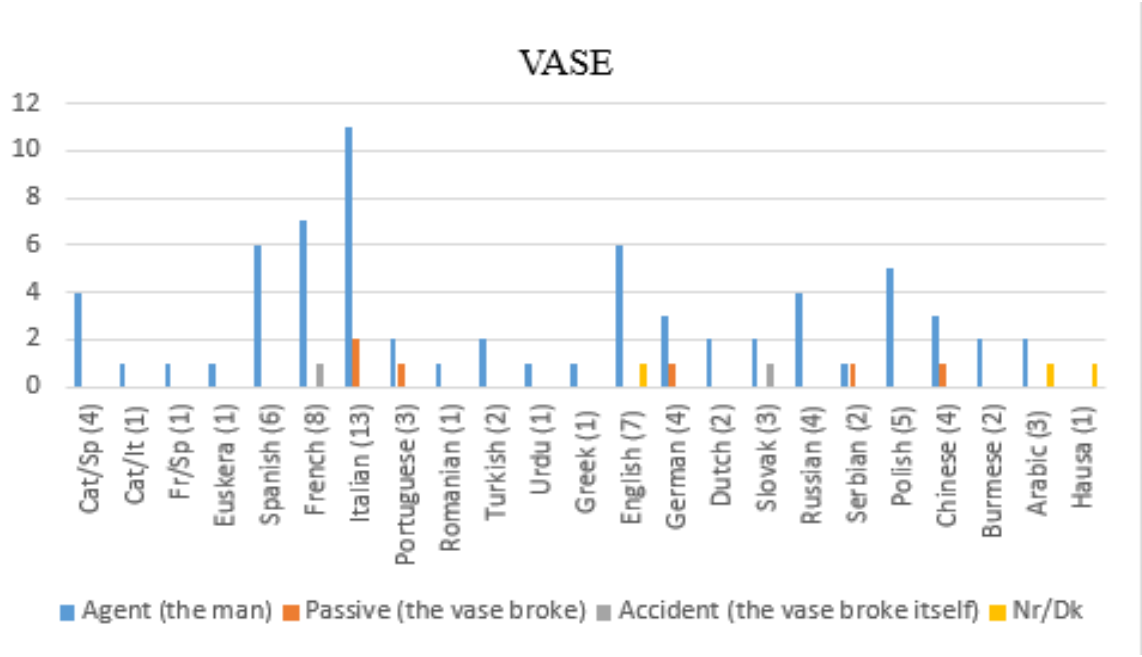
## Appendix AAA

**Table 7.** *Colour names for black.*

| NAMES | LANGUAGES |
|---|---|
| Black | Catalan/Spanish; Catalan/Italian; Spanish; Italian; Portuguese; German; Russian; Polish; Burmese; Arabic |
| (light/dark) gray | Catalan/Spanish; Catalan/Italian; French/Spanish; Euskera; Spanish; French; Italian; Portuguese; Romanian; Turkish; Urdu; Greek; English; German; Dutch; Slovak; Russian; Serbian; Polish; Chinese; Burmese; Arabic; Hausa |
| Charcoal | French/Spanish |
| Granite | English |
| Medium gray | German |

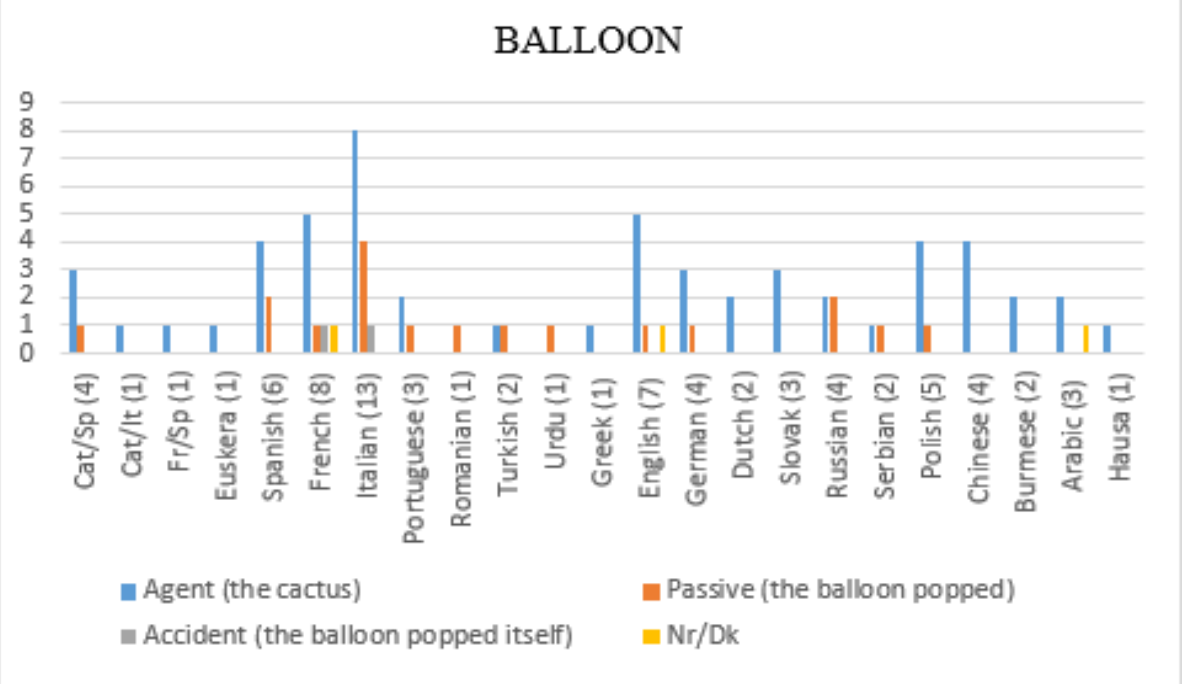
## Appendix BBB

**Figure 46.** *Agentivity in the picture of a vase.*



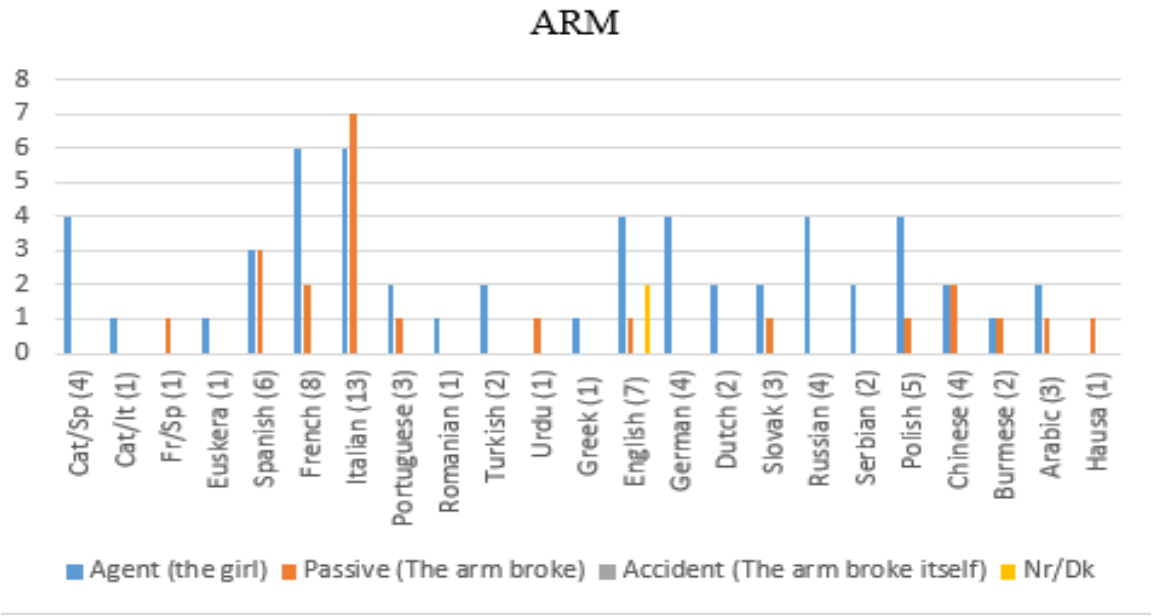
## Appendix CCC

**Figure 47.** *Agentivity in the picture of a balloon.*



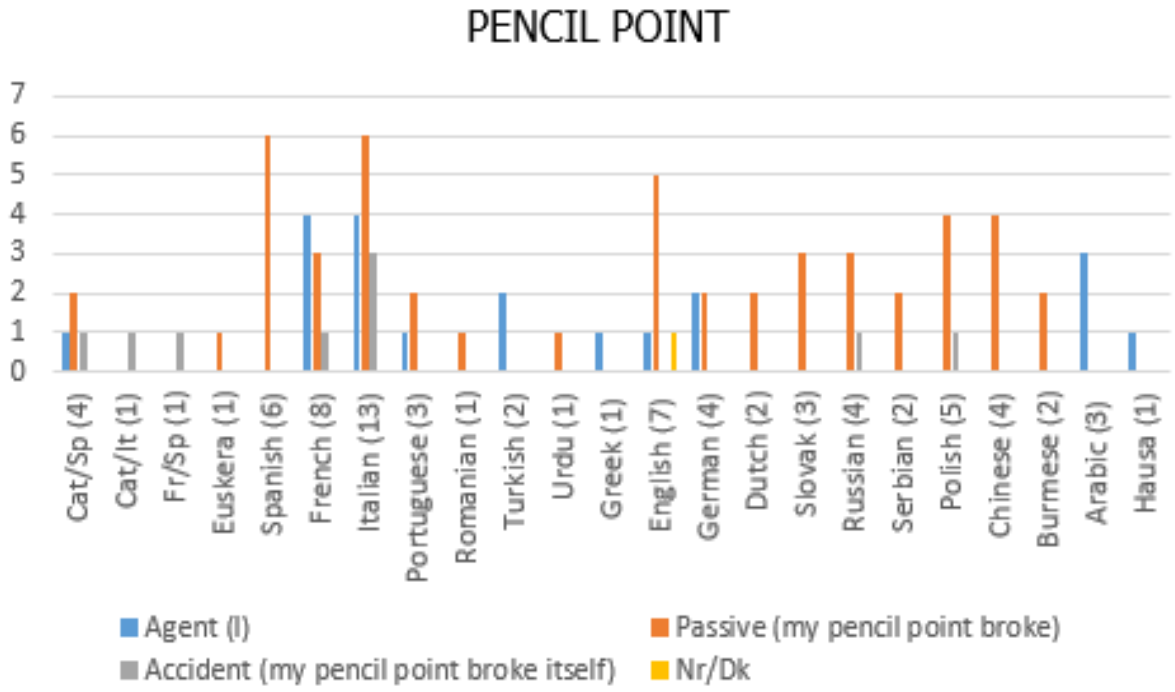
## Appendix DDD

**Figure 48.** *Agentivity in the picture of a broken arm.*



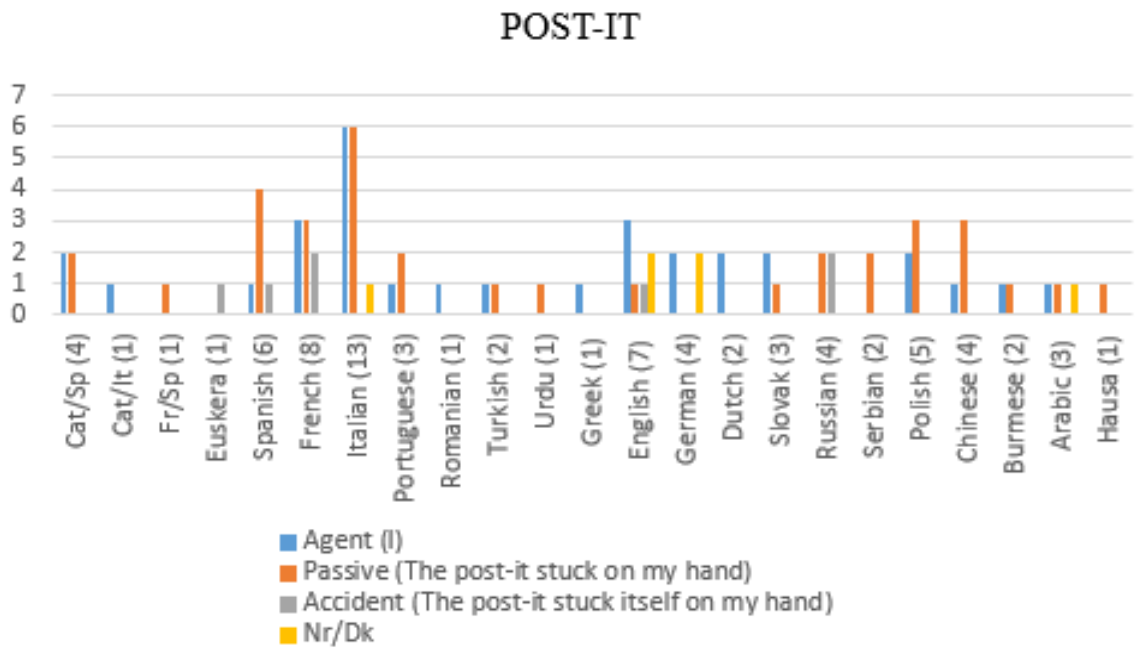
**Appendix EEE**

**Figure 49.** *Agentivity in the picture of a pencil point.*



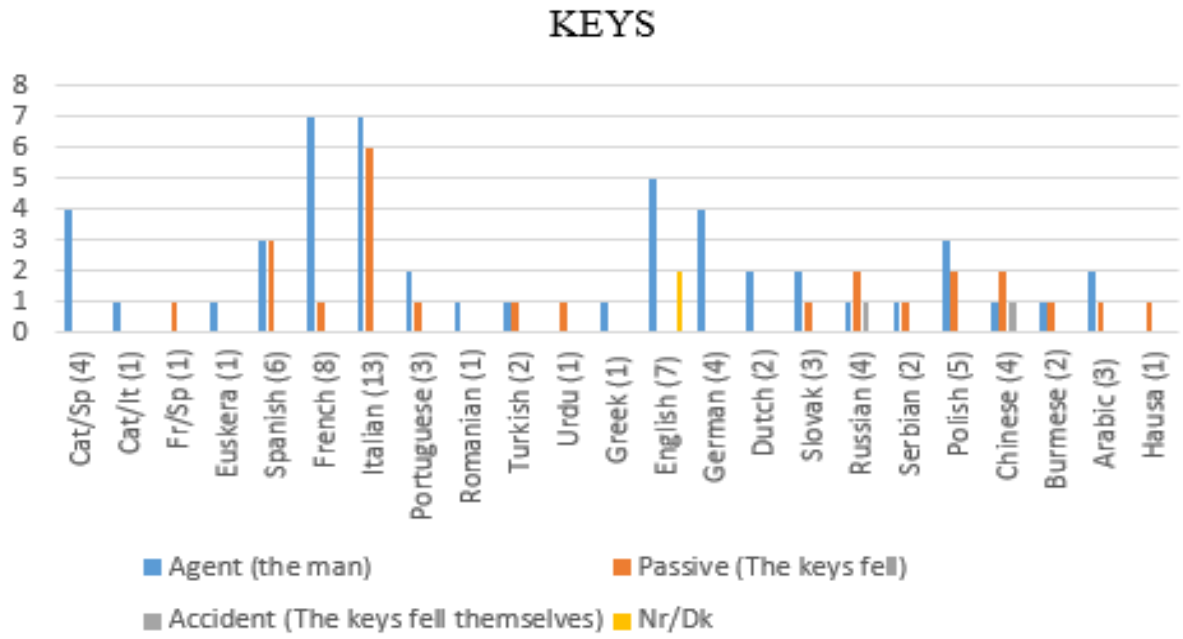
## Appendix FFF

**Figure 50.** *Agentivity in the picture of a post-it.*



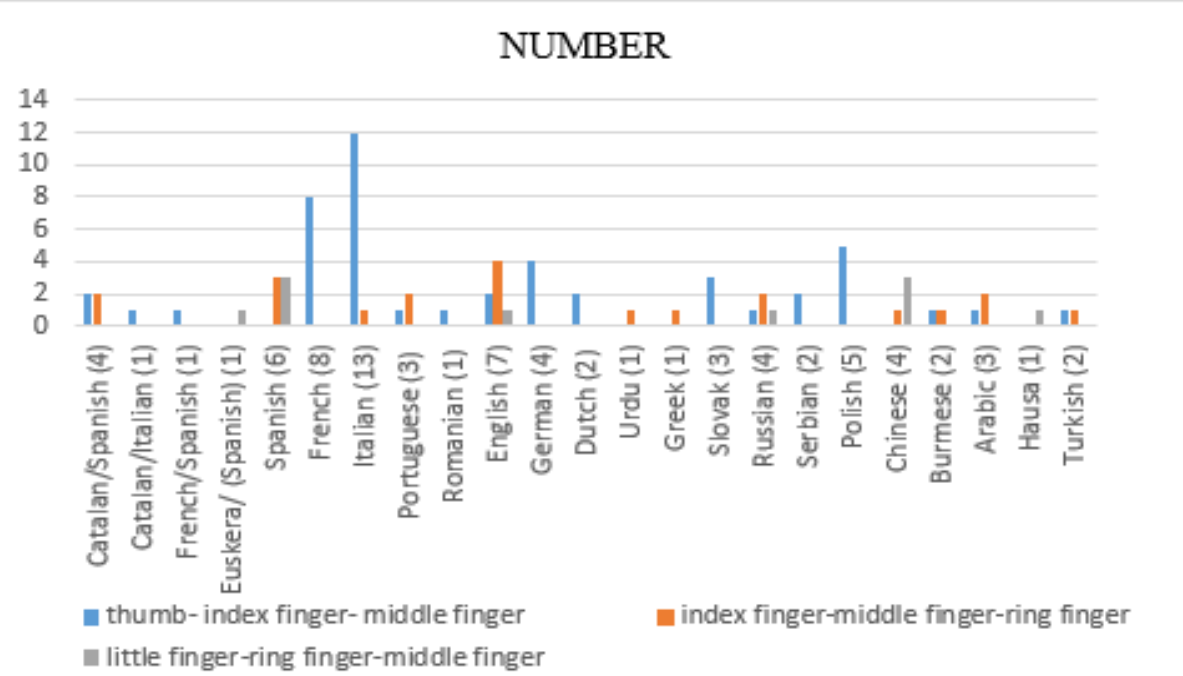
## Appendix GGG

**Figure 51.** *Agentivity in the picture of a keys.*



## Appendix HHH

**Figure 52.** *Number representation on counting.*



## Appendix III

**Table 8.** *Grammatical gender (I).*

| Families | Languages | KEY | BRIDGE | SUN | MOON |
|---|---|---|---|---|---|
| Indo-European: | Catalan | Feminine | Masculine | Masculine | Feminine |
| Romance | Spanish | Feminine | Masculine | Masculine | Feminine |
| languages | French | Feminine | Masculine | Masculine | Feminine |
| | Italian | Feminine | Masculine | Masculine | Feminine |
| | Portuguese | Feminine | Feminine | Masculine | Feminine |
| | Romanian | Feminine | Neuter | Masculine | Feminine |
| Isolated language | Euskera | - | - | - | - |
| Germanic | English | - | - | - | - |
| languages | German | Masculine | Feminine | Feminine | Masculine |
| | Dutch | Masculine | Feminine | Feminine | Masculine |
| Indo-Iranian | Urdu | - | - | - | - |
| Greek | Greek | Neuter | Feminine | Masculine | Feminine |
| Slavic languages | Slovak | Masculine | Masculine | Neuter | Masculine |
| | Russian | Masculine | Masculine | Neuter | Feminine |
| | Serbian | Masculine | Masculine | Neuter | Masculine |
| | Polish | Masculine | Masculine | Neuter | Masculine |
| Turkic | Turkish | - | - | - | - |
| Sibo-Tibetan | Chinese | - | - | - | - |
| | Burmese | - | - | - | - |
| Afro-Asiatic | Arabic | Masculine | Masculine | Feminine | Masculine |
| | Hausa | - | - | - | - |

## Appendix JJJ

**Table 9.** *Grammatical gender (II).*

| Families | Languages | CAMEL | RABBIT | SNAIL | SHEEP | MOUSE |
|---|---|---|---|---|---|---|
| Indo-European: Romance languages | Catalan | Masculine | Masculine | Masculine | Feminine | Masculine |
| | Spanish | Masculine | Masculine | Masculine | Feminine | Masculine |
| | French | Masculine | Masculine | Masculine | Masculine | Feminine |
| | Italian | Masculine | Masculine | Feminine | Feminine | Masculine |
| | Portuguese | Masculine | Masculine | Masculine | Masculine | Masculine |
| | Romanian | Feminine | Masculine | Masculine | Feminine | Masculine |
| Isolated language | Euskera | - | - | - | - | - |
| Germanic languages | English | - | - | - | - | - |
| | German | Neuter | Neuter | Feminine | Neuter | Feminine |
| | Dutch | Masculine | Neuter | Feminine | Neuter | Feminine |
| Indo-Iranian | Urdu | - | - | - | - | - |
| Greek | Greek | Feminine | Neuter | Neuter | Neuter | Neuter |
| Slavic languages | Slovak | Feminine | Masculine | Masculine | Feminine | Feminine |
| | Russian | Masculine | Masculine | Feminine | Feminine | Feminine |
| | Serbian | Feminine | Masculine | Masculine | Feminine | Masculine |
| | Polish | Masculine | Masculine | Masculine | Feminine | Feminine |
| Turkic | Turkish | - | - | - | - | - |
| Sibo-Tibetan | Chinese | - | - | - | - | - |
| | Burmese | - | - | - | - | - |
| Afro-Asiatic | Arabic | Masculine | Masculine | Masculine | Feminine | Masculine |
| | Hausa | - | - | - | - | - |

## Appendix KKK

**Table 10.** *Grammatical gender (III).*

| Families | Languages | APPLE | LEMON | AVOCADO | MELON | KIWI |
|---|---|---|---|---|---|---|
| Indo-European: | Catalan | Feminine | Feminine | Masculine | Masculine | Masculine |
| Romance | Spanish | Feminine | Masculine | Masculine | Masculine | Masculine |
| languages | French | Feminine | Masculine | Masculine | Masculine | Masculine |
| | Italian | Feminine | Masculine | Masculine | Masculine | Masculine |
| | Portuguese | Feminine | Masculine | Masculine | Masculine | Masculine |
| | Romanian | Neuter | Feminine | Neuter | Masculine | Neuter |
| Isolated language | Euskera | - | - | - | - | - |
| Germanic | English | - | - | - | - | - |
| languages | German | Masculine | Feminine | Feminine | Feminine | Masculine |
| | Dutch | Masculine | Masculine | Masculine | Feminine | Masculine |
| Indo-Iranian | Urdu | - | - | - | - | - |
| Greek | Greek | Neuter | Neuter | Neuter | Neuter | Neuter |
| Slavic languages | Slovak | Neuter | Masculine | Neuter | Masculine | Neuter |
| | Russian | Neuter | Masculine | Neuter | Feminine | Neuter |
| | Serbian | Feminine | Masculine | Masculine | Feminine | Masculine |
| | Polish | Neuter | Feminine | Neuter | Masculine | Neuter |
| Turkic | Turkish | - | - | - | - | - |
| Sibo-Tibetan | Chinese | - | - | - | - | - |
| | Burmese | - | - | - | - | - |
| Afro-Asiatic | Arabic | Feminine | Masculine | Masculine | Masculine | Masculine |
| | Hausa | - | - | - | - | - |

## Appendix LLL

**Table 11.** *Grammatical gender (IV).*

| Families | Languages | DEATH | JUSTICE | LIBERTY | PEACE | LIFE |
|---|---|---|---|---|---|---|
| Indo-European: Romance languages | Catalan | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Spanish | Feminine | Feminine | Feminine | Feminine | Feminine |
| | French | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Italian | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Portuguese | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Romanian | Feminine | Feminine | Feminine | Feminine | Feminine |
| Isolated language | Euskera | - | - | - | - | - |
| Germanic languages | English | - | - | - | - | - |
| | German | Masculine | Feminine | Feminine | Masculine | Neuter |
| | Dutch | Masculine | Feminine | Feminine | Feminine | Feminine |
| Indo-Iranian | Urdu | - | - | - | - | - |
| Greek | Greek | Masculine | Feminine | Feminine | Feminine | Feminine |
| Slavic languages | Slovak | Feminine | Feminine | Feminine | Masculine | Masculine |
| | Russian | Feminine | Feminine | Feminine | Masculine | Feminine |
| | Serbian | Feminine | Feminine | Feminine | Masculine | Masculine |
| | Polish | Feminine | Feminine | Feminine | Masculine | Neuter |
| Turkic | Turkish | - | - | - | - | - |
| Sibo-Tibetan | Chinese | - | - | - | - | - |
| | Burmese | - | - | - | - | - |
| Afro-Asiatic | Arabic | Masculine/Feminine | Masculine/Feminine | Feminine | Masculine | Feminine |
| | Hausa | - | - | - | - | - |

## Appendix MMM

**Table 12.** *Grammatical gender (V).*

| Families | Languages | WAR | HOPE | ANGER | PURITY | SADNESS |
|---|---|---|---|---|---|---|
| Indo-European: Romance languages | Catalan | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Spanish | Feminine | Feminine | Feminine | Feminine | Feminine |
| | French | Feminine | | | | |
| | Italian | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Portuguese | Feminine | Feminine | Feminine | Feminine | Feminine |
| | Romanian | Neuter | Feminine | Feminine | Feminine | Feminine |
| Isolated language | Euskera | - | - | - | - | - |
| Germanic languages | English | - | - | - | - | - |
| | German | Masculine | Feminine | Masculine | Feminine | Feminine |
| | Dutch | Masculine | Feminine | Feminine | Feminine | Neuter |
| Indo-Iranian | Urdu | - | - | - | - | - |
| Greek | Greek | Masculine | Feminine | Masculine | Feminine | Feminine |
| Slavic languages | Slovak | Feminine | Feminine | Masculine | Feminine | Feminine |
| | Russian | Feminine | Feminine | Masculine | Feminine | Feminine |
| | Serbian | Masculine | Feminine | Masculine | Feminine | Feminine |
| | Polish | Feminine | Feminine | Feminine | Feminine | Masculine |
| Turkic | Turkish | - | - | - | - | - |
| Sibo-Tibetan | Chinese | - | - | - | - | - |
| | Burmese | - | - | - | - | - |
| Afro-Asiatic | Arabic | Feminine | Masculine | Masculine | Masculine | Masculine |
| | Hausa | - | - | - | - | - |