

**UNIVERZITA PALACKÉHO
V OLOMOUCI**

FILOZOFICKÁ FAKULTA

KATEDRA ANGLISTIKY A AMERIKANISTIKY

**STRUCTURAL PRIMING
THROUGHOUT SECOND LANGUAGE
DEVELOPMENT**

BAKALÁŘSKÁ PRÁCE

**VYPRACOVALA:
VEDOUCÍ PRÁCE:**

**PETRA HAVLÍČKOVÁ
JEFFREY KEITH PARROTT, Ph. D.**

2019

Čestné prohlášení

Prohlašuji, že jsem tuto bakalářskou práci vypracovala samostatně pod odborným dohledem vedoucího práce a uvedla jsem všechny použité podklady a literaturu.

V Olomouci dne 20. srpna 2019

Petra Havlíčková

TABLE OF CONTENTS

1. Introduction	1
2. First language acquisition	
2.1. Mental model of language	5
2.2. Syntactic Priming	5
2.3. Child language acquisition	7
2.4. L1 adults	8
3. Second language acquisition	
3.1. Critical Period Hypothesis	10
3.2. Bilingual adults	11
3.3. L2 adults	12
3.4. Passive voice	13
4. Experiment	
4.1. Hypothesis and research question	14
4.2. Designing the experiment	14
4.3. Participants	16
4.4. Test items	16
4.5. Independent measure of proficiency	19
5. The process	
5.1. Pilot study	20
5.2. Criteria for exclusion of responses	21
5.3. Results	22
6. Conclusion	
6.1. Extraneous factors in the experiment	23
6.2. General discussion. Interpretation	25
7. Works Cited	29
8. Appendices	33
9. Abstract	50

1. Introduction

This thesis examines the effectiveness of the process of second language learning using the psycholinguistic experimental method of mapping internal grammar's development, syntactic priming, to see whether acquisition takes place. The participants in this research are students of English as their second language.

The method was first used for syntax by Bock (1986), to map the development of internal grammars, which after enough data lead to development of an internal model of grammar later proposed by Roelofs (1992). This proposition model shows how the internal grammar's system is likely organized (based on data from many experiments).

Next, it derived how the internal processing functions to form phrases and clauses. It was researched by Bock (1986, 1987), Bock & Griffin (2000), Branigan *et al.* (1999, 2000), Corley & Scheepers (2002), Savage *et al.* (2003) for first language acquisition and by for example Loschky (1994), Hartsukier *et al.* (2004) for second language acquisition or by Felser (2007) for second language learning.

It is an open question about what primarily leads to advanced L2 levels in second language learning, whether it is mainly subconscious acquisition and therefore people follow the same path as they did with their first language, or conscious learning, which would imply that the second (and any following) language can never be as internalized as when children would learn it. Stephen Krashen's theory (1981) claim that consciously learnt grammar may only act as a "Monitor" over one's language productions to ensure correct grammar is being used, and even though "Monitor" users may be getting their message across, it is by immersion into the environment, together with inclusive social setting (a condition which he calls "low affective filter") that enables learners to truly acquire a language. (Krashen 1981: 47)

This claim is however disputed by for example Robinson (1995), who says that L2 acquisition cannot happen even in a natural environment and a substantial part of second language learning is due to conscious learning, by paying deliberate attention to specific structures in use. (Robinson 1995: 283-284)

If this were true, it would imply that the innate ability of people to acquire language indeed disappears with age and later acquired languages are not being as used in the same way as the first language.

Traditional language grammar tests where there is no subconscious process involved can be influenced by the Monitor, which is some imitation of an abstract system in the brain, which oversees the language rules and subsequently applies them. However, the subconscious processes cannot be influenced by the Monitor, because this is not its function, as it was showed for example by Felser (2007), and therefore it can be established by these experiments which of these two claims is true and to what degree. If the results were nil, then even when the participants started during puberty, meaning during the time when they were still capable of some degree of internalization, it would no longer work.

Let us now turn attention to the psycholinguistic method itself. Structural or syntactic priming is a phenomenon whereby "realizations of syntactic rules" (by encountering some structures in use), the "activation level [on the syntactic nodes] of strength of the procedures" that were just encountered by a speaker result in "raising the probability of their subsequent use. The repetition of syntactic structure is a possible consequence." (Bock 1986:358)

Bock conducted a pioneering study in this specific field. That it was a pioneering study was due to her controlling the experiment environment to avoid any possible intrusions. She managed to show that priming sensitivity manifests itself even when the impulse does not come from lexical level, but from syntactic level [although arguably, lexical level priming is stronger. The structures are excited from their base level in the brain by a recent previous encounter, and then it is more likely for them to appear in the following utterances.

She was since supported by other researchers – in that this method of syntactic priming for determining the speaker's level of acquisition can be used to study the abstract grammatical representations in people's brains.

The discoveries made by this method serve as a mapping tool of the cognitive process of language acquisition (as per the model developed by Roelofs (1992)). When the results cannot be attributed to priming on lexical or semantic level, nor from the level of the immediate social setting, it "suggests that priming is tapping into linguistic knowledge itself, and is not just facilitating particular processes." (Branigan et al. 1995)

By now, it can be said that "The phenomenon of syntactic priming has now been well attested in a series of studies." (Corley 2002: 126) An

important feature of a valid experiment in this area is that the test subjects need to be mostly “unaware of the priming effect (e.g. Bock, 1986).” (Branigan et al. 2000: B16)

Thus far, by using minor variations of this method, for example monolingual children were tested (Savage et al. 2003, 2006). A natural process of building a mental model of language was observed, progressing from simple and specific (tied to particular words and constructions, and function words like pronouns to more abstract connections.

In bilingual adults, cross-linguistic priming between Spanish and English was conducted by Hartsukier et al. (2004), where they were looking for any connections between the two languages on syntactic level. The direction in which the learners studied the language showed itself to be stronger as it manifested in higher structure recall of the target language than it was the other way around.

Syntactic repetition was also observed in writing production by these experimental methods (Branigan et al. 1999), where the excited state (i.e. higher probability for using the structure) lasted over several consecutive elements.

While we are looking at where people tend to repeat syntactic structures, the repetition tendencies can be found on many language levels. Lexical priming (of words stored in the lexicon and the immediate connections between them) was researched for example by Pace-Sigge (2013).

The experiment of Pickering & Branigan (1995: 498), where they "found comprehension-to-production priming in cases where there was no semantic relationship between prime and target. ...", served as a guiding tool in designing the experiment of this thesis. The other one is by Bock (1986). It is mostly because, as they found, comprehension to production version of the experiment design cannot be attributed to any other factors. Another experimental design where the results cannot be attributed to social factors is the one established by Potter & Lombardi (1998), where participants were alone in a laboratory setting, or the one by Corley & Scheepers (2002), where the syntactic information was transferred via the Internet. They replicated the experiment by Pickering (1998), only in their case it was online.

Repetition of previously encountered syntactic structures was also seen to occur in dialogues (Branigan et al. 2000). "Other studies have found similar effects using sentence completion (Pickering & Branigan,

1998) and sentence recall (Potter & Lombardi, 1998)” (Branigan et al. 2000: B16).

Certain research papers examined advanced L2 English learners (Dąbrowska 2006, Chan 1991, Felser 2007), including their development in relation to the years of exposure to the language (Johnson 1989). In the study by Felser (2007), it was established that non-native speakers lacked more complex "abstract linguistic representations" –and it pertains to the research question about what happens when a person studies their second language.

Either, second language learners have at least partial access to their innate language competence, and hence there is a possibility for second language learners to achieve at least some level of proficiency. This holds especially true for people who started learning the language People starting with L2 during early puberty often perform better than their counterparts who started learning the second language earlier (for example, Johnson & Newport 1989, Hartsukier 2004).

Or, second language learners do not have access to language competence as they did with their first language (Savage et al. 2003) and the way they learn the language is by utilizing their adult problem-solving skills, plus there is large individual variation in their final skills (Bley-Vroman 1989). Together with appropriate environment, where there is no affective filter at play, enough motivation and well-developed Monitor (Krashen 1981), they can imitate a high level of proficiency.

By using this experimental method, what is the end level of advancement in learning second language in the group? How is it related to their formal language skills, which they learnt at school? Are people who undergone this type of learning a language still sensitive to syntactic priming? Can we observe any developments there, as their formal skills advance? And finally, how well do the learners perform in comparison to native speakers in the same tasks? Is it possible to detect any link between explicit knowledge of English grammar and sensitivity to priming, or in other words, is second language learning the same in this regard as first language acquisition?

2. First language acquisition

2.1. Mental model of language

The premise of the experiment is based on this conjecture, supported by many experiments and research papers:

In the human brain, there is a mental model of language, the reflection of which can be observed in a controlled experimental environment. A more detailed look into the mental model of language is offered by Bock and Loebell (1990), who describe three steps of this language processing: “conceptualization” where a concept arises in the brain, “formulation” of a concept “in linguistic form”, then “articulation”, which entails communicating the concept by the means of “speech or writing”. (Branigan et al. 1999: 635) The formulation part, according to them, includes syntactic processing.

Concepts “in the mental lexicon are represented at two levels: a syntactic level, called the lemma stratum, and a morphophonological level, called the form stratum.” (Branigan et al. 1999: 638-639)

There is an important factor at play during establishing the mental model of grammar, be it for the first language or second language: the level of exposure to the structure. As with the research of Street & Dąbrowska (2012) and their High Academic Attainment and Low Academic Attainment groups, even native who did not have as much experience with passive combinatorial structures were less likely to comprehend and produce them. Here we can conclude that by the same token, because humans have way longer experience with lexically specific and morphologically specific items, this way of exciting phrases or forms or morphemes will manifest itself more strongly compared to those which were established in the brain later in life.

2.2. Syntactic priming

The method by which the insight into the mental model of language is obtained is by syntactic priming. Internal grammatical “combinatorial nodes have a baseline level of activation, temporarily raise this level following use of a particular construction, and then decay rapidly back to their baseline level.” (Branigan et al. 1999: 638-639)

Syntactic priming naturally occurs in everyday language use. There it shows itself to be a performance constraint on productivity (which is one of the core components of Chomsky's theory of language) - this means that the full set of choices for certain structures by which the message can be expressed is limited by those which the speaker recently encountered, and these "nodes" or specific combinatorial structures (as per the Roelofs's model and the expanded version of Pickering & Branigan 1998) are then activated (Bock 1986), thus more likely to appear in the subsequent productions.

The paper by Pickering & Branigan (2000) found "syntactic coordination...activated during spontaneous dialogue" (Branigan et al. 2000: B22), and they "excluded non-syntactic explanations" for their results. (Branigan et al. 2000: B20) They observed that these "representations ...are accessed during both production and comprehension." (Branigan et al. 2000: B22)

These "representations", as they call them, reflect the internal language body. Here the previously used structures are raised into the conscious mind and therefore it "reduces the speaker's computational load" (Branigan et al. 2000: B23) so that the possible constructions with which a concept can be described are not being picked out of the entire set of possibilities.

Syntactic priming also aids sentence recollection, when the respective nodes are activated. "(A) sentence is regenerated in immediate recall from a representation of its meaning, using recently activated words."(Potter & Lombardi 1998: 265)

There is stronger priming on the lexical level, that is, priming was stronger when the verb was repeated between the interlocutor and the participant in the research. (Kim & McDonough 2008: 149) It is certain that lexical priming is an even stronger phenomenon because lexically specific nodes are established first in children (Savage et al. 2003, 2006) and the relevance of them survives long into adulthood. (Branigan et al. 1999: 638)

Bock (1989) showed that word categories may not be just abstract concepts, by observing that priming a category (in this case, preposition) means that "other prepositions in the following sentences got excited enough to be produced... ." (Pickering & Branigan 1998: 646)

"Comprehension-to-production" priming (where a test subject understands a sentence, processes the sentence in their brain, and then produces one of their own) is most likely to show the true reflection of

linguistic knowledge. (Pickering & Branigan 1995: 499) "Importantly, these experiments indicate that single speakers tend to repeat syntactic structure in ways that cannot be explained by non-syntactic (e.g. lexical, semantic, or prosodic) factors." (Branigan et al. 2000: B16)

The constructions that are raised into an excited state do not stay there indefinitely. The paper by Pickering et al. (1999) "tested whether priming effects persist over intervening stimuli in a written sentence completion task, a task that does not involve any explicit memory component." (Pickering et al. 1999: 636) The excited state does not last long, only when immediately necessary, and their results confirm such assumptions: "decay occurs even when participants do not apply a related procedure between prime and target." (Pickering et al. 1999: 638)

2.3. Child language acquisition

The studies by Savage et al. (2003, 2006) have shown that children first establish lexical representations in their brains and any syntactic-like connections they will have developed up until a certain age would only be lexically specific – tied to lexical items, and only later do these items reach the rule abstractness which allow them to apply said rules anywhere where appropriate and to extrapolate the rules.

Since these experiments reflected the children's level of language production – it corresponded with the level of abstractness and productivity of the combinatorial structures in the brain – it can be said that such tests can be used to determine the level of acquisition of at least native language.

When we look at children of older ages, we see that "teenagers, interestingly, often seem to achieve native-speaker competence. ...some studies show that in the age range of 10 to 15, they not only reach native-speaker competence, but they also progress more rapidly and perform with greater accuracy in the early stages of learning than do their younger counterparts." (Bley-Vroman 1989: 9) However, any obtained knowledge here can be due to adult problem-solving skills (Bley-Vroman 1989: 5).

Bley-Vroman (1989) elaborates that "... the two substantial advantages which adults possess - previous knowledge of a language and a general cognitive ability to deal with abstract formal systems - are able approximately, but not perfectly, to compensate for the loss in adults of the child's knowledge of Universal Grammar and of a learning procedure designed specifically to construct grammars."

While teenagers have more capability to acquire language, there are findings which support the discovered concepts of Johnson & Newport (1989). They showed "direct evidence that there is a decline over age in the ability to acquire a second language..." However, "the results show a continuous linear decline in ability, instead of a sudden drop-off at puberty" (Johnson & Newport 1989: 63)

The hypothesis is that if the priming will work or the students exhibit some gradual improvement with the grammar level they are on, they do have at least some access to the grammar strata.

However, if there is no observable priming trend, then even if their comprehension is high, they are not as likely to produce the structures (as was the case with Dąbrowska & Street 2006), no connection would be established.

2.4. L1 adults

Not even L1 speakers share entirely the same grammars, however they do converge around the same core.

That the baseline encounter of what can result in acquisition is very subjective to an individual is also supported by the fact that not even L1 learners have absolute knowledge of their language.

It was discovered that the level of exposure determined whether they chose a specific feature. For example, in Street & Dąbrowska (2012), they found that people without higher education were less likely to comprehend complex passive constructions, as passive constructions are more likely to appear in a written discourse with which people with higher education are more likely to come in contact. The explanation which was proposed by the researchers was "that LAA [their abbreviation for "low academic attainment"] participants lack a well-entrenched verb-general passive construction and therefore rely predominantly on lexically specific representations for individual verbs."(Street & Dąbrowska 2012: 5)

"Most linguists ...assume that all first language learners converge on the same grammar ...all speakers are believed to share the same "core" grammar. ...Conversely, that second language learners typically do not converge has been used to argue that L2 learning is fundamentally different from first language acquisition (cf. Bley-Vroman, 1990, 2009)." (Street & Dąbrowska 2012: 1)

This corresponds with the model of language attainment by children in that the less often one gets into contact with a combination, the

less likely they are to have it well acquired within their mental model of language. However, even though these participants were well past their critical period, their "performance improved dramatically as a result of additional experience with the relevant construction, indicating that the initial differences in test scores are attributable to differences in specific linguistic knowledge."(Street & Dąbrowska 2012)

Their results showed that the level of comprehension of the specific structures corresponded with the rate of their usage in the British National Corpus (Street & Dąbrowska 2012: 4).

While a variable and diverse input is necessary for a productive language acquisition, there will always be the scarcity of input available for individuals to develop the same core grammar.

Studies were done for monolingual adults' processing of passives (Liversedge et al. 1998), and others to examine the time it takes for certain structures to be produced, i.e. the response tendencies and latencies for actives and passives (Segaert et al. 2011): What was discovered was "That actives benefit from syntactic repetition syntactically repeated actives are produced faster, irrespective of word repetition." (Segaert et al. 2011:5) Nevertheless, most likely there is some of the original language competence at play, since it is possible to observe gradual development in second language abilities as it progresses from simpler constructions and morphemes to the more advanced ones. To give an example, "...learners have been shown in many studies to be more accurate in their use of the progressive *-ing* than in their use of the third person singular *-s*." (Bley-Vroman 1989: 32) This is valid for second language learning and for first language learning alike.

As of the time of writing the paper, "we do not know what causes the first language orders." (Bley-Vroman 1989: 33)

3. Second language acquisition

3.1. Critical Period Hypothesis

Let us first define the term “Critical Period Hypothesis”: Critical Period Hypothesis (Lenneberg 1967) says that after the onset of puberty, people are less likely to learn a language properly and he even claimed that it is nearly impossible. The hypothesis had been widely accepted at first, however, there were flaws in his research as, for example, he only considered impaired L1 learners and did not at all include second language learners in his research (also mentioned in Bley-Vroman 1989: 4).

Later this was disputed among others by Bley-Vroman (1989), who summarized in his essay that it is not as easy as it may seem at first to give the "age factor" an absolute value, since "age intersects with a range of "factors [and]... clarifying its relationship with learning rate and/or success is a major challenge." (Abello-Contesse 2009: 170) Now it cannot even be said that “the younger the better” applies to language acquisition, since young learners do not possess skills that adults have, such as “higher level of cognitive development and greater analytical abilities.” (Abello-Contesse 2009: 171)

It is now established that the Critical Period Hypothesis failed to take many important points into account, and it is currently modified to encompass the following scenarios, which are not mutually exclusive. There are either “(i) multiple critical periods”, then maybe what we call a critical period is “(iii) a 'sensitive' yet not 'critical' period”, and on top of that, we observe “(iv) a gradual and continual decline from childhood to adulthood.” (Abello-Contesse 2009: 170)

Also, in this paper, they propose two altered versions of the Critical Period Hypothesis, which are more in accordance with the most recent findings:

"The exercise hypothesis": If humans keep learning (other) languages throughout their early life, the potential for learning another foreign language will remain strong.

"The maturational state hypothesis": Children have a higher potential for learning languages and this ability gradually ceases as they age.

Apart from other factors that play a role in learning a language, one pertaining to our interest is "grammatical sensitivity". It is defined as "the

individual's ability to demonstrate his awareness of the syntactical patterning of sentences in a language" (Carroll 1973 – in Krashen 1981: 20). "A third component of aptitude is labelled "inductive ability". This is the ability to "examine language material... and from this to notice and identify patterns and correspondences and relationships involving either meaning or grammatical form." (Carroll 1973: 8) (Krashen 1981: 20)

3.2. Bilingual adults

Bilingual speakers exhibit partial incorporation of linguistic components into their established first language model.

While the level of acquisition is not absolute or symmetrical, because it depends on the richness and strength of the input, lexical items will settle on the same lexical nodes (for the same concept); around them, nodes connect to morphological features, categorial nodes and then, combinatorial nodes are established according to the unique rules of each of the languages.

The experiment of Hartsukier et al. (2004: 412) "showed cross-linguistic priming in dialogue". Bilingual people were more likely "to produce English passive sentences more often following a Spanish intransitive or active sentence". Because of other traits of the non-native speaker's speech, such as code switching, where people start a sentence in one language and end it in another, we assume the internal structures of language production are being accessed. As they pointed out: "This account provides a straightforward way of explaining the close integration of languages that can occur during bilingual conversation. ... For example, one of our naive participants produced the sentence "A coin is being attracted by an *imán*." [magnet] (Hartsukier et al. 2004: 413) The same lexical node was accessed, however the wrong lexical item (of the other language) was used.

Their account in the study also mirrors the direction in which the other language is acquired, and in this direction, these connections are stronger. This illustrates the asymmetry of multiple acquired or learnt languages.

From the results of this experiment by Hartsukier et al. (2004), we can extrapolate the findings and apply them to the language representation system in the brain. The results account for the "bilingual lexical-syntactic representations" and the lemmas for specific language components for both languages - the words and structures "are connected

to the same category node and to the same combinatorial nodes", as they are accessed during sentence production.

3.3. L2 adults

Non-native speakers of English appear to not reach the same levels of their native counterparts.

A second language learner doesn't start from scratch, "he does not ... come to language as "an organism initially uninformed as to its general character"" (Bley-Vroman 1989: 16), because they would have already acquired one language. This fact helps the student learn the second language faster, as they are already aware of how a language works and may infer some implications from that. "On the other hand, foreign language learners ... may presume that features of the native language are universal." (Bley-Vroman 1989: 16) Hence the student is likely to make mistakes in the instances where he assumed the language features to be universal, but which are in fact only specific to his language (or missing in the language he is learning).

In Felser (2007) advanced L2 learners, native speakers of Greek were studied, and in this study, it was established that they lacked more advanced abstract linguistic representations.

Even though these native Greek speakers of English scored very high on conventional language tests, they lacked "abstract linguistic representations" in their brains "such as movement traces". They only exhibited "shallow parsing" (as it was named by Felser (2007: 28) (from Hammerton *et al.*, 2002: 552)), where they do not "assign a full hierarchical representation to an input string", because it might "often be unnecessary" for their language processing. While the researchers do not disregard that non-native speakers may develop some abstract linguistic representations, they claim that "movement traces" do not get developed. This lends credibility to parts of the hypothesis that say that people only have second language stored at the word-form stratum and do not form many complex combinatorial nodes (Felser 2007: 28)

Moreover, as per Bock & Griffin (2000: 188) "It is clear that lexical repetition can enhance structural repetition (Pickering & Branigan 1998), although it does not seem to be essential to it (Bock, 1989). One conjecture is that there may be two different factors at work in these effects." (Bock & Griffin 2000)

This is because as the first language acquisition progresses from

lexically and morphologically specific representations to the more abstract combinatorial representations, so does second language - even though the level which the people achieve may vary.

Second language learners face many cognitive obstacles (some with higher probability of manifesting themselves, some less probable) preventing them from fully achieving proficiency in their second language. There is an observable trend of decline in the ability to learn new languages further into adulthood.

While many learners can imitate the proficiency of advanced speakers, the processes by which they do so are not necessarily similar as those of native speakers during first language acquisition.

The argument against the claim that first language acquisition and second language acquisition are entirely the same comes from the phenomenon of fossilization of language ability at the bare minimum level needed for communication. (Bley-Vroman 1989: 10)

Because "...the phenomenon is so frequent in foreign language learning, and unknown in child language development, it constitutes a serious obstacle to the assertion that adult and child language acquisition are fundamentally the same." (Bley-Vroman 1989: 10)

3.4. Passive voice

For the purposes of this paper, to specify what the studied syntactic feature is, we shall define a passive clause as:

Passive clause is a tensed clause, which undergoes changes in its phrasal structure from the original active clause such that the object of an active clause becomes the subject of the passive one, and the subject is either unpronounced or becomes a by-adjunct. Semantic roles of these sentence functions remain the same.

1.

Dalí painted his famous painting *The Persistence of Memory* in 1931. *The Persistence of Memory* was painted in 1931 (by Dalí).

4. Experiment

4.1. Hypothesis and research question

The hypothesized result is that there should be a correlation between the level of formal second language knowledge and the sensitivity to the priming tasks. By some means, L2 grammar needs to be acquired to the subconscious mind in order for people to be fluent, and whether the same factors play a role or if adult problem solving skills play a bigger role should not be an issue in obtaining a result which would allow us to see the manifestation of people's different types of knowledge.

Main research questions are therefore about the relationship between proficiency in second language and the priming sensitivity. Then, we try to establish whether those results approach the results of the control group, native speakers, in any way.

4.2. Designing the experiment

The experiment is a mixture of several, one that was used in the paper by Bock (1986), where she used a pictures for structured description task, and the one by Hartsukier (2004), where there was scripted speech used in order to trigger a specific response in the other participant. The form of the experiment, online test, and the form of priming, together with the way fillers are employed, are original. Then, the way of measuring the proficiency of non-native speakers against the experimental task was also not inspired by any other research paper.

Firstly, the individuals were asked if they were native speakers or students of English and for how many years they have been learning English. The last piece of general information I inquired was about people's age.

2.

1→ Are you an English native speaker?

Y Yes

N No

2→ How many years have you been learning English? (native speakers, please write N/A)

Type your answer here...

3 → Tell me your age.

Type your answer here...

People were not told the purpose of the test before they took it, however there was an optional debriefing session.

They were presented with a test question and they were supposed to first pick a suitable sentence which describes a given picture. This served as a prime, since they were required to read the sentence and understand it. Hypothetically, and since the method is well attested, this triggered a grammatical structure to the “surface” of the mind. Fillers were questions where people were required to either finish a sentence or produce a new one altogether.

The most important questions were the ones where participants were required to produce an entirely new sentence.

3.

7 → What happened in this picture (in one sentence)?



It was possible to grammatically formulate all the target sentences in either active or in passive constructions.

In the second half, people were given a multiple-choice test which looked at different aspects of English grammar. Here, they were supposed to pick the one that feels the most correct.

4.

33 → These pills don't seem to have any side __, so far they didn't __ me in any way.

A effects, effect

B affects, effect

C effects, affect

D affects, affect

4.3. Participants

Participants are volunteers from the internet space from all ages and backgrounds who agreed to participate in my research. Their age range spans from 15 to 54 with the most people being in their early twenties. For non-native speakers, the years for which they were learning English spans from 7 to 21 years. The group of 15 native speakers are to be considered a control group.

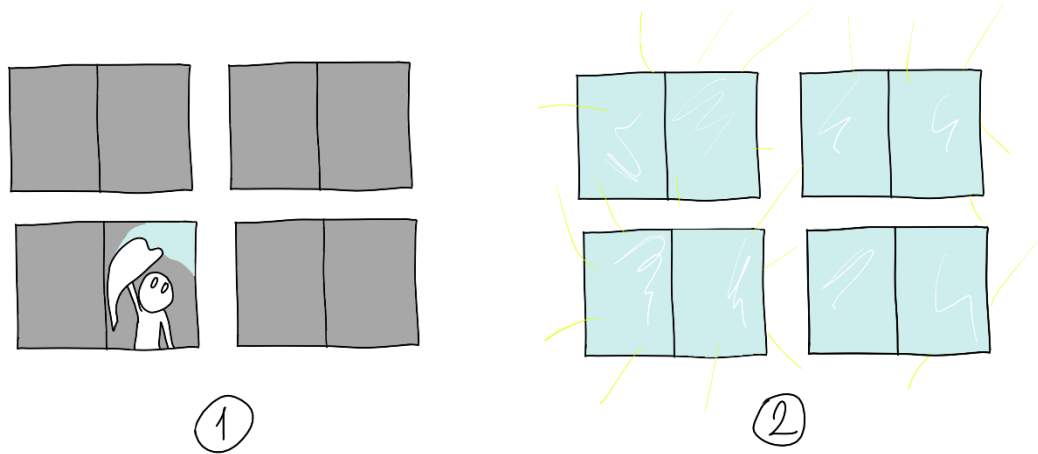
4.4. Test items

Here is an overview of pictures that were used during the experiment. The full list can be found at the back of this book under Appendix 6. There were three categories of experimental tasks: The prime items (an example of which can be seen on the picture below), the purpose of which was to cause a preference for passives in the subsequent choices.

The pictures were presented together with a multiple-choice question, where one of the responses was a fitting description of the picture shown. This was done for the participants to understand the sentence and therefore (according to previous literature) activate the feature in their subconscious mind.

Here is an example of this type of question (a priming question) with the picture in use, together with a few examples of the answers that were given during response collecting:

5.
Which sentence describes the picture?



The windows were cleaned.

The second type of task was a so-called filler. It needs to be noted that the following sentences are here to prevent any conscious choice of only one type of expression, a phenomenon called implicit learning. The form of the question required the participants to finish a sentence by filling out a single word or a phrase. These items were presented in the form of either finishing a sentence, such as the example of a filler item below:

6.
Finish this sentence (according to the picture):
Little bird built a nest _____.



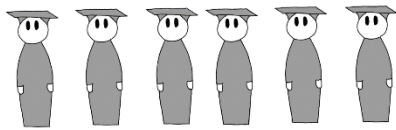
e.g. in a tree, on a tree

The second way of presenting the fillers was to make people produce full sentences in describing an action or a change depicted in a picture.

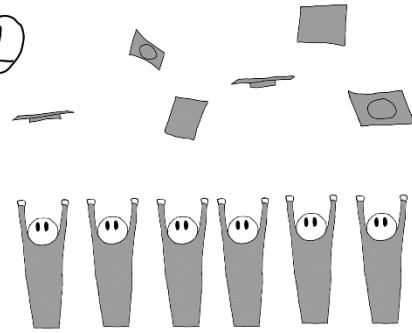
7.

What happened in this picture?

①



②

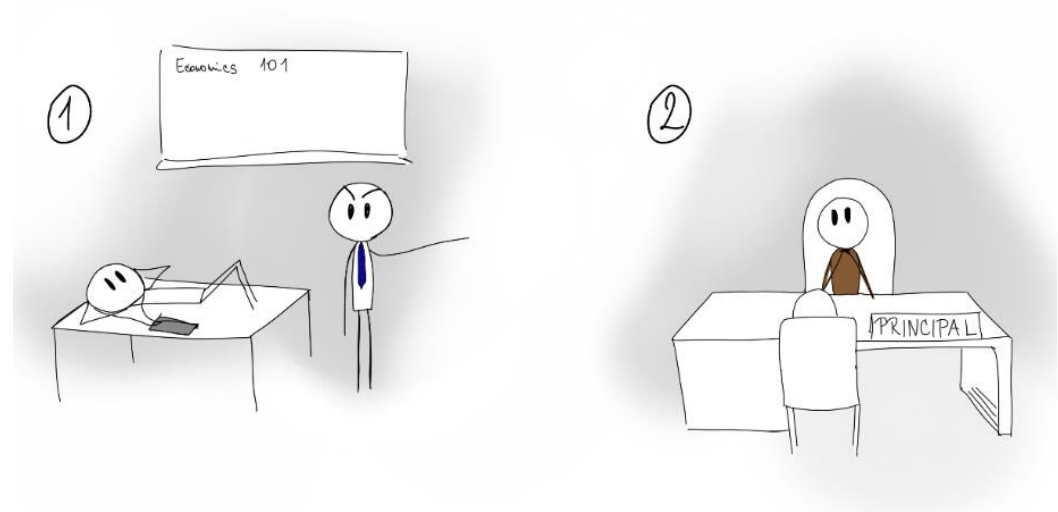


e.g. The class has graduated.

Students received their diplomas.

In the target items (an example of which can be again seen on a picture example below), the task was to describe a change that took place in the picture. The preferred way was in one sentence, but people received no explicit limitations, and the highest number of sentences it took any one individual was two. While the goal was to obtain picture descriptions in full sentences, clauses where a tensed verb would appear were acceptable.

9. Describe the event in this picture:



e.g. A student was sent to the principal, because they lied on the table in class. Misbehaving student was sent to the principal.

The entire test was arranged in this way:

(P= prime, F= filler, T= target)

P-T-P-T-F-P-T-F-P-T-P-F-T-P-F-T-P-F-F-T-P-T-T-T

4.5. Independent measure of proficiency

As an independent measure of language proficiency of the participants, we shall use a simple grammar test consisting of eight questions spanning over the general grammatical rules of English that students generally cover, and some more subtle rules that students would most likely only encounter and familiarize themselves with if they were really immersed in the environment, read a lot or listened to a lot of advanced conversations, and most likely also got to use the rule consciously correctly. The grammatical items were chosen at random.

Beside the grammar test and the main task, the general info that was asked of the participants was their age, how long they have been learning English (a question which was not applicable to native speakers). Next, I asked them about their self-evaluation of their English skills to compare it with the actual results with the grammar test. Lastly, I

asked them about how they felt about the exercise, to see if they possibly experienced any distress during the task.

5. The process

5.1. Pilot study

To test the basic baseline activation of the test subjects, two native speakers were chosen and two non-native speakers. The point was to test whether there is a point in continuing with the study. These four volunteers participated in a simple exercise where they were told a description of a picture by me, which was to serve as a priming item, and then were supposed to describe another picture by themselves, preferably in one sentence. There were no fillers.

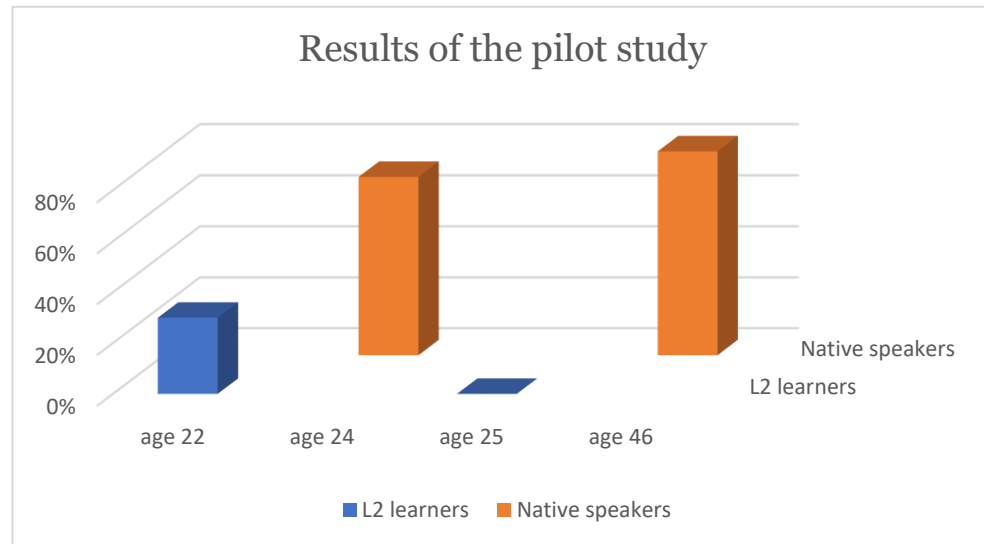
The results were very much aligned with the general assumption that native speakers are prone to repeat previously encountered grammatical structures while in non-native speakers, it could even be said that it is a matter of chance.

The results of the native speakers (out of ten items) were 70% and 80% repetition of the passive structure in their target item. Nobody produced an implausible passive just for the sake of creating a sentence in passive voice.

The results of the non-native speakers were more diverse, as it was expected: 30% and 0%. 30% learnt English since they were eight years old, therefore there was the possibility of still employing the child language learning competence which begins to disappear with the onset of puberty while the person with 0% most likely experienced fossilization. The results of this tiny pilot study imply that it is possible to observe the unique situation of the non-native speaker participants, as there is no guarantee that their skills are quantifiable when controlled only for one thing. More things need to be considered when making conclusions.

The pilot study also served the purpose of unification of the instructions. The results of the pilot study are pictured in the graph below.

10.



From direct prime – target sequence of items, native speakers were a lot more likely to use the same way of picture description. Implicit learning towards the end however might have played a role in native speakers. Non-native speakers were immune to implicit learning, and in the second participant, fossilization took place.

5.2. Criteria for exclusion of responses

The basic criterion for responses to be valuable was that they exhibit either the usage of a passive voice or active voice, meaning they would need to be formulated in the form of a clause, ideally in a full sentence, which was part of the instructions. Therefore, if an individual did not interact with at least 50% of the tasks they were asked to interact with, or they did not follow the instructions (or possibly, did not understand the instructions) that it should be a sentence and used for example a single word (e.g. launched, trail, no idea, fire) or left the majority of the questions blank, their responses were not included in the analysis of the results.

Moreover, since one of the research questions was to contrast the responses on the experiments with the results on the part that observed formal knowledge of English grammar, if an individual did not even get to the part about grammar (second half of the test), their responses also had to be excluded.

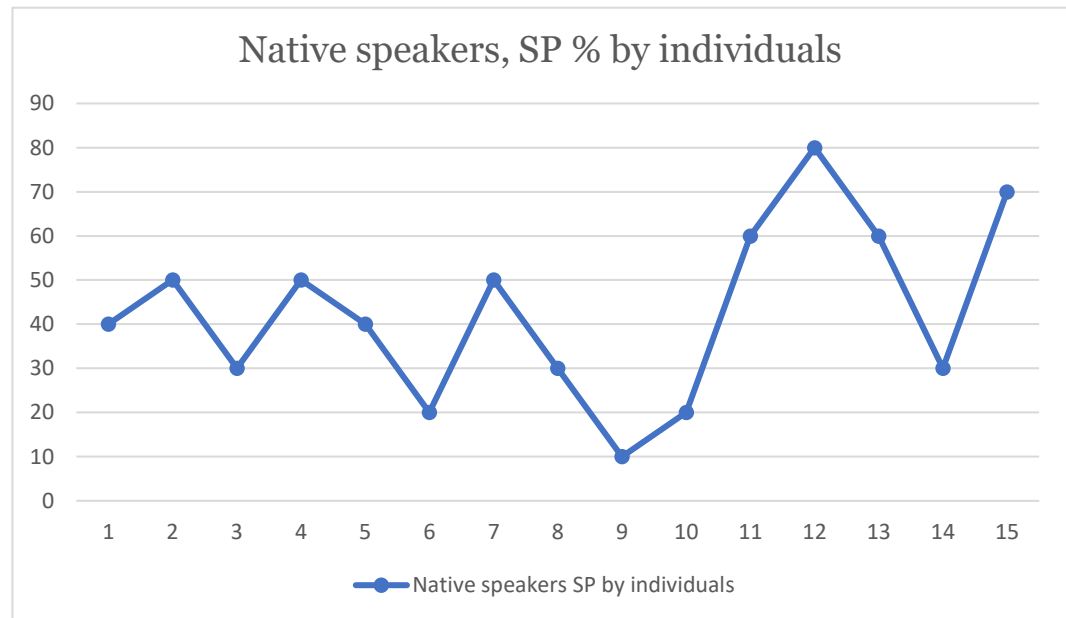
5.3. Results

The responses of 40 people were counted into the final results. The average time it took to finish this survey for people who did not leave halfway through was 17 minutes 12 seconds. The completion rate of the survey was 72.1%, that is, 72.1% of the people who opened it also finished.

The pilot study was already discussed, let us now proceed to the experiment. Appendix 2 which shows a graph of grammar test success & the years people spent learning English follows a trend of more scattered on the side of worse results on this formal grammar test and then, around the peak of possible results, greater variance is observable. The same holds true for the graph at Appendix 5, where when we put grammar test success with the results on the priming experiment, the graph follows a nearly identical curve as the one in Appendix 2. Further discussion of the results can be found in the conclusion.

The control group's results are depicted in the graph below. As previous research hinted at, it would be futile to expect uniform results even in native speakers, and the general trends should rather be observed. Besides other things, formal education (though this time in native speakers) plays a role.

11.

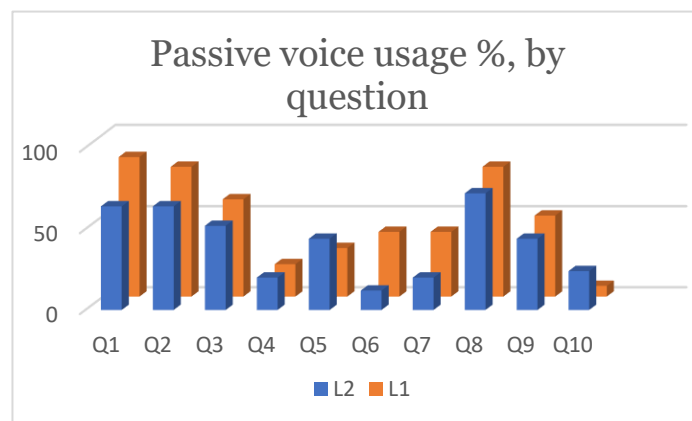


The most passivized descriptions appeared at the first and the eighth

item. The least passivized item in the target list was a picture of a man being hit by an apple. This sentence was not produced using passives by only one of the native speakers.

There must be something that made me, the author of this thesis, think that the production of this sentence is natural, however there was a unique consensus of the native speakers that this event should be described in an active voice. We may be observing authorial bias here, or the fact that no matter how hard I try, my language processing abilities will never be those of native speakers. For comparison, the passive voice usage in non-native speakers was 20% for the same question, which means that there could be adult solving skills at play in those who decided to use passive voice.

12.



Concerning native speakers, it is very interesting that many of them didn't pick the correct response to the second question of the grammar test.

6. Conclusion

6.1. Extraneous factors in the experiment

Were there any extraneous factors that could have influenced the results? Firstly, the nature of an experiment in a controlled environment makes any "natural setting" without any other contextual factor impossible. Furthermore, people might have considered this experiment a sort of "test" where they assumed would exist a correct answer, and therefore maybe focused on the details too attentively. The reason for the way

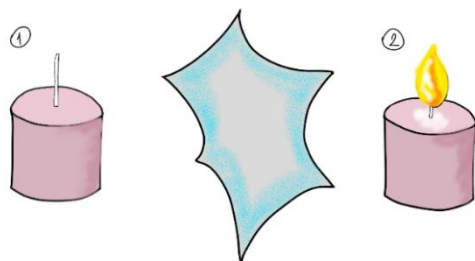
priming items were presented was to ensure attentive reading and understanding, therefore facilitating a baseline activation of the grammatical structure.

It is also possible that throughout the experiment, which took an average of 17 minutes to complete, implicit learning began to play a role – people could have deduced what the experiment is about. However, that would entail the responses should be more uniform all the way through the end, if people discovered the point. This was not the case and implicit learning is not observable in the results.

Could whether the agent was pictured in the target items play a role in whether people choose to describe it with passive or active voice? Not entirely, because in the target items, 80% had the agent pictured, and then the trend of high response rate carried over to the third question, where the item was pictured. One of the reasons for the strong priming effect over the first three target items could have been that there were no fillers used, and therefore the effect was stronger. This was expected, since the goal was to explore all of the possibilities, with fillers, without them, and in the end, persistence of priming, where there were three target items.

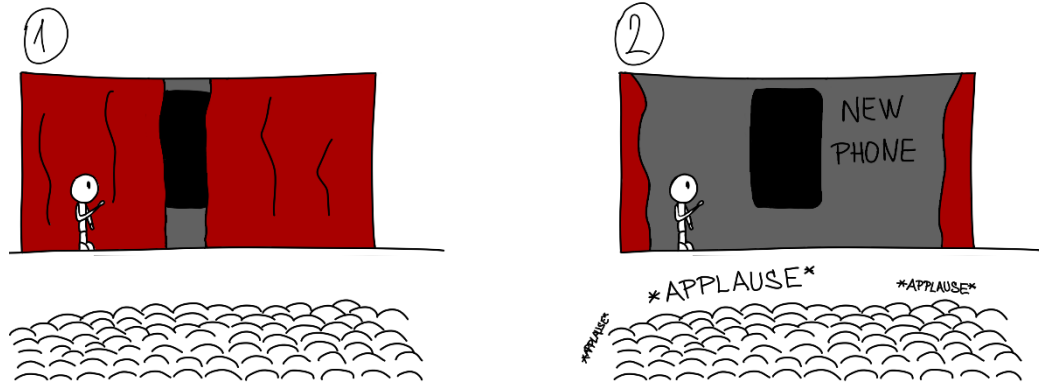
Next, the experiment had the goal to span over many possibilities of picture description, including those where the agent is not explicitly pictured. Also, my description does not mean other people see it the same way, for example in the “Candle was lit.” question, other possibilities were for example “A candle was lit by some kind of magic.”, which appeared among the responses. This response captured the cloud of something which appeared in between the two candles.

13.



In contrast, pictures where the agent was visible followed a general trend where heightened preference for passives was observable too themselves. The following example scored as high as the first two with hidden agents.

14.



Other means of avoiding passives, and this held true overall, not just for the pictures that did not have agent in them, was to use a general pronoun, such as “they”, or by using “somebody, a person” in place of the agent. And finally, the individuals who were generally not using passives anywhere used actives even with the pictures without agents. While it can be said that it might have played some role in people with formal education, it cannot make the responses worthless.

6.2. Discussion. Interpretation

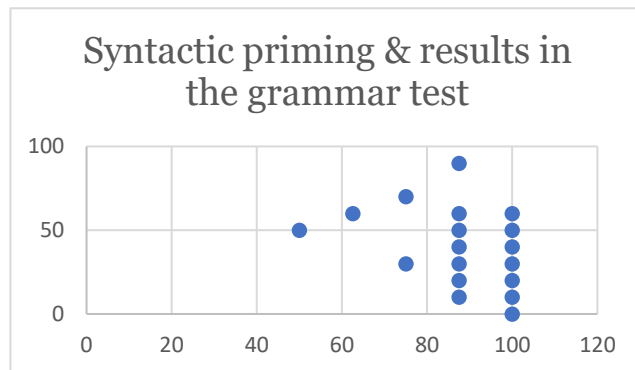
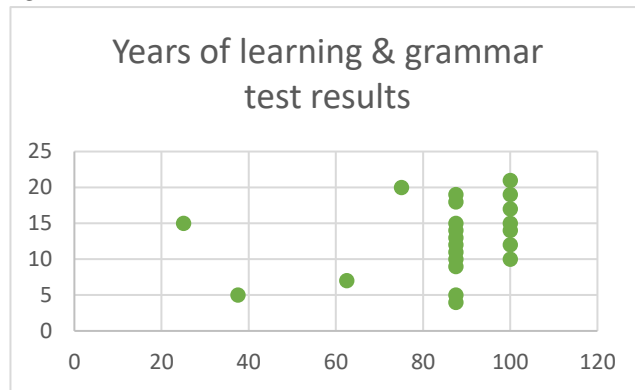
The research question was whether there is any correlation between the sensitivity to priming of second language learners and their success in a general grammar knowledge, found by results in a conventional grammar test. The hypothesis was that yes, this is indeed the case, there needs to be some form of correlation, since the sensitivity to priming was observed in bilingual speakers to an extent.

Even by using this method, which is supposed to trigger subconscious responses in people, the opposite of the hypothesized results was discovered. Ideally, the result would follow a curve of sorts which would center around the peak grammar proficiency and also susceptibility to priming, either with “the more knowledge, the more priming” or “the more knowledge, the less priming”, however the more the people were proficient in language, the more their results in the experiment differed. There was still a minority of people who performed well on both tasks, however.

Second language learners that participated in this study appear to

follow a trend in their subconscious usage of language throughout the years they spent learning. A very similar trend is observable on the second graph, pictured below, where formal grammar proficiency is also connected in this manner to the years the people spent learning.

15.



The information from the two graphs can be summarized as follows: The better a person is in their formal language skills, the bigger variation there is on the syntactic priming task. Second, the better a person is in their formal language skills, the greater variation there is in the years it took them to arrive at this stage. At the top, there is always very large individual variation in the results.

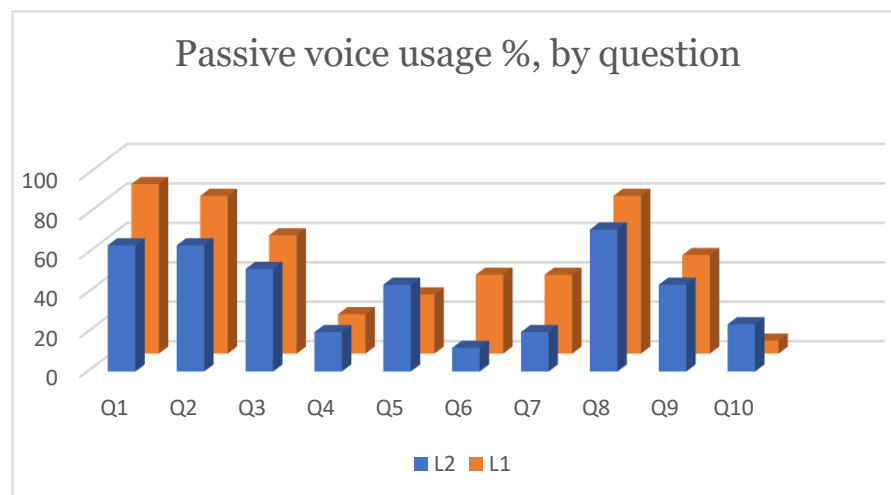
It appears that there is no correlation between the two researched factors within second language learners - the better the results on the grammar test, the less unified the results were on either the priming task or years spent learning. It needs to be concluded that there is no correlation between formal education and language acquisition, at least from the results at hand. Possibly, the more time a person spends on formal education, the less they can utilize their intuitive language skills. It

could be said that maybe with the language that the person is learning, they are also taught the way to process it. This result would confirm the argument of language acquisition being more practical than simply formal learning. The skills to which a person may arrive by formal learning are not as reliable, even though some top performers are present.

Within second language learners, we can see a development of explicit knowledge and subconscious knowledge demonstrated in the sensitivity to priming follow a similar path within the graphs to that of native speakers. First three items are more prominent in the usage of passive voice there, for both groups– it might have been likely due to the fact that there were no intervening items. In the last three items, a gradual fall is observable in the priming trend – this shows the rapid decay of this momentary phenomenon, for both groups.

Secondly, an interesting observation was made for native speakers at item 4 – here, the prime shared the same semantics with the target – possibly a verb, and definitely the concept of fire – an inanimate concept, therefore it could have been assumed that passive voice would be more likely. However, it did not work with native speakers, as they do not have their combinatorial possibilities associated on the basis of semantics of the verb. Then, by comparing the two groups but dividing the responses by questions, native speakers and second language learners follow the same trends when the specific context of a question is considered, as is seen in the graph below.

16.



We can see that there is short persistence of priming observable on questions 8, 9, and 10 for both native and non-native speakers. The

activation of a specific grammatical feature does not last long. Next, we can see that the persistence of priming is shorter in non-native speakers when one intervening item (i.e. filler item) or two filler items are presented, as is observable in questions 6 and 7, respectively. Here, the trend for native speakers was more consistent. And lastly, we can observe a higher preference for passives when an agent is not pictured for both native and non-native speakers (even though for non-native speakers the effect was stronger), and this priming effect then carried over to the one where the agent was pictured. A decline is again observable in both groups.

To summarize, non-native speakers seem to exhibit certain trends regarding priming as native speakers do. Within the context of this experimental method itself, it can be said that they indeed approach the results of native speakers.

7. Works cited

1. Abello-Contesse, C. (2009) Age and the Critical Period hypothesis. *ELT Journal, Volume 63/2*, pp. 170-172.
2. Bley-Vroman, R. (1989) The Logical Problem of Foreign Language Learning. *Linguistic Analysis, Volume 20* (no. 1-2), pp. 3-45.
3. Bock, K. J. (1986). "Syntactic persistence in language production." *Cognitive psychology, Volume 18* (no. 3), pp. 355-387.
4. Bock, K. J. (1987). An Effect of the Accessibility of Word Forms on Sentence Structures. *Journal of Memory and Language, Volume 26*, pp. 119-137.
5. Bock, K. J. (1989). Closed-class immanence in sentence production. *Cognition, Volume 2* (no. 2), pp. 163-186.
6. Bock, K. J., & Griffin, Z. M. (2000). "The persistence of structural priming: Transient activation or implicit learning?" *Journal of experimental psychology: General, Volume 129* (no. 2), pp. 177-192.
7. Branigan, H. P., Pickering, M. J., & Cleland, A. A. (1999). "Syntactic priming in written production: Evidence for rapid decay." *Psychonomic Bulletin & Review, Volume 6* (no. 4), pp. 635-640.
8. Branigan, H. P., Pickering, M. J., & Cleland, A. A. (2000). Syntactic co-ordination in dialogue. *Cognition, Volume 75*, pp. B13-25
9. Branigan, H. P., Pickering, M. J., Liversedge, S. P., Stewart, A. J., & Urbach, T. P. (1995). Syntactic Priming: Investigating the Mental representation of language. *Journal of Psycholinguistic Research, Volume 4* (no. 6), pp. 489-506.
10. Carroll, J. (1973) Implications of aptitude test research and psycholinguistic theory for foreign language teaching. *Linguistics, Volume 112*, pp. 5-13.

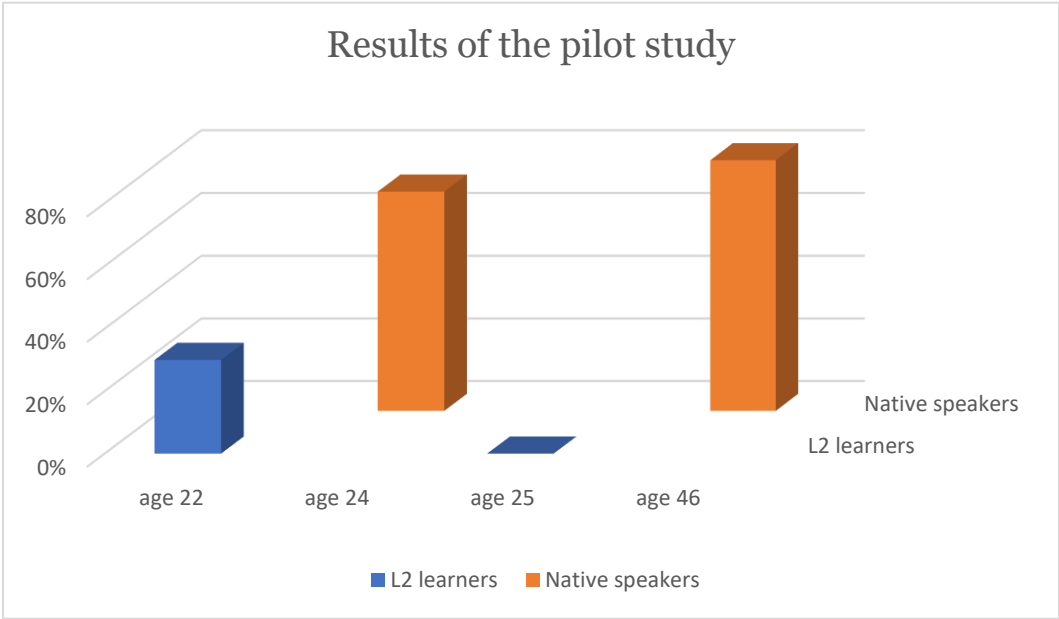
11. Corley, M., & Scheepers, C. (2002). "Syntactic priming in English sentence production: Categorical and latency evidence from an internet-based study." *Psychonomic Bulletin & Review*, Volume 9 (no. 1), pp. 126-131.
12. Dąbrowska, E., Street, J. (2006). Individual differences in language attainment: Comprehension of passive sentences by native and non-native English speakers. *Language Sciences*, Volume 28, pp. 604-615.
13. Felser, C., & Roberts, L. (2007). "Processing wh-dependencies in a second language: A cross-modal priming study." *Second Language Research*, Volume 23 (no. 1), pp. 9-36.
14. Hammerton, J., Osborne, M., Armstrong, S., & Daelemans, W. (2002). Introduction to special issue on machine learning: approaches to shallow parsing. *Journal of Machine Learning Research*, Volume 2, pp. 551-558.
15. Hartsuiker, R. J., Pickering, M. J., & Veltkamp, E. (2004) "Is syntax separate or shared between languages? Crosslinguistic syntactic priming in Spanish-English bilinguals." *Psychological Science*, Volume 15 (no.6), pp. 409-414.
16. Johnson, J. S., & Newport, E. L. (1989) "Critical period effects in second language learning: The influence of maturational state on the acquisition of English as a second language." *Cognitive psychology*, Volume 21 (no. 1), pp. 60-99.
17. Kim, Y., & McDonough, K. (2008). "Learners' production of passives during syntactic priming activities." pp. 149-154.
18. Krashen, S. D. (1981) *Second Language Acquisition and Second Language Learning*. Oxford, United Kingdom: Pergamon Press Inc.
19. Krashen, S. D. (2013). *Second Language Acquisition: Theory, Application and some Conjectures*. Cambridge, United Kingdom: Cambridge University Press.

20. Lenneberg, E. H. (1967). *Biological foundations of language*. New York City, New York: John Wiley and Sons.
21. Liversedge, S. P., Pickering, M. J., Branigan, H. P., & van Gompel, P. G. (1998). Processing Arguments and Adjuncts in Isolation and Context: The Case of by-Phrase Ambiguities in Passives. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Volume 24 (no.4), pp. 461-475.
22. Loschky, L. (1994). "Comprehensible input and second language acquisition: What is the relationship?" *Studies in second language acquisition*, Volume 16 (no. 3), pp. 303-323.
23. Messenger, K., Branigan, H. P., McLean, J. F., & Sorace, A. (2012). Is young children's passive syntax semantically constrained? Evidence from syntactic priming. *Journal of Memory and Language*, Volume 66, pp. 568-587.
24. Pace-Sigge, M. T. L. (2013). The concept of Lexical Priming in the context of language. *ICAME Journal*, Volume 37. Retrieved from http://clu.uni.no/icame/ij37/Pages_149-174.pdf
25. Pickering, M. J., & Branigan, H. P. (1995). Syntactic Priming in Language Production. *Trends in Cognitive Sciences*, Volume 3 (no.4) pp. 136-141.
26. Pickering, M. J., & Branigan, H. P. (1998). "The representation of verbs: Evidence from syntactic priming in language production." *Journal of Memory and language*, Volume 39 (no. 4), pp. 633-651.
27. Potter, M. C., & Lombardi, L. (1998). Syntactic Priming in immediate recall of sentences. *Journal of Memory and Language*, Volume 38, pp. 265-282.
28. Robinson, P. (1995). "Attention, memory, and the "noticing" hypothesis." *Language learning*, Volume 45 (no. 2), pp. 283-331.

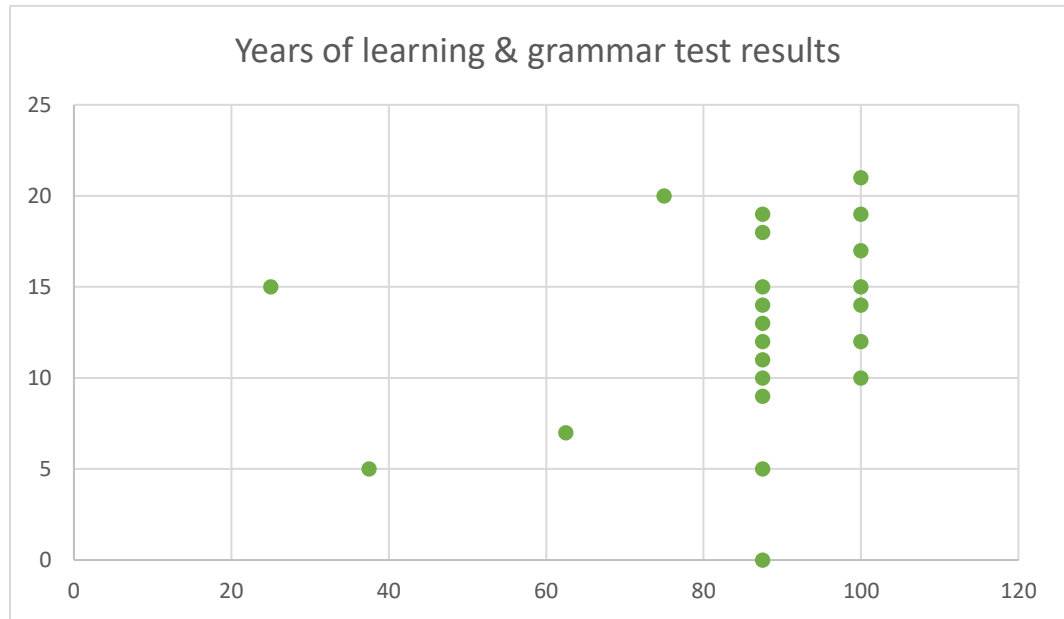
29. Roelofs, A. (1992). A spreading activation theory of lemma retrieval in speaking. *Cognition*, Volume 42, pp. 107-142.
30. Savage, C., Lieven, E., Theakston, A., & Tomasello, M. (2003). "Testing the abstractness of children's linguistic representations: lexical and structural priming of syntactic constructions in young children." *Developmental Science*, Volume 6 (no. 5), pp. 557-567.
31. Savage, C., Lieven, E., Theakston, A. & Tomasello, M. (2006) "Structural priming as implicit learning in language acquisition: The persistence of lexical and structural priming in 4-year-olds." *Language Learning and Development*, Volume 2 (no. 1), pp. 27-49.
32. Segaert, K., Menenti, L., Weber, K., & Hagoort, P. (2011) "A paradox of syntactic priming: why response tendencies show priming for passives, and response latencies show priming for actives." *PloS one*, 6 (no. 10), pp.1-14.
33. Street, James A., & Dąbrowska, Ewa (2012). "Lexically specific knowledge and individual differences in adult native speakers' processing of the English passive." *Applied Psycholinguistics* 35, no. 1 (2014), pp. 97-118.

8. APPENDICES

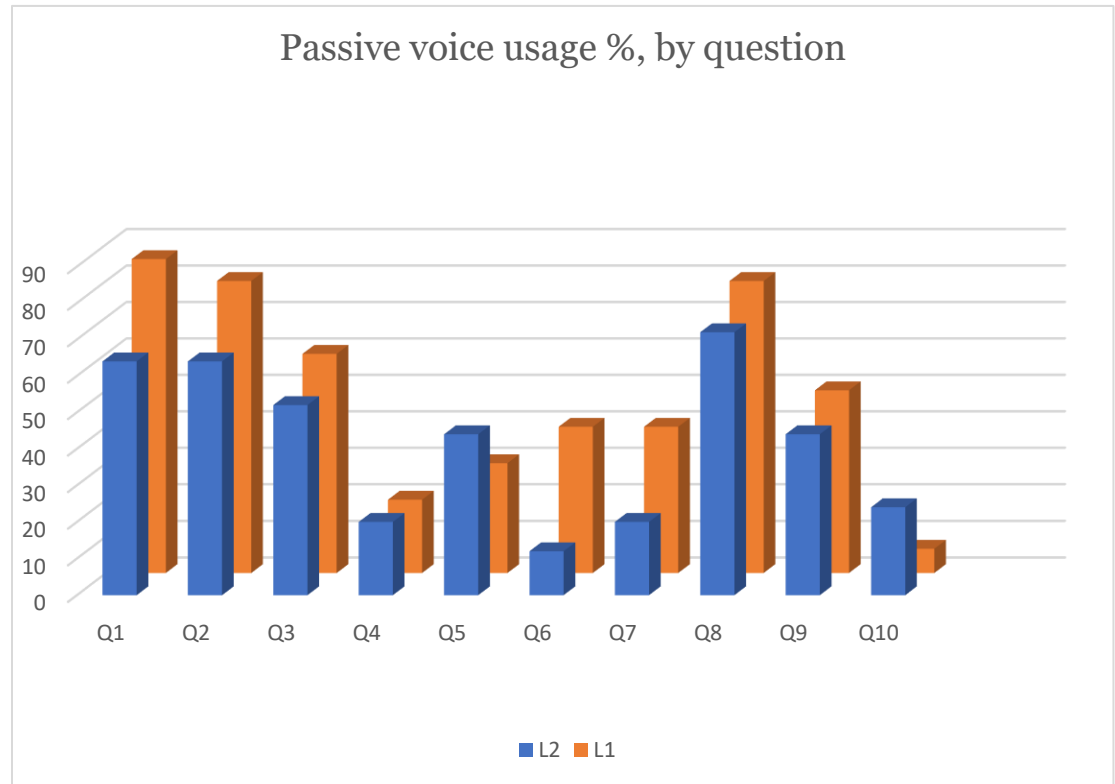
Appendix 1: Second language learners and native speakers' comparison in usage of passives. Pilot study.



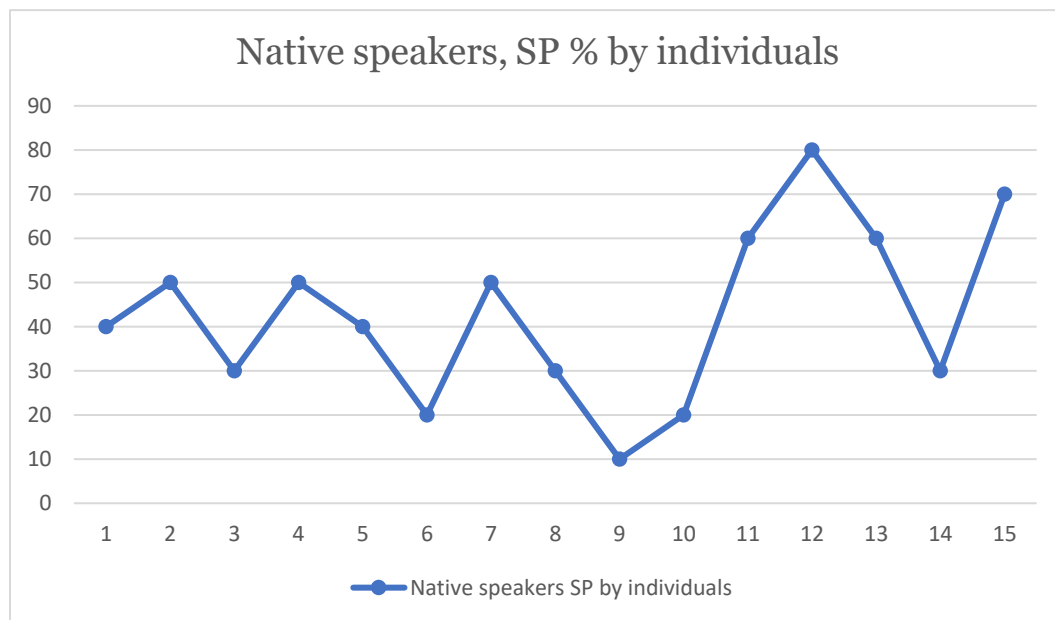
Appendix 2: Grammar test results & years spent learning English.



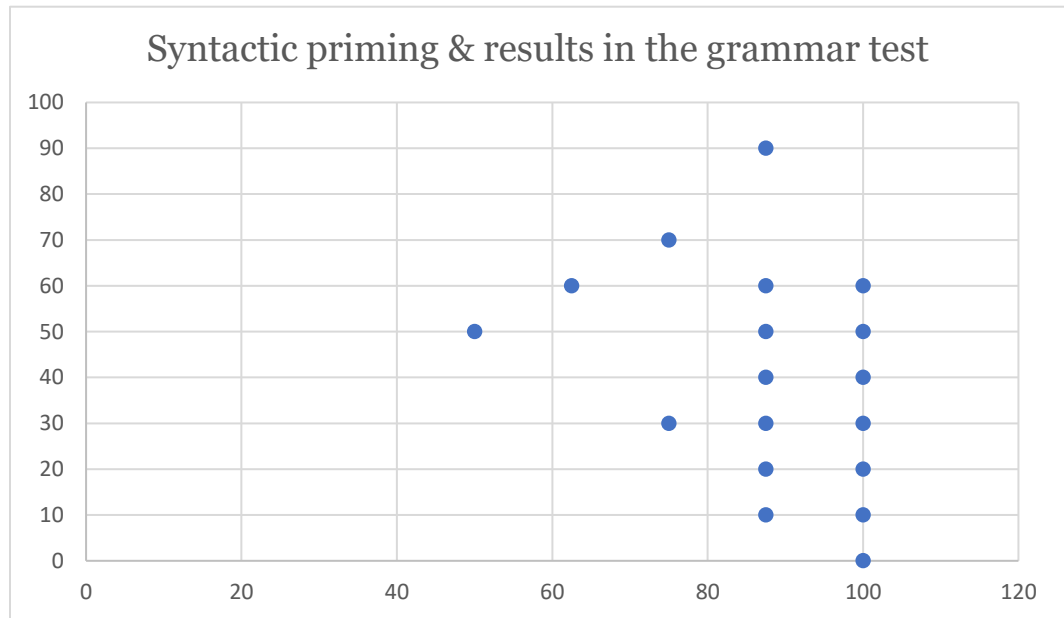
Appendix 3: Native speakers & second language learners, side by side comparison, % of passive constructions by question.



Appendix 4: Native speakers, usage of passives by individuals

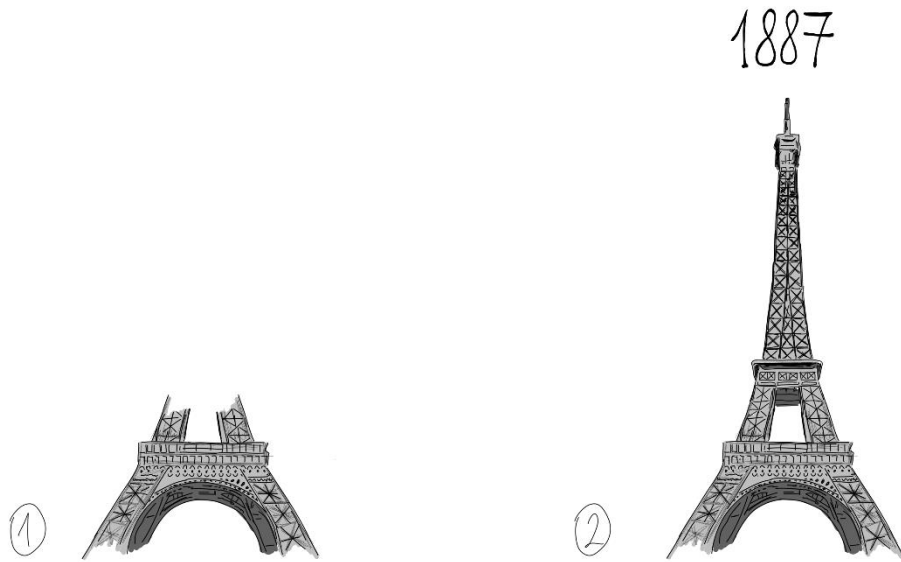


Appendix 5: The correlation of sensitivity to priming & success on the grammar test

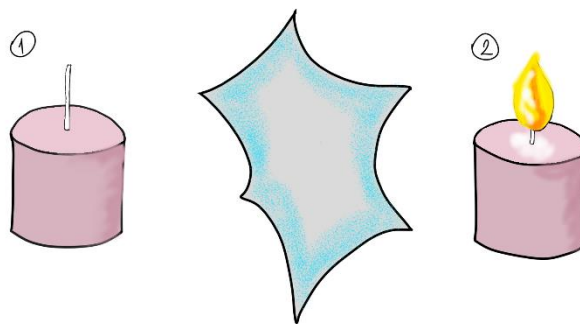


Appendix 6: Pictures used in the research

1. prime



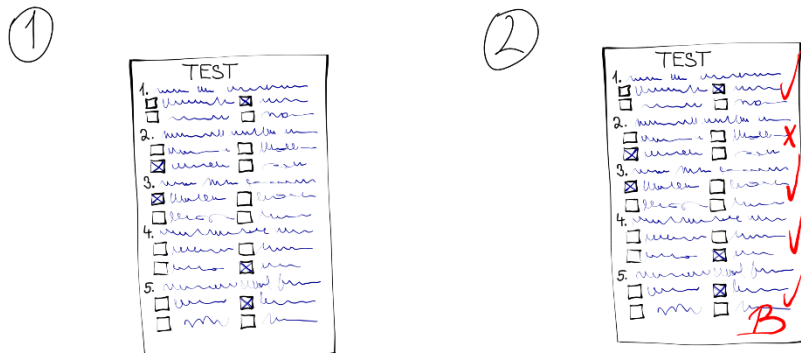
2. target



3. prime



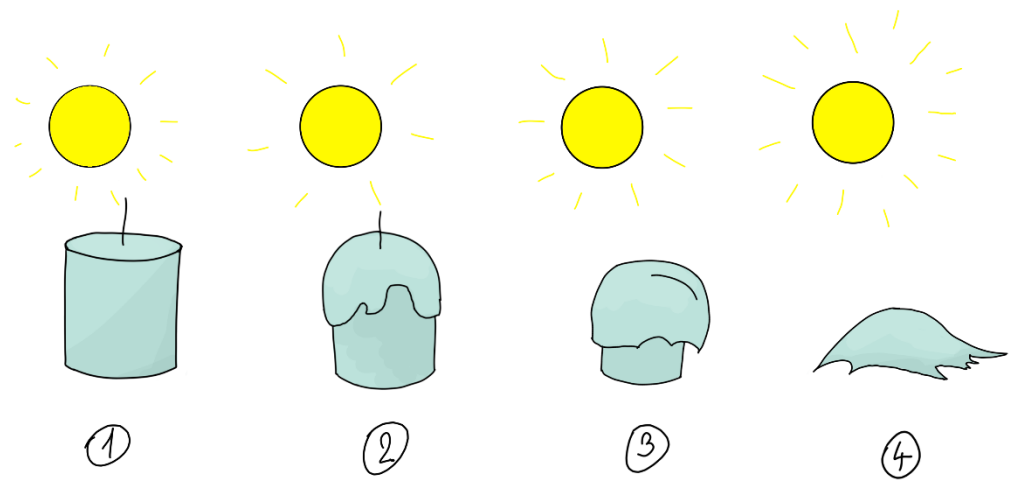
4. target



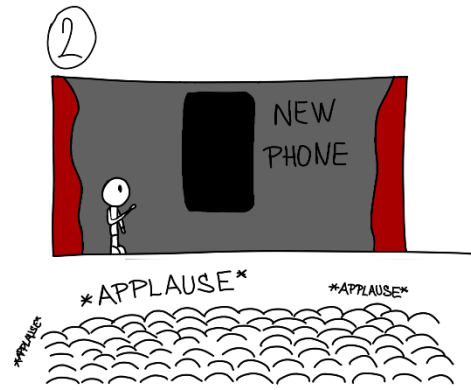
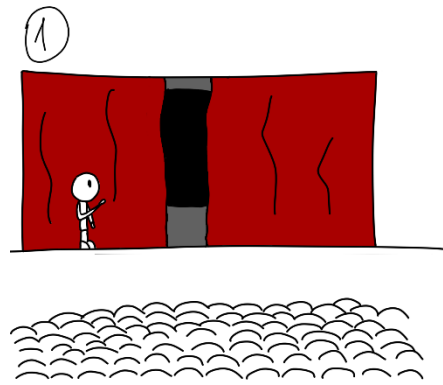
5. filler



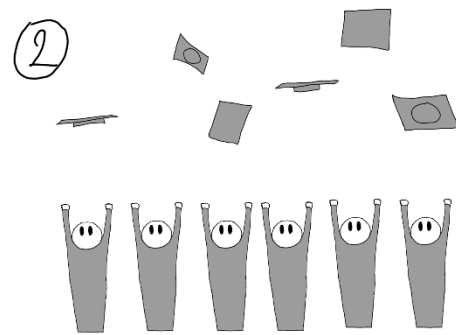
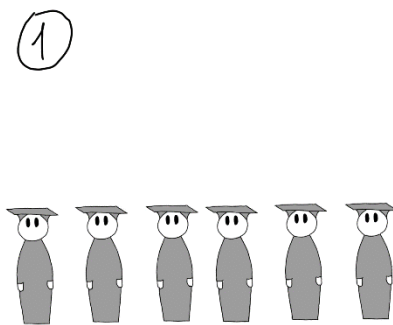
6. prime



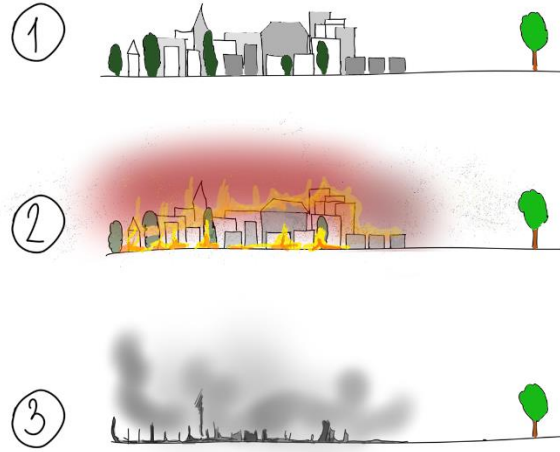
7. target



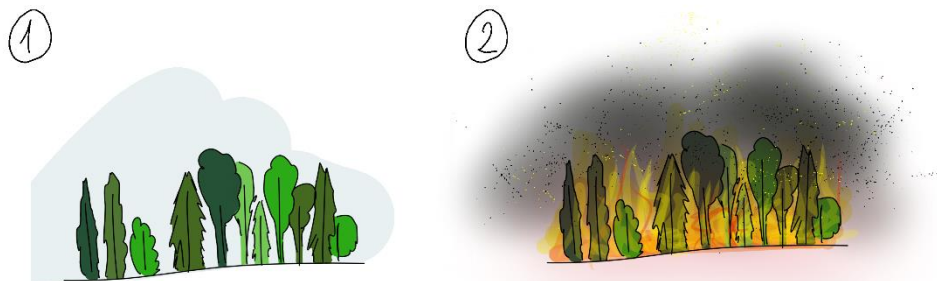
8. filler



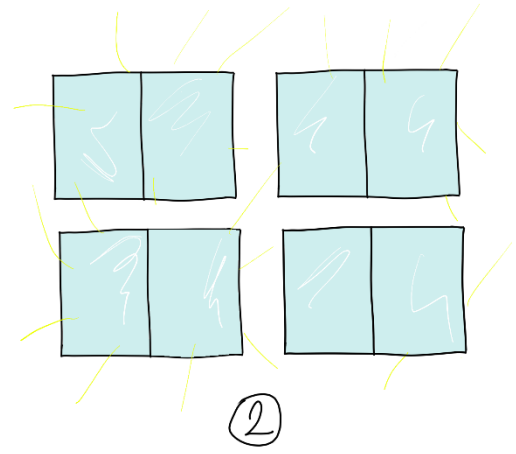
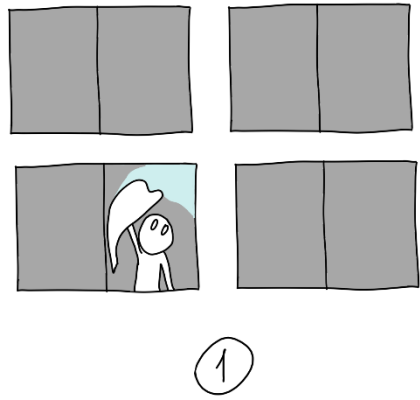
9. prime



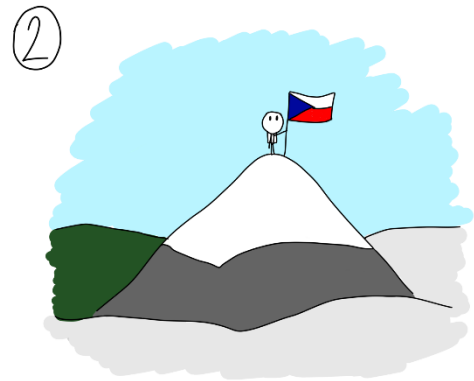
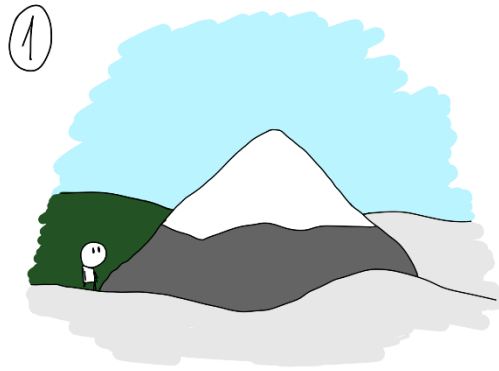
10. target



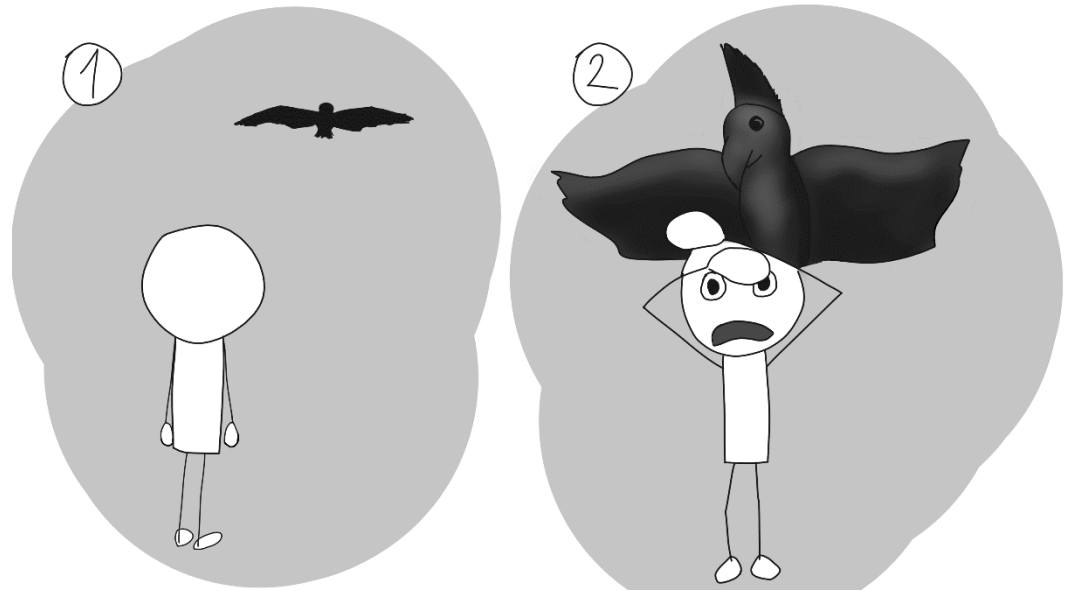
11. prime



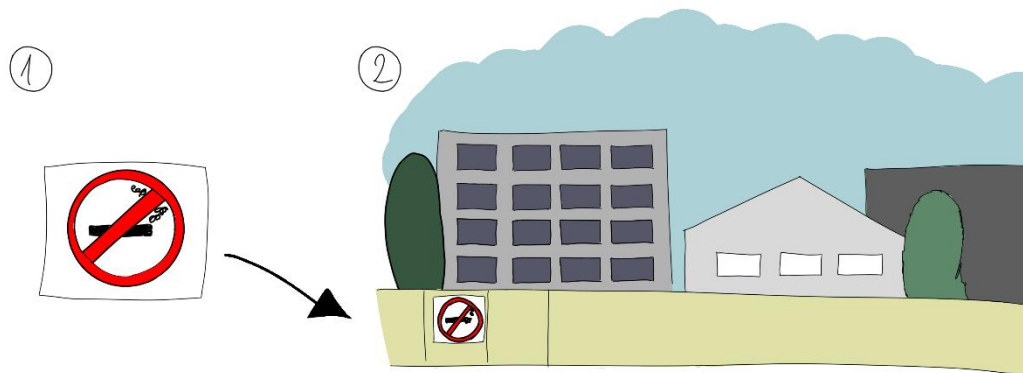
12. filler



13. target

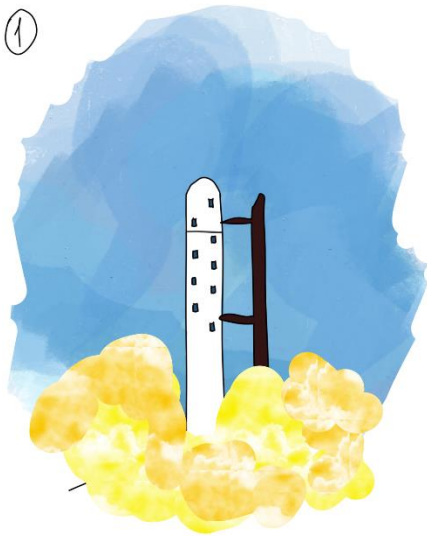


14. prime



15. filler

①



②



16. target

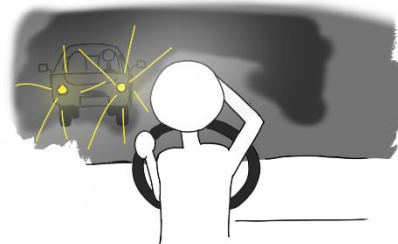


17. prime

①

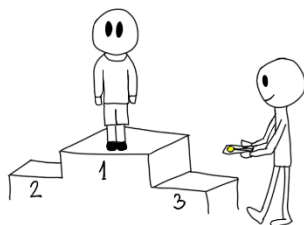


②

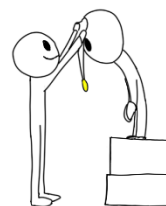


18. filler

①

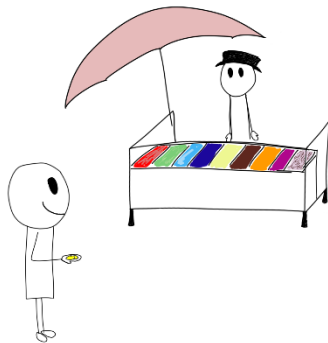


②



19. filler

①



②

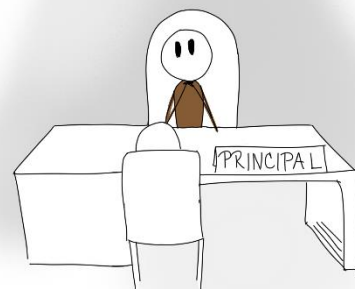


20. target

①



②

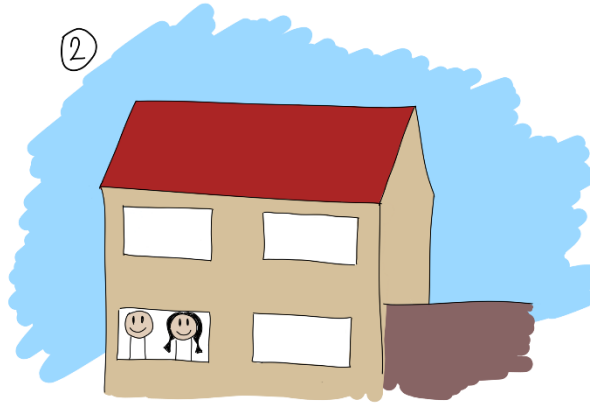


21. prime

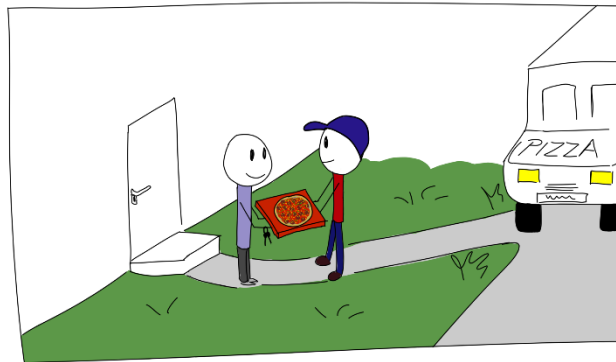
①



②



22. target



23. target

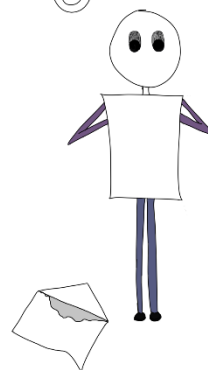
①



②



③



24. target

①



②



9. Abstract

This study investigated the relationship between proficiency in formal education of ESL students and their results in a syntactic priming experiment. Their results were then compared to those of a control group of native speakers in the same task. We try to verify the assumption of many research papers that susceptibility to structural priming entails native speaker-like language proficiency (intuitive language use and minimal use of adult problem-solving skills).

Participants were given a test where the priming items were presented in the form of a multiple-choice question to ensure that the sentence is read and understood, and then they picked the ideal description of a given picture. The description was formulated using a passive structure. They were then asked to describe other pictures in full sentences and here it was observed whether they would use active or passive voice.

This paper replicated several findings from previous literature, where they used essentially the same method.

We were able to replicate the short persistence of priming. Native speakers were overall more likely to repeat given structures, as was hypothesized. However, no clear correlation between the two main investigated factors (formal proficiency in language and the experimental results) was found, even though some non-native speakers had their results in the range of native speakers. Nevertheless, comparison of graphs where the responses are divided by respective questions show similarities between the control group's results and non-native speakers. The graphs that show grammar test with years of learning English, and with the results on the experiment, seem to follow similar trends.

The conclusion is that whether a syntactic structure is more likely to be repeated must depend more on some other factor, which cannot be purely measured in raw numbers for individuals and seems to be unique to the context, since it appears to behave in a similar manner for both native and non-native speakers. In this way, it can indeed be said that non-native speakers are approaching the results of native speakers.

Key words: syntactic priming, second language acquisition, passive voice

ABSTRAKT

Tato práce se zabývá vztahem mezi dovednostmi v druhém jazyku u studentů a jejich výsledky v experimentu na syntaktický priming. Výsledky jsou posléze porovnány s kontrolním vzorkem rodilých mluvčích a jejich výsledkem ve stejných úkolech. Pro začátek bereme v potaz úvahu mnoha výzkumů, které předpokládají že citlivost k primingu znamená, že jedinec je v jazyku pokročilý dá se říct až do úrovně rodilého mluvčího (kde intuitivně používá jazykové znalosti a minimum obecných dovedností osvojených v dospělosti).

Účastníkům byl dán test s větami na výběr, kde jedna z nich představovala popis obrázku (za použití pasivní konstrukce), aby byla jistota že si tuto větu skutečně přečtou. Poté popisovali svými slovy ostatní obrázky. Zde bylo cílem pozorování zda věty které použijí budou v aktivu nebo v pasivu.

Tento experiment úspěšně replikoval několik výsledků předchozích studií, kde použili v podstatě stejnou metodu.

Tento experiment replikoval krátké trvání tohoto jevu skrz následující vyprodukované věty. U rodilých mluvčích byla mimo jiné větší pravděpodobnost zopakování daného typu větné konstrukce, jak se předpokládalo. Žádná hlavní souvztažnost mezi zkoumanými prvky (formální zdatností v gramatice druhého jazyka a úspěchu v primingu ideálně na úrovni rodilých mluvčích) nebyla nalezena, i když u některých studentů se nacházely výsledky v rozsahu rodilých mluvčích. Nicméně, porovnání grafů kde jsou procentuální úspěšnosti rozdělené dle specifických odpovědí a ne dohromady, ani dle jednotlivců, ukazují velké podobnosti mezi rodilými mluvčími a studenty. Zpracování výsledků v gramatickém testu spolu s roky studia angličtiny a s výsledky experimentu ukázalo že tyto dva jevy obecně následují stejné křivky.

Z výsledků se dá říci, že pravděpodobnost zopakování jisté struktury musí záviset na něčem jiném, co se nedá změřit čistě procentuálně a zdá se být unikátní v daném kontextu, navíc by se spíš mělo brát vzhledem k výsledkům rodilých mluvčích.

V takovémto případě jsou tendence obou skupin velmi podobné, s tím že student se obecně vzato přibližují výsledkům rodilých mluvčích.

Klíčová slova: syntaktický priming, osvojování druhého jazyka, pasivní konstrukce