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**Acquisition of Verbal Aspect in L2 English by advanced learners
with L1 Russian and L1 Norwegian: A web-based eye tracking study**

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Abstract

It is well known that the similarities between L1 and L2 (also L3, etc.) facilitate language acquisition, whereas significant differences between them result in non-facilitating effects. These effects are known as Cross-Linguistic Influence (CLI). The main objective of the current study is to investigate the CLI, experienced by high proficient L2 English speakers when the grammatical aspect is being acquired. In order to investigate and compare different L2 processing patterns, I tested L1 speakers of a language with an obligatory contrast between perfective and imperfective aspect (Russian) and a language without such distinction (Norwegian). The participants recruited for this experiment were university students with advanced level of proficiency in English, and the groups were closely matched by proficiency. From the perspective of grammatical aspect, none of these languages bears complete similarity to English. Moreover, these languages differ dramatically in how they encode aspectual semantics in their grammar; hence I hoped to find substantial differences in processing and acquisition of the English system due to CLI. In Russian, with its perfective/imperfective contrast, aspectual information is obligatorily encoded in the verb form. Speakers of Russian link imperfective aspect with ongoing events and perfective aspect with completed events. In Norwegian, on the other hand, there is no grammatical way of encoding aspectual differences, i.e., the same verbal forms are employed to refer to either ongoing or completed events. As for English, there exist specialized forms that encode progressive meaning (e.g., Present and Past Progressive), but the jury is still out as to whether the Simple Past forms encode perfectivity or should be treated as neutral aspect. The goal of this thesis is thus to investigate semantic acquisition and processing of the English Past Progressive and Simple Past forms by studying online changes in gaze patterns by L2 listeners with L1 Russian and L1 Norwegian. The thesis aims to answer the following research questions:

RQ 1: Do native speakers of Russian have strong opposition between Simple Past and Progressive Past in L2 English due to the transfer of similar opposition from their L1 on the processing level?

RQ 2: How will Norwegian L1 speakers behave in the online eye-tracking Picture-Sentence Matching task?

RQ 3: Is there any difference between online and offline results in the L1 Norwegian or the L1 Russian group?

The methodology used to answer these research questions was web-based eye tracking. The experiment was implemented on JATOS platform using Webgazer.js software. The participants were asked to perform a sentence-picture matching task: they viewed visual displays with two pictures on the screen and listened to pre-recorded audio stimuli while their eye movements were tracked. This setup allowed for collecting both processing and conscious choice data performed after each sentence. The task contained audio stimuli of sentences with the Past Simple and Past Progressive verbal forms, and visual stimuli, depicting ongoing and completed events.

The results of the experiment show that:

- 1) Both groups have a strong preference for an ongoing event picture when they listen to sentences involving the verb in the Past Progressive form. The offline responses also reflect this preference. This corresponds to the pattern exhibited by L1 speakers of English.
- 2) L1 speakers of Russian have a strong preference for a completed event picture when they listen to sentences involving the verb in the Past Simple form. The offline responses also reflect this preference. This does not correspond to the pattern exhibited by L1 speakers of English, who had no preference for either completed or ongoing event picture in this condition.
- 3) L1 speakers of Norwegian have a weaker, but still substantial preference for an ongoing event picture when they listen to sentences involving the verb in the Past Simple form. The offline responses also reflect this preference. This does not correspond to the pattern exhibited by L1 speakers of English, who had no preference for either completed or ongoing event picture in this condition.

Taken together, the results indicate that while learners from both L1s converge on target-like interpretation of the Past Progressive form, their interpretation of the Past Simple form is deviant from that of the native speakers even at advanced levels of proficiency. We argue that this is likely due to CLI, with L1 Russian speakers mapping the semantic opposition between imperfective and perfective aspect onto English and L1 Norwegians making a link between the English and the Norwegian Simple Past tense forms.

Key Words: English, Norwegian, Russian, Verbal aspect, Cross-linguistic-influence, Web-based eye tracking.

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1. Introduction

It is well established that languages interact and influence each other within an individual's mind. When it comes to the acquisition of the second language, it is quite clear, that the only other language that can influence L2 is the learner's mother tongue. The fact that the similarities between L1 and L2 facilitate the acquisition of the latter, whereas the differences between them can result in non-facilitating effects, making the process of learning more complex for the L2 speakers (see, f. ex., Slabakova, 2009 for references). According to the Feature Reassembly Hypothesis (Lardiere, 2009), if an L2 learner faces the necessity to reassemble some features from their L1 in order to achieve target-like patterns in L2, it can drastically slow down the process since the L1 patterns are still stronger and more dominant. Consequently, because of the dominance of the L1, its' influence can be found in L2 speaker's processing patterns.

The aim of the current study is to investigate how the L1 speakers of languages with and without a grammaticalized distinction between completed and ongoing events in the past tense acquire the semantics of Past Simple and Past Progressive in L2 English. The verbal aspect is a grammatical property that encodes information related to a particular stage of the event, for instance, it can denote a difference between ongoing and completed events. To convey this semantics the aspect English utilizes a set of verbal forms, for instance, Past Progressive or Past Perfect. When it comes to the Simple Past tense, some scholars (f. ex., Smith, 1997) have argued that this form necessarily refers to the completed event. However, other studies (f. ex., Binnik & de Swart, 2012), have questioned this and categorize this form as the so-called neutral aspect. They argue that speakers need more context to determine whether the described event is ongoing or completed. Some empirical studies on the processing of the Simple Past tense in L1 English (see, f. ex., Martin, 2019 or Arunachalam, S. & Kothari, A, 2011) are in line with this intuition.

In the current study, we tested speakers with two different first languages: Russian and Norwegian. As many other Slavic languages, Russian verbal system includes a category of grammatical aspect. Each verb in Russian is marked for either perfective or imperfective aspect. The aspectual distinction in Russian is expressed by the means of morphology – a native speaker of Russian understands whether a verb is perfective or imperfective based on the presence or absence of prefixes (to mark the perfective aspect) and suffixes (to mark the so called secondary imperfective; (see Maslov, 2004, p. 500). For instance, in aspectual pair *risovat'* – *narisovat'* (to paint IMP – PERF), it is the prefix *na-* that shows that *narisovat'* is perfective and refers to a completed event, and this system applies to both grammatical tenses

(past and non-past). Thus, example (1) refers to a completed event with a specific result and cannot be interpreted as an event that has been interrupted or ongoing. Grammatical aspect is unambiguously signaled by the form of the verb, and no other context is needed in order to convey the notion of completeness.

(1) *Byl* *vecher.* *Mama* *narisoval-a* *vaz-u*
 be.Past evening. Mom.NOM paint_{PF}-Past-Fem vase-Acc

‘It was evening. Mom painted a vase’

Conversely, example (2) involves a verb in the imperfective aspect and refers to an ongoing event.

(1) *Byl* *vecher.* *Mama* *risoval-a* *vaz-u*
 be.Past evening. Mom.NOM paint_{IMPF}-Past-Fem vase-Acc

‘It was evening. Mom was painting a vase’

Norwegian in the current study is used as an example of a non-aspect language. It does not have specialized grammatical means of expressing the semantics of verbal aspect. There exist lexical means to convey the semantics of ongoingness/completeness, such as *å holde på gjøre noe* (‘to keep on doing something’), *å være i ferd med å gjøre noe* (‘to be in the middle of doing something’) etc. At the same time, previous studies based on production data (Behrens et al., 2013) showed that the share of these expressions is approximately 39% of all of the instances of ongoing events in the past, which signals that this semantics is not obligatorily expressed in Norwegian. It is also important to mention that not all the verbs can be used in combination with these expressions. For instance, *å være i ferd med* can only be used with verbs, that denote achievements, for instance, *de var i ferd med å nå fjelltoppen* (they were in the middle of reaching the top of the mountain). At the same time, the Norwegian simple past tense (f.ex., *barna bakte ei kake*) is underspecified in terms of completeness, in other words, this form can be interpreted as either referring to an ongoing or a completed event (Tonne, 2006). This indicates that the Norwegian past tense is an ambiguous structure that requires additional context in order to say whether the event is ongoing or completed.

Taking into consideration the aforementioned distinction between the verbal systems of the two L1s, I will to investigate, whether and to what extent L1 Russian and L1 Norwegian speakers are influenced by their L1s in the processing of L2 English, more specifically in their

interpretation of the Past Simple and Past Progressive tenses in English. In order to investigate this, I formulate the following research questions:

RQ 1: Do native speakers of Russian have strong opposition between Simple Past and Progressive Past in L2 English due to the transfer of similar opposition from their L1 on the processing level?

RQ 2: How will Norwegian L1 speakers behave in the online eye-tracking Picture-Sentence Matching task?

RQ 3: Is there any difference between online and offline results in the L1 Norwegian or the L1 Russian group?

In order to answer RQ1 and RQ2 I need to use experimental methodology that will allow me to research the patterns of online L2 processing. I will use the design from Minor et al. (2020) – Processing Grammatical Aspect in a Visual World: English vs Russian. In this study, the native speakers of Russian and English were investigated from the perspective of their interpretation of aspect in their L1. This study will provide a baseline for L1 and L1 English processing (and interpretation) of aspectual distinctions in these target languages.

Based on the previous research that focused on L1 processing, this thesis will investigate processing of grammatical aspect in L2 English by speakers of two different L1s: Russian and Norwegian. I will adapt the experimental paradigm and the set of stimuli from a previous VWP study by Minor et al. (2020), but use web-based eye tracking – a recent innovation of the existing eye-tracking methodology that makes data collection easier, allowing to achieve comparable results to traditional infrared eye-tracking (see Vos et al., 2021).

In order to answer RQ3 I will compare the online eye-tracking results with the results of the offline Picture-Sentence matching task that the participants performed after listening to the target sentence. That will allow me to assess whether the participants' conscious choice is the same or diverges from their processing patterns.

To answer these research questions I recruited the L1 Norwegian and L1 Russian speakers. I recruited highly proficient L2 speakers of English (levels B2-C2 according to CEFR), currently enrolled at the bachelor or master programs at the University of Tromsø – The Arctic University of Norway and The Northern Federal Arctic University (Arkhangelsk, Russia). Participants received links with the instructions and the experimental tasks and completed the tasks on their own computers.

My thesis aspires to contribute to the studies on the cross-linguistic influence and L2 processing. To the best of my knowledge the L2 processing of English grammatical aspect has not yet been studied for the L1 speakers of Russian and Norwegian. In addition, it will contribute to the understanding of how L1 speakers of Norwegian interpret the ambiguous past tense, which is studied theoretically, but not empirically. Methodologically, it will add to the pool of studies that employ web-based eye tracking, which is still a novel methodology and the positive and negative experience of using this methodology can help improve the data collection in future.

From the practical perspective, this project can have some teaching implications. Knowing how L2 learners interpret Past Simple and Past Progressive in English and what effect cross-linguistic influence may have, ESL and EFL teachers can adjust their practices in order to better explain the meaning of the verbal forms and help the learners overcome non-target-like CLI-driven interpretations and eventually master the target-like semantics of aspectual forms in English.

This thesis includes six chapters:

Chapter 1. Introduction. This chapter contains the main research background that my study is based on, my objectives and research questions, scientific and practical significance. It will also include the thesis layout.

Chapter 2. Theoretical background. This chapter includes important theoretical and empirical works on Cross Linguistic Influence; Second Language Acquisition and theoretical models of SLA; Language Processing (especially second language processing); Eye tracking (also web-based eye tracking) and Visual World Paradigm; Grammatical Aspect in general and in English, Russian and Norwegian in particular. In addition, it will include an overview of the studies on the processing of grammatical aspect in English as L1 and L2, Norwegian as L1 and Russian as L1, since these studies are especially relevant to the current project.

Chapter 3. Research Questions and Experimental Methodology. This chapter includes a set of my research questions, presents demographics of the recruited participants, experimental stimuli and a description of experimental procedure. In addition, it includes predictions and hypotheses for the experiment.

Chapter 4. Results. This chapter summarizes the results of the proficiency task as well as the results of the eye-tracking experiment and the statistical analysis of the results.

Chapter 5. Discussion. In this chapter, I provide a discussion of the findings in light of the research questions, as well as lay out some limitations of my study and the ways to overcome them in future.

Chapter 6. Conclusion. In this chapter, I provide a brief summary of the core findings and their implications and suggest some potential follow up studies.

Finally, this thesis includes a Reference List and an Appendix with experimental materials, which were used in the experiment.

2. Theoretical Background

In this chapter, I present the theoretical and empirical research that my project is based on. I will discuss such notions as transfer and cross-linguistic influence. I will say a few words about language processing in general and second language processing in particular and talk about the ways to study language processing, in particular eye tracking because this methodology is employed in the practical part of my thesis. In addition to that, the background gives an overview of the grammatical aspect systems in the three languages involved in the project: Russian, English and Norwegian and lays out some debates related to the description of grammatical aspect in these languages. In addition, it provides an overview of the available data on the processing of grammatical aspect in L1 English, Russian and Norwegian and L2 English.

2.1. Language Transfer and Cross-Linguistic Influence

It has been long known that languages in one's mind actively interact with each other. This interaction triggers the phenomena, known as **language transfer**. Odlin (1989, p. 27) defines it as the influence, coming from similarities and differences that a new and all previously acquired languages have, even if they are not acquired perfectly. It means that while acquiring a new language we tend to base our learning on the linguistic knowledge that we already have. In case of L2 acquisition our native language is the only source of transfer. It is also important to say that the phenomenon of transfer is sometimes mentioned as **cross-linguistic influence (CLI)**.

Since transfer results from similarities and differences between languages, it is logical to conclude that it can be either beneficial or harmful. In linguistics, these notions are referred to as **positive** and **negative** transfer (also known as **facilitating** and **non-facilitating effects**). Due to it, speakers of some L1s can be superior over other L1s while acquiring the same L2. For instance, speakers of L1 Spanish experience considerably fewer difficulties while acquiring English in comparison to L1 Arabic due to the high frequency of cognates. It can be applied for acquisition of other subsets of a language (Odlin, 1989, p. 26).

As it was already mentioned, acquiring L1 does not presuppose significant difficulties for an individual. As Lardiere (2009) says, there are no easier and more difficult features in L1. Acquiring L2, however, one uses the metalinguistic knowledge from L1 and therefore has to unlearn some of L1's features that do not match this L2. Obviously, the larger difference between features is, the harder this process of unlearning will become. Just as in Westergaard

(2003), Norwegian L1ers, who acquire English, have to unlearn V2 word order, which gets especially challenging in the case of topicalized sentences due to notable differences between English and Norwegian. Thus, in this example differences in word order in these two languages become the source of CLI and that is the reason the Norwegian L1ers, learning English, can produce sentences like *Yesterday went I to the store* at the beginning stages of acquisition. However, as mentioned by Johnson & Newport (1989), who compare English L2 speakers, exposed to L2 at the different stages of life, from childhood to adulthood, L2 does not become impossible to learn with the age, and even those, who start learning L2 after puberty are capable of achieving native-like. Nevertheless, the early exposure would be an indisputable advantage due to children's neuroplasticity, which decreases with age.

Here it is also important to mention the notion of **interlanguage (IL)**. As Selinker (1982) states, it is the linguistic system that occurs while an individual is on his/her way to acquire L2 and governs the knowledge of L2 this individual has. IL deviates from **target language** (the one that this individual learns) – the representations from IL are taken from both L1 and L2, and differences between them act as a source of CLI.

It is well known that CLI is attested at all language levels and can have different manifestations. The most obvious and noticeable one is the influence that takes its source in differences between phonetic systems of L1 and L2 – the phenomenon that is called **accent**. When children are exposed to L1, their articulatory apparatus is being formed and fixed in the way they are able to pronounce the sounds of L1 – just as if the human muscles are getting used to doing particular exercises, feeling uncomfortable after being exposed to the new ones. It also applies to SLA, when our L1 articulation is exposed to a new phonetic system. As mentioned in Zsiga (2013, pp. 460-461), an adult L2 speaker may replace a sound from L2 with a similar sound in L1, found in the same category. For instance, a French learner of Russian will not be able to produce the rhotic trill, replacing it with a native uvular R. And, according to Flege et al. (1995), almost all native speakers of Italian (in a sample of 120 participants), who lived in Canada and started learning English after the age of 15 could not attain English-like pronunciation, almost irrespectively of the length of residence.

However, this does not mean that one cannot master their L2 pronunciation after puberty. As Boengaerts (1999) suggested, deliberate phonetic training can help an individual reach a nativelike level of pronunciation. This suggestion was proven by a series of studies of late learners, where some of the L2ers were judged as nativelike. Despite this, Boengaerts still believes that this native-like attainment is a unique phenomenon, which is likely to be dependent on individual characteristics of a learner. Similar results were attested in Birdsong

(2007), where some of the late learners of French performed with native-like vowel length and voice onset time. Again, as it is obvious from the aforementioned studies, the majority of L2ers are still giving themselves out with a foreign accent.

When it comes to vocabulary and semantics, it seems like the native-like attainment is a highly likely developmental scenario. Slabakova (2006) claims that there is no critical period for semantics, which means that nativelikeness is achievable irrespectively of the onset of L2 acquisition. Hellman's (2011) study of Hungarian L1ers late learners of English also showed that highly professional speakers have the vocabulary, compatible to that of native speakers and early bilinguals. However, the possibility of native-like attainment does not mean that non-advanced developmental stages are deprived of CLI and that is why I would like to discuss possible CLI, appearing on a semantic level.

Very common CLI phenomenon is known as **false friends** – words in different languages that have similar phonetic form, but different semantic meanings. A few articles, such as Escribano (2004), point out that L2ers are more likely to make an error when it comes to these false friends. Otwinowska & Szewczyk (2019) also mention that the learnability of the false friends is smaller, compared to the control words. The opposite happens to **cognates** (words, similar in form and meaning) – they are learned and processed faster than non-cognate controls (see Brenders et al., 2011; Marecka et al., 2021, Otwinowska & Szewczyk, 2019).

Similar things happen to the syntactic structures. When L1 interferes with L2, syntactic structures, deviating from the target language, will also be the ones to give a non-native speaker out. This CLI is represented in syntactic features of L1, coming out in L2, while L2ers are developing their language skills. As it is mentioned in Westergaard (2003), the Norwegian L1 learners of L2 English use V2 as a default word order, even though V2 is not typical for English. Another well-known illustration for CLI would be the subject drop in L2 English. As said in Park (2004), the speakers of Romance languages have a tendency to omit personal pronouns in L2 English, because their L1 allows it. At the same time, the speakers of non-pro-drop languages do not do it.

Thus, it is obvious, that the interaction of two or more languages result in various changes on the individual knowledge of these languages depending on the sets of languages this individual knows. Since the current work is devoted to CLI appearing in the process of second language acquisition, the next chapter will be devoted to this notion.

2.2. Second Language Acquisition

The notion of **second language acquisition** (SLA) has been around for more than half of the century, originating as a sub-discipline of applied linguistics, bearing the pedagogical implication and further developing into an independent and autonomous field within linguistics. Despite vast amount of literature devoted to SLA, the definition can still be ambiguous. As mentioned in Gass et al. (2020), by saying “second” we may refer to any language, that is learned after one’s L1 (after one’s mother tongue is already in place).

This definition inevitably raises a question of bilingual L1 acquisition, which is, as Pearson (2009) states, a situation when an individual is acquiring two languages simultaneously (f. ex., in **one parent – one language** model). In this case, the acquisition of the following language(s) will be influenced not by one stable language system, as it is in case of monolingual, learning their L2, but two, and each of the L1s in this case can be the source of transfer for the languages, acquired further in life. Moreover, as Slabakova (2016) notes, in the recent years there has been a vast amount of literature, separating L2 acquisition (L2A) from L3 acquisition (L3A). It remains to be seen how much similarity and difference there is in the processes governing L2A and L3A, and whether the definition given in Gass et al. (2020), would need to be adjusted based on the recent findings pertaining to the L3A.

It is also important to distinguish the notion of acquisition from the notion of learning, since these two processes may not always mean the same thing different, despite often being used interchangeably in the SLA framework. In Krashen (1982), the learning is a **conscious** process of becoming aware of the existing rules of a language, while acquisition is **subconscious** process based on developing so-called language intuition. In other words, a speaker, who has been picking up the grammar from the input, simply knows that the language sample is correct or not without having to consciously apply specific rules, which they were taught explicitly. At the same time, in the case of SLA the processes of learning and acquisition often go hand in hand, with declaratively learned knowledge becoming more and more automatized.

One of the most prominent approaches to the studies of language acquisition is related to Universal Grammar (UG). As described in Valian (2009), after Noam Chomsky many researchers started assuming that there is a set of linguistic principles and parameters that are universal across languages, that are either on or off in a particular language. Exposed at a very young age, a typically developing human being can master any language to a native-like level.

For instance, a child of Asian origin, adopted by an ethnically Norwegian family in the infancy will not show any differences from their peers in their Norwegian proficiency in any language domains. That leads us to understanding that we have an innate capacity to learn any language we are exposed to within a particular age by accessing the set of some inborn capacities to acquire a language. When it comes to SLA, the belief that people acquire L2 based on their L1 with further shift to L2 properties is quite strong. This idea goes in line with the hypotheses that deal with L1 as the initial states assume that the L2 learner makes basic assumptions about L2 according to what their L1 has to offer. These ideas are discussed in a bit more detail below.

According to **the Full Transfer/Full Access Hypothesis (FTFA)**, developed by Schwartz & Sprouse (1996), while L2 learners have full access to the UG, the initial stage of L2 is the final stage of L1. Having received enough L2 input, L2er resets the parameters so that they match the L2 target, using their access to the UG. In other words, L2ers copy L1 grammar and restructure during the acquisition process. However, this hypothesis has been criticized for not making it clear how and when the L2er gives up the L1 features (cf. evidence that patterns from L1 and L2 may be used interchangeably by intermediate L2 learners) and, most recently, evidence that hardly fits into the FTFA models stemming from the patterns observed in L3A (see e.g., Westergaard, 2021; Westergaard et al. 2022).

Another approach that models the influence of L1 grammar at the initial state of SLA is **the Minimal Tree Hypothesis** by Vainikka & Young-Scholten (1994). According to this hypothesis, the initial state of L2 contains only lexical categories from L1, while the functional ones are absent at first and are gradually added later from the UG based on the input one receives. However, some studies, see e.g., Haznedar (1997) and the references therein, point out that there are functional categories at the very beginning levels of L2A. According to White (2003), even in some studies of Vainikka & Young-Scholten, the low-proficiency participants from non-article languages produce the articles, which are considered a functional category.

More recent approaches try to provide more nuanced explanations of the processing and acquisition patterns that L2ers exhibit. It is important to mention **The Feature Reassembly Hypothesis (FRH)** by Lardiere (2009) which argues that one needs to reconfigure the features existing in L1 so that these features become applicable to L2. Initially, L2ers search for L1 closest equivalents in the target languages. Slabakova's (2009, see also Cho & Slabakova, 2014) **Cline of Difficulty** builds on the FRH and proposes that mapping L1 morpheme to L2

morpheme is less challenging for an L2 learner than e.g., transferring contexts and concepts. The cline of difficulty is illustrated in Figure 1.

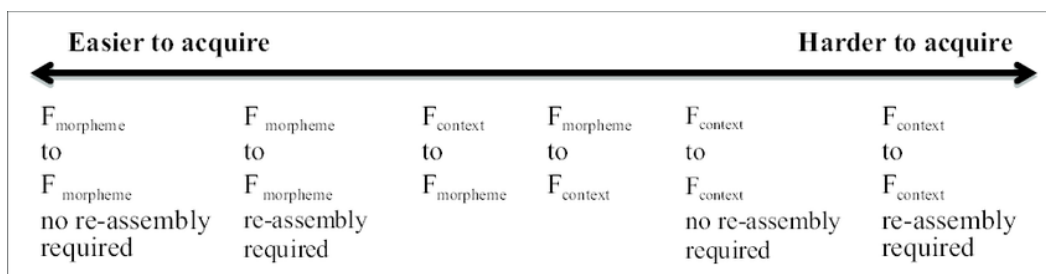


Figure 1. Cline of Difficulty (Cho & Slabakova, 2014)

These ideas are quite relevant for a theory of CLI, more specifically in the domain of the acquisition of functional categories. Even similar categories in the two languages are rarely identical, and therefore transfer-based errors may be expected.

Finally, when adults start acquiring L2, they already have a strong dominant linguistic system in their mind and in order to achieve target-like patterns in L2 this system has to be inhibited. Inhibition of one's dominant language takes time and effort. Green's (1998) **Inhibitory Control Model** postulates that our language systems are in general activated on *different* levels, unless an individual is a completely balanced bilingual with both languages being equally dominant and that is an extremely rare case. If a particular situation requires the prevalence of one language over another, the mechanism called **inhibition** adjusts the activation level so that a speaker can use their less dominant language. Clearly, the more dominant language is the more effort it takes to inhibit it. Thus, when L1 is not inhibited completely, it becomes the source of possible CLI, which is attested in various processing studies. Crucially, we should distinguish CLI in the domain of acquisition (how structures in previously acquired languages influence the acquisition of subsequent languages) and CLI in processing (how the more dominant language affects language processing of the less dominant language in real time). Future studies will definitely shed more light on the role of CLI on processing and acquisition. I will continue discussing language processing in more detail below.

2.3. Language processing

It is clear that one's knowledge of a language will be somewhat different from the language one can produce and comprehend, and in order to see, at least roughly, how the language is represented in one's mind it is important to study how this person processes the language. As an individual starts to get some linguistic input (a word, a sentence etc.), they start to process it to find out the meaning. We know from a big number of studies that this process happens

incrementally, i.e. we do not wait until we get the whole item to start analyzing it. This has been proven for the levels of lexis – similarly sounding words, f. ex., candy vs candle, compete with each other until more sounds are released (Dahan & Magnuson, 2006, pp. 265-268) or syntax – the meaning of a sentence unfolds as more parts of this sentence get available to a recipient (Tanenhaus et al., 1995).

As said in Fodor (1998), processing is a job, completed by **parser** – the system that quickly analyzes each incoming piece of input from the morphological and syntactical perspective and thus figures out the meaning of an utterance a speaker reads or listens to. Since processing goes incrementally, the parser does the analysis multiple times as the new items of an utterance become available; fitting the semantic meaning of the words, that it got into the given syntactic construction and the existing pragmatics.

The study of how one processes language is not a simple task – the old traditional methodology of language acquisition would only show what the speaker can produce or comprehend, based on the speaker's judgment. This information can only provide indirect evidence on how a human being processes a language. Methodologies became more sophisticated in the last few decades with the advent of advanced experimental techniques, such as eye-tracking, electroencephalography, functional MRI etc. These methods allow the scientists to dig into the way one processes the language by studying the online reactions that our mind yields to different linguistic units.

For instance, in EEG studies of L1 and L2 processing, see f. ex., Kaan (2007) for references, researchers investigate so-called **brain event-related potentials**, with the **MMN**, **N400**, **P600** and **ELAN (early left anterior negativity) effects** being the most frequently mentioned ones. Eye tracking also helps us see how people process language at the sentence-, phrase- and even word-level and how interpretation dynamically unfolds over time. The studies do that by examining eye-movements and gaze fixations of the participants over time. Since eye tracking is the main methodology employed in the current study, it will be discussed in more detail in section 2.4 below.

2.3.1. Second Language Processing

Since the acquisition of L1 and L2 are not the same processes, it is important to investigate how much L1 and L2 processing patterns overlap and how these processes differ, at least before L2ers achieve near-nativelike levels. For instance, evidence from event-related potentials,

mentioned in Rossi et al. (2006) show that low-proficiency L2 speakers of German and Italian exhibit P600 to a weaker extent compared to highly proficient speakers. ELAN effects to certain linguistic patterns are almost non-detectable for low-proficient L2 speakers. Another important feature in L1 processing that is often deficient in L2ers is the ability to predict upcoming information based on various cues (f. ex., DeLong et al. 2005; Dikker et al. 2010, a.o.).

At the same time, processing studies have reported evidence that predictive abilities may develop with advanced proficiency, and especially for properties that are also present/similar in the learners' L1. For instance, proficient L2 speakers of Spanish in Grüter et al. (2012) do not show the same efficiency predicting grammatical gender, compared to the L1 speakers. On the other hand, in Hopp (2015), L2 speakers of German used case marking to make predictions, however, to a lesser degree than native speakers. Data from Dussias et al. (2013) suggest that late learners of L2 Spanish with L1 Italian can use articles as cues to predict the upcoming noun, which is arguably attributed to linguistic similarity between the L1 and the L2. At the same time, L1 speakers of English (a language that lacks nominal gender) did not show any comparable processing patterns. To sum up, evidence from L2 processing studies suggest that the ease and efficiency of L2 processing can partly be related to proficiency and partly to the similarities between languages: the closer the L1 and L2 representations are, the easier it is to process them in the L2.

2.4. Eye tracking

Eye tracking is a technique, which is commonly used in many branches of research, including language acquisition. As mentioned in Yarbus (1967), that the main principle of this technique stems from its name – a special device tracks and records eye movements and fixations while a speaker of a language or languages is performing a comprehension task. As reported in Wade & Tatler (2009) the technique originates in the XIX century when scientists started to study the eye movements using sets of mirrors or lenses.

One of the first people who noticed that the process of reading does not simply involve going smoothly from one word to the other in a row was M. Lamare. After a series of experiments, carried out in the end of 1870-s he reported that the time used on reading different text lines of the same length differs. He also noticed that the reading was not linear. According to Wade (2010), Lamare was working together with Émile Javal, who is believed to be first scientist to mention the notion of *saccades* – rapid eye movements. As Płużyczka (2018) mentions, one of the most outstanding scientists in the eye-tracking research was Edmund Huey

who is known to have built the very first eye tracking device using contact lenses attached to an aluminum indicator. This device differed drastically from its modern analogue. Unlike now, the usage of eye-tracker was much more invasive, and Huey had to use drugs to smoothen the experimental procedure for his subjects.

Now the eye tracking has evolved from using invasive uncomfortable devices into a much smoother and easier researcher- and participant-friendly procedure. In cognitive research in 1990-s, see f. ex., Tanenhaus et al. (1995), Ballard et al. (1995), the eye-tracker was attached to a headband and therefore fixed in a way that allowed the researchers to monitor subjects' eye-in-head position. The eye-tracker itself includes an infrared camera. The technology advanced, and Babcock & Pelz (2004) built and described the lightweight eye-tracking device that was portable and therefore accessible to employ in the further research. Later the infrared camera evolved and “moved” to the computer screen – the tasks that would be presented on a computer did not require a headband anymore and a monitoring device was attached to the screen, which made the whole procedure more comfortable for the participants.

2.4.1. Web-based eye tracking

With the general development of online research methodology, see e.g., Semmelmann & Weigelt (2017), several attempts to employ web-based eye tracking took place. The combination of *WebGazer.js* software and a simple webcam, attached to a personal computer seemed to be an affordable alternative to laboratory-based experiments. The quality of the data obtained from such experiments is reported to be comparable to traditional infrared eye-tracking, unless very detailed spatial location or very high temporal resolution of the fixations are needed, or unless the researcher is limited by a small number of trials or participants.

Web-based eye tracking became particularly popular during the COVID-19 pandemic due to the possibility to collect the data remotely. However, being able to recruit the participants from different places without having to travel gives the access to the broader and more diverse population, which is a significant advantage of this methodology.

More research is certainly needed, but the available comparisons of the reliability of web-based eye-tracking data are quite promising. Vos et al. (2021) compared the results from infrared and web-based eye trackers using the VWP (Visual World Paradigm) experimental design with two pictures on the screen. According to this study (see the results presented in a graph below), webcam-based eye tracking gives comparable results to its infrared alternative.

It is worth mentioning however, that a larger number of the participants (double the sample size of the infrared alternative) was recruited for the web-based task. In addition to that, a webcam-based eye-tracker needs to be recalibrated more frequently in order not to lose the special precision, which is substantially lower, compared to the infrared camera.

According to Figure 2, the data that comes from web-based and infrared eye-tracking replicates quite closely (I would say is almost identical) and this validates the use of web-based tools instead of the infrared one. Similar results were attested in other recent studies, such as Slim & Hartsuiker (2021) and Degen et al. (2021).

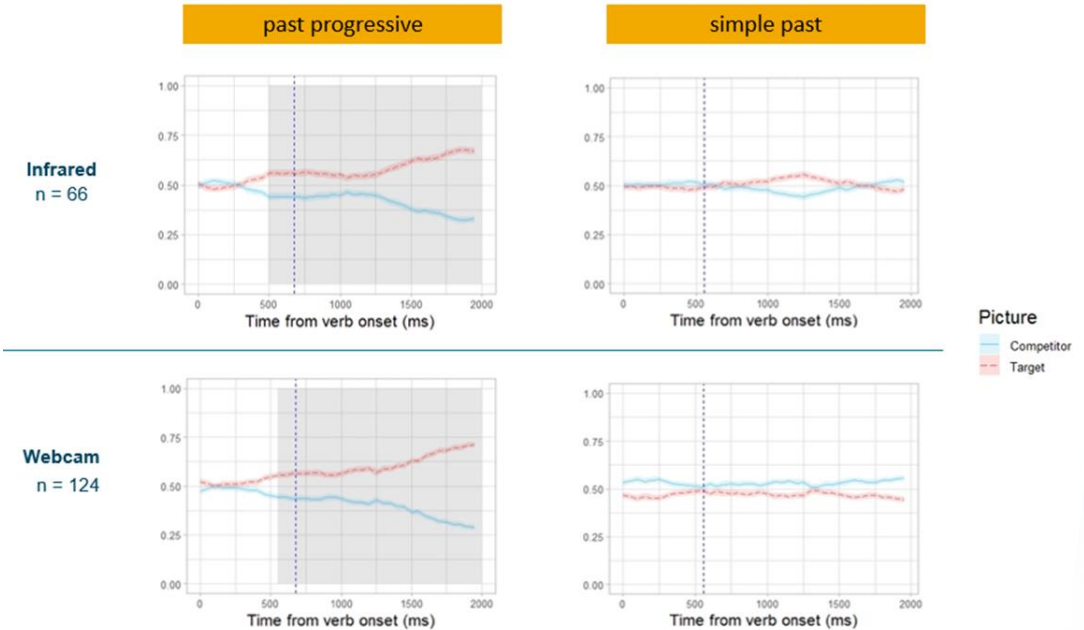


Figure 2. Comparing infra-red and web-based eye-tracking (Vos et al., 2021)

The application of the eye tracking proves very useful when it comes to the research on online sentence processing. The speakers of a language are tested on their ability to make use of various gender, aspect etc. cues to dynamically construct an interpretation of the sentence. F. ex., in Mitsugi (2021) eye tracking helped to reveal that both L1 and L2 speakers could use polarity adverbs to predict the interpretation of the final verb. Eye tracking can also show how the listeners construct the representation of the unfolding event, based on the set of linguistic cues present in a sentence. For instance, the studies by Minor et al. (2020) and Vos et al. (2021), which are used as the basis in the current project, shows that English L1 speakers associate sentences in Past Progressive with ongoing event representations, while their preference remain undetermined when they listen to sentences with verbs in the Past Simple tense (see Fig.2).

2.4.2. Visual World Paradigm

One of the most widely used techniques within eye tracking is known as the Visual World Paradigm (VWP). The concept of Visual World Paradigm was first introduced in Cooper (1974), who proposed that listeners, presented with aural and visual stimuli, would subconsciously try to match them by looking at the “associated” picture, and tracking the point and time of the gaze allows us to see how and when the aural stimuli are interpreted and processed. At first VWP did not get much attention from the researchers and was not employed for almost two decades until the researchers turned their attention to this technique and developed it further in the 1990-s (see e.g., Tanenhaus et al. 1995).

Huettig (2011) states that the idea behind the comprehension VWP task is to present a participant with both visual and aural stimuli and record their eye movements while the certain task is being completed. St the same time, in case of production VWP studies, participants have to comment on the visual items they are presented with. The example of screen based VWP task, used in Thothathiri et al. (2018) is presented in Figure 3:

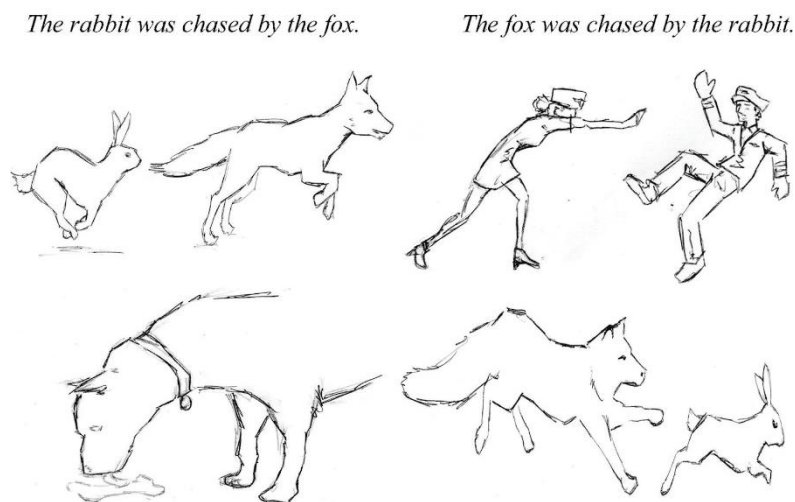


Figure 3. Visual World Eye-tracking task (Thothathiri et al., 2018)

The VWP task illustrated in Fig.3, explores the patterns of L1 English acquisition of thematic roles. Thothathiri et al. (2018) aim to find out how English-speaking children interpret both semantic and syntactic cues in order to assign semantic roles.

VWP is a very suitable research method that helps to understand how people process utterances about events and objects (Huettig et al., 2011, p. 167). This may be the reason why this methodology is widely used among linguists who aim to explore processing patterns exhibited in various population groups. Since its revival in 1990-s, the VWP has become a

powerful and solid technique that is widely used in language acquisition studies. For instance, in Zhou et al. (2014), the evidence from VWP contributed further evidence on the incrementality of aspectual processing on the morphological level in Mandarin Chinese. The results indicated that the participants directed their gazes to the target picture immediately upon hearing the suffix containing aspectual information. Another example of using VWP is the study of Hopp (2016), where it was found out, that L2 learners of German, who underwent a pre-training, were able to use gender cues to predict the upcoming noun. See more examples of various VWP studies in Huettig et al. (2011).

2.5. Grammatical Aspect

While tense is a grammaticalized placement of an event on a specific spot in the timeline, aspectual meaning conveys additional information about the utterance, which is needed to understand how the event unfolds in its temporal setting. Two sentences that have identical lexical units and that are placed in the same period can have two different meanings depending on the aspect. As stated in Smith (1997), **aspect** is a semantic domain that uses linguistic categories to express its grammaticized meaning. The aspectual meaning is tightly connected to the concept of **telicity** – the event feature that specifies whether this particular event has a telos or an outcome (telic event) or is presented in progress (atelic event) (Smith, 1997, p. 19). In other words, aspectual meaning shows us whether the action is e.g., ongoing or completed.

Aspectual meaning is normally expressed by two categories: situation and viewpoint (see also, *situation aspect* and *viewpoint aspect*). **The situation type** is a temporal property classification of an event. Smith lists the following categories: *state* (know, love), *activity* (laugh, stroll), *accomplishment* (build a house, walk to school), *semelfactives* (tap, knock) and *achievement* (reach the top). This category is conveyed by the verb that is used in a sentence. **The viewpoint type** is expressed by a grammatical morpheme. There are *perfective*, *imperfective* or *neutral* viewpoints (Smith, 1997, p. 3). Appearing in an utterance, situation and viewpoint interact with each other and impose various limitations. For instance, English verbs of states (*love, know, believe*) cannot be presented as a progressive event. The same is true for e.g., Mandarin Chinese and other languages (Binnik & de Swart, 2012, p. 776).

However, not only the verb and its grammatical form can contain the aspectual meaning – nominal argument can also contribute to whether an utterance refers to a specific bounded event or to a continuous activity. For example:

- (1) a. *He played sonatas.*
b. *He played that sonata.*

It is obvious that the activity in (b) describes an accomplishment situation type, and thus has an endpoint and is perfective, while (a) is unspecific and thus atelic and imperfective (Verkuyl, 1989, p. 43).

2.5.1. Grammatical Aspect in English

When it comes to the aspectual system of English there is a particular debate on how it has to be organized. According to Smith (1997), English only distinguishes between the perfective and imperfective viewpoint aspect, where the former denotes a completed event and the latter refers to an ongoing event. The imperfective aspect can also be mentioned as *progressive* and it uses continuous forms to denote the durative events. For example:

- (2) a. *Mary talked.* (Perfective)
b. *Mary was talking.* (Imperfective) (Smith, 1997, p. 170).

In these examples, we can see that event (b) represents an event in progress. On the contrary, event (a), describes a single, non-progressive action, using Simple Past. However, some other linguists, such as Binnik & de Swart (2012) would not describe Simple Past as a valid way to express perfectiveness, preferring to describe Simple Past as neutral and arguing that the sentence needs additional context to define the aspect. The idea behind this claim is that the distinction between perfective and imperfective is not enough to fully describe the aspectual system of English, and perfective-neutral-imperfective paradigm is more suitable. Smith (1997) herself mentions the presence of neutral viewpoint and says that there are some sentences with perfective viewpoint that have flexible interpretations:

- (3) a. *Sam owned three peach orchards.*
b. *Sam owned three peach orchards last year, and still owns them.*
c. *Sam owned three peach orchards last year, but he no longer owns them* (Smith, 1997, 171).

Here we see that sentence A can be interpreted in different ways and examples B and C unfold the possible interpretations, especially when it comes to the stative actions.

As stated in Smith (1997) before, the viewpoint and the situation types of aspect consistently interact with each other and one cannot be ignored while another is taken into consideration. English is a good example of it. The perfective viewpoint matches all the situation types thus it is considered as a main viewpoint, while the imperfective is restricted by

non-stative events only. It means that sentences like “*He was knowing Sam in school*” are absolutely ungrammatical, while “*The man in black was approaching the crowd*” is completely acceptable and implies that the action was in progress at some point in the past.

Thus, grammatical aspect in English can be either **perfective**, **imperfective**, or **neutral**. In addition to that, the sentence context also gives additional information on the type of action. The distinction between situation types, which is based on semantic properties of a particular verb, also imposes some limitations to the use of aspect – we know that one cannot form a sentence in progressive using a state verb. However, in general, English allows us to see the difference between completed and ongoing events, and this distinction can be conveyed both in verbs themselves and additional context.

Therefore, within this study we will assume that English Simple Past does not necessarily entail completed events, taking into consideration the evidence (f. ex., Minor et al. (2020) or Martin (2019) that show that L1 speakers of English do not have a solid interpretation of Simple Past as a completed event.

2.5.2. Grammatical Aspect in Russian

The system of aspect in Russian also distinguishes between perfective and imperfective viewpoints, and the difference between them is salient and expressed morphologically and thus obvious to a native or advanced speaker of Russian.

As noted in Binnik & de Swart (2012), each verb in Russian is marked as either perfective or imperfective and in the majority of cases, each perfective has its imperfective counterpart. As in English, the perfective aspect denotes the event with initial and final endpoints, whereas the imperfective aspect has its focus on an event in progress. Rich verbal morphology of Russian helps to distinguish between verbs that have very similar lexical meaning but different aspectual characteristics. The language uses big inventory of prefixes and suffixes to mark grammatical aspect, as in the example below:

(4) a. *pisat'*
to write-IMP

na-pisat'
to write-PERF

b. *kolot'*
to stab-IMP

kol-nu-t'
to stab-PERF

(Smith & Rappaport, 1997, p. 229).

Some prefixes also give additional meanings to the verbs, as in the example (5):

- (5) a. *do-pisat'* (to add in writing)
b. *za-pisat'* (to begin writing)
c. *is-pisat'* (to cover with writing)

The usage of the derivational morphology sometimes changes not only the viewpoint aspect, but the situation aspect as well. Coming back to the example (5), having added prefixes to the stem, we get activity type in (5a) and accomplishment type in (5b) (Smith & Rappaport, 1997, p. 242).

Since all the verbs are marked as perfective and imperfective, there is no place left for neutral. Thus, context will not be a determining factor in understanding which aspect is used, unlike it is in English. Ex.:

- (6) a. *Maria čitala knigu*
Maria read-PAST-IMP a book
b. *Maria pro-čitala knigu*
Maria read-PAST-PERF the book

Thus, only by the verb we see, that sentence (6b) means that Maria finished reading the book, but sentence 6a emphasizes the process of reading a book, but we do not know and do not care if the book has been read completely or not. Therefore, distinguishing aspectual pairs helps us to see whether the verb is perfective or not.

When it comes to L2A of English for the native speakers of Russian, we want to assume that Past Progressive in English will give the same meaning as Past Imperfective in Russian. Ex.:

- (7) *Maria dolgo čitala tu knigu* = *Maria was reading that book for a long time*

In example (7) we assume that the sentences in Russian and English have identical meaning. The case with Russian Past Perfective and English Simple Past is slightly different. As it was mentioned before, Simple Past would rather belong to a neutral aspect, shaping its specific characteristics in the particular context. Given that this thesis is based on the research of L2A of English Past Simple and Past Continuous, the presence of a neutral aspect and the importance of context will be taken into consideration during the development of experiment stimuli.

2.5.3. Grammatical Aspect in Norwegian

Even though Norwegian, just as English, belongs to the Germanic group, the system of aspect differs from those of English and Russian. First, it is important to mention that Norwegian does not have a syntactic structure that would denote an ongoing event such as English Progressive (*to be +ing*) or Russian imperfective verbs – thus there is no obvious distinction between progressive and simple verb forms (Johansson & Lysvåg, 1987, p. 158).

However, Norwegian uses its own means of marking ongoing events. Thus, a corpus study carried out by Tonne showed that there is a set of fixed phrases that denote that the action is currently in progress. These pre-grammaticalized forms are sometimes called “*pseudo-coordinators*”, and they denote the “midst” of the event and thus do not focus on initial and final points, creating unambiguous imperfective context. One of them is construction that uses a combination of a posture verb and an infinitive. Ex.:

(8) a. *Barna satt og leste*
The-children sat-PAST and read-PAST
The children were sitting and reading

b. *Barna leste*
The-children read-PAST
The children read

In sentence (8a), the presence of the verb *å sitte* (*to sit*) refers to the ongoing event, and the speakers of Norwegian would interpret it as an ongoing event. Example (8b) is given as a counterpart, which does not denote an event in progress (Tonne, 2007, p. 187).

In addition to that, there are also a few fixed phrases-pseudocoordinators that also do the same job in creating the imperfective meaning. Ex.:

(9) a. *Han holdt på å dø*
He KEPT ON to die
He was dying

b. *Han døde*
He died

(10) a. *Han var i ferd med å frakte materialene opp til balkongen*
He WAS-IN-THE-MIDDLE OF carrying the-materials up to the-balcony
He was carrying the materials up to the balcony

b. *Han fraktet materialene opp til balkongen*
He carried the materials up to the balcony

(11) a. *Disse var på vei til å bli byens verste forbrytere*
These WERE-ON-WAY-TO become the-city's worst criminals
These were becoming the city's worst criminals

b. *Disse ble blant byens verste forbrytere*
These became the city's worst criminals

In sentences (9-11a) we see that there are such fixed phrases as *å holde på*, *å være i ferd med*, *å være på vei til* etc., which carry the imperfective meaning. Sentences (9-11b) are given to compare the two types on the events where the event in *b* does not bear the imperfective meaning, while in *a* it is clear that the event was in process in a particular time point (Tonne, 2007, p. 188).

However, given the fact that there is no obvious opposition between perfective and imperfective that is expressed grammatically as it is in English. Thus, according to Johansson & Lysvåg (1987, p. 159) Norwegians tend to overuse the progressive form because of teaching materials and reliance on the real context.

When it comes to the interpretation of Norwegian past tense we can say that it does not necessarily corresponds 100% to the English Simple Past. According to Tonne (2006) sentence *Barna leste da jeg kom inn* (Children read-Past when I came in) can be translated and thus interpreted both as *Children read when I came in* and *Children were reading when I came in*. Therefore, we can hypothesise that L1 speakers of Norwegian do not assume that Norwegian Past tense equals English Past Simple despite the fact that sentences in these forms in two languages are quite similar.

2.6. Previous research on acquisition and processing of grammatical aspect

There is a considerable number of experimental studies devoted to the acquisition and processing of grammatical aspect in both L1 and L2. In this section, I will give a brief overview of some of them, which will be helpful in building up the hypotheses for the current study.

2.6.1. English as L1

R. Brown (1976) carried one of the first series studies to have shown the patterns of acquisition in aspectual meaning in L1 English out. First, it was mentioned that *-ing*, which is used to form the progressive in English, is the first morpheme to appear in child speech. Secondly, Brown claimed that English-speaking children are quite successful in classifying the verbs into state-action groups and thus they almost never overgeneralize the progressive and say something similar to *he's believing me*. This seems to be unique, because children tend to do a lot of overgeneralizations as soon as they acquire a new feature – this is why we can hear *he goed or two deers*. There were a few possible explanations to this phenomenon. First, the classification into state-active verbs is purely semantic and children can make their assumptions based only on the meaning and some abstract innate capacity to distinguish between these two types of meaning, whereas the past or plural forms derivation does not have the obvious logic for regular and irregular items. The main argument against this theory is that the English borderline for these groups is not universal and thus it is not possible to talk about innateness. Brown himself tried to explain by studying the input that children receive, i.e. by comparing the use of progressive in a child's and their mother's speech. The logic behind this claim is the following: if mother's speech contains the state verbs in progressive form, children are very likely to adopt this usage. In Li & Shirai (2000) children, whose mothers' speech was conventionally correct, had little to none occurrences of forms like *believing* or *knowing* used as predicates.

When it comes to distinguishing between simple past and progressive past, which is the main feature to be studied in the current research, there is contrasting data. Madden & Zwaan (2003) gave their English native speakers a forced choice task, which showed that the participants are more accurate when they need to match completed events with simple past compared to matching past progressive with ongoing events (76% and 56% respectively). After changing the task, (the participants only had to say whether a picture matched an utterance), Madden & Zwaan realized that the experimental items are judged globally – the absolute majority of the responses was positive. In addition, the reaction time was measured. It revealed

that the subjects are significantly faster to judge the matching pairs, compared to non-matching ones.

In Arunachalam & Kothari (2011), English L1 participants had to judge whether a video of either fully completed or partially completed event can be described by a Past Simple sentence. As a result, fully completed videos were judged as acceptable in 97,3% while partially completed videos were judged as acceptable only in 46,9%.

In Minor et al. (2020) online study showed that the adult native speakers of English do not draw a firm line between these two tenses – they do indeed understand that progressive aspect would denote an ongoing event, whereas no similar effect is attested for simple past, which is not necessarily interpreted as a completed event. Figure 4, showing that the progressive clearly denotes ongoing events and that the simple past does not show any preferences is presented below.

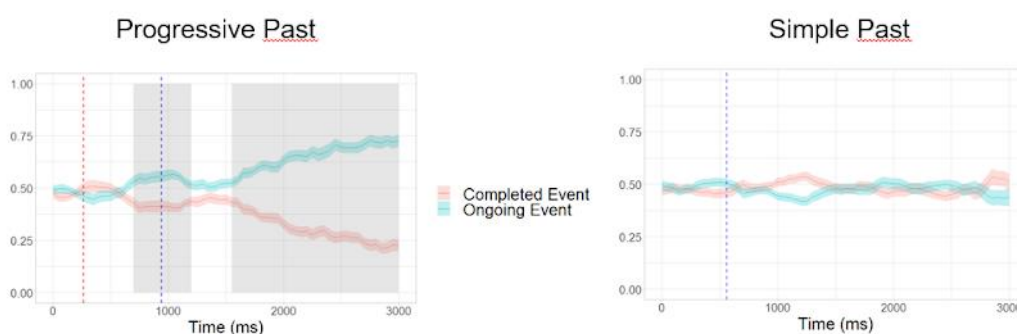


Figure 4. The results of eye-tracking study on past simple/progressive opposition in L1 English (Minor et al., 2020)

2.6.2. English as L2

It is logical to hypothesize that due to cross-linguistic influence the speakers of different languages with various aspectual systems will have different patterns of acquisition. A few studies, based on revealing the real-life language processing, try to dig into these patterns. Kaku-MacDonald et al. (2019) studied L1 Japanese L2 English speakers, whose language distinguishes between completed and canceled events (*Lisa erased the star but it still remains*). “Canceled” implies having the event in progress in the past, which is known to be unfinished. In the truth-value judgment tasks the participants judge visual stimuli, depicting unfinished actions as simple past sentences (*Lisa erased the star*), unlike L1 English control group. This

effect is attested in all proficiency levels. However, the understanding of this feature increases with the proficiency, but not drastically.

Another research by Roberts & Liszka (2021), based on self-paced reading task with the highly proficient L2 English speakers with French, Dutch and German as their L1 revealed that the lack of English progressive analogue in L1 makes the processing of temporarily ambiguous sentences in past progressive considerably harder, compared to the control group. The conclusion comes from the fact that the same participants process similar past simple sentences on the native-like level. However, since aspectual meaning is encoded grammatically in French, this group seemed to be the most successful among the L2ers.

2.6.3. Russian

As an aspect-marked language, Russian gets much attention from linguists. Thus, in Bott & Gattnar (2015), the research show that the native speakers of Russian perform with significantly increased reaction time in the case of aspect and for-adverbial mismatch in the sentence, irrespectively of adverb placement (SVO-Adv or Adv-VOS) in the eye-tracking experiment. Moreover, the offline production task, in which the participants had to complete the sentences (either correct or with aspect-adverb mismatch), showed that the native speakers of Russian were not able to complete sentences with mismatched adverbials due to semantic violation. For example:

(12) a) *Celyx polčasa dostig...*

For half an hour reach-PAST-PERF

b) *Polčasa nazad dostig*

Half an hour ago reach-PAST-PERF

Example (12a) illustrates the mismatch between for-adverbial and aspect of the verb and therefore the native speakers of Russian failed to complete such sentences, whereas example (12b) is perfectly fine and the participants did not experience any difficulties completing these sentences

In Minor et al. (2020), the eye-tracking study also showed that the adult speakers of Russian interpret imperfective and perfective verbs as each other's counterparts, rapidly distinguishing between them and picking the right picture.

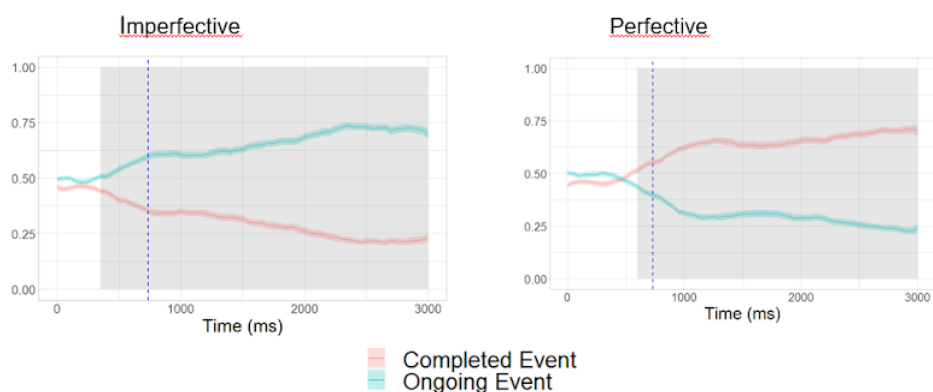


Figure 5. The results of eye-tracking study on past simple/progressive opposition in L1 Russian (Minor et al., 2020)

Figure 5 (above) shows that the imperfective-perfective opposition is very prominent and Russian L1 speakers do not have any doubts and ambiguities while processing the grammatical aspect.

Similar evidence exists for Polish in Milczarski (2021). Polish also distinguishes between perfective and imperfective events. The participants in this study had to rate the duration of the events they were presented with. The results showed that the imperfective events were rated longer, compared to the perfective ones.

Since the aspectual meaning in Russian is coded on the morphosyntactic level – verbs use prefixes and suffixes in order to distinguish between ongoing and completed events, it was also crucial to find out whether the verb is processed incrementally. Using the VWP, the study of Minor et al. (2022) showed that the native speakers of Russian do process a verb on a morphological level, and the semantics of the verbs that had the aspectual meaning encoded in prefixes was recognized faster than in the case with suffixes.

2.6.4. Norwegian

In Behrens et al. (2013), where the researches aimed at elicited production, it was noted, that Norwegians are not very eager to use the progressive constructions-pseudocoordinators (*å holde på, å være i ferd med* etc.) – only 14, 5% of all the utterances used them. The participants had to give a description of the video clips with different types of dynamics. The ones that depicted the event without change of states were most described with some of the pseudocoordinators – 38, 65%. However, this number still seems quite low. Even lower number of ongoing event markers is attested in the same study in German (only 2%), which is also a

non-aspect language. It means that in the majority of cases the speakers would use the neutral form even while talking about ongoing events, even though their languages would have the means to express the duration. Similar preference for the non-marked utterances was attested in Athanasopoulos & Bylund (2013), who studies the speakers of Swedish.

To the best of my knowledge, the processing of grammatical aspect in Norwegian has not been studied yet. That is why I will talk about the research that is done for other non-aspect languages, like Swedish. Similarity Judgment task in Athanasopoulos & Bylund (2013) revealed that the native speakers of Swedish would judge [+/- endpoint] video clips as the similar ones much more often than the native speakers of English. Therefore, it can be assumed that in the case of Swedish there is no firm line between the process and the result.

3. Research Questions and Experimental Methodology

In the following sections I will present my research questions, which are based on the literature review presented in the previous chapter. I will give an overview of the participants that were recruited for the current study and mention the conditions of their participation. I will also describe my experimental methodology that is used to answer my research questions and give details about the process of the experiments. I will sum up the chapter by discussing my predictions, hypotheses and expectations from the results.

3.1. Research Questions (RQs)

Since my main task is to explore and compare CLI attested in L2 learners of English with Russian and Norwegian as L1, my RQs are based on a few main topics. First, I aim at investigating the patterns of CLI that university students, who are speaking English as L2 and having aspect and non-aspect language as their L1, have. As mentioned before, the different structures of L1s result in different CLI, and the speakers of aspect languages are expected to have better ability to differentiate between ongoing and completed events in the past test. In our case, Norwegian takes the place of a language without aspect marking, whereas Russian represents an aspect language.

However, it is also important to mention that neither Russian nor Norwegian aspect system duplicates the one in English. English has prominent aspect marking that can be expressed grammatically – while Russian has perfective/imperfective opposition and information about aspectual meaning is encoded directly in verbs, English adds neutral aspect to its' paradigm and aspectual meaning can partly be stored in the context. As it was already mentioned (see f. ex. Minor et al., 2020), empirical evidence show that Russians transfer the perfective/imperfective opposition when they have to distinguish between Past Simple and Progressive tenses. At the same time, the English native speakers do not necessarily associate Simple Past with perfective aspect, and their choice of the visual stimuli, representing the completed event does not correlate with aural stimuli in English Simple Past.

Therefore, it is assumed, that native speakers of Russian, acquiring English, do not transfer perfective and imperfective aspect as separate units, but rather as the whole opposition between them. When it comes to the Norwegian native speakers, who have not been investigated from this perspective yet, it can be suggested that they would not have similar opposition between Past Simple and Past Progressive. Again, the data from Athanasopoulos &

Bylund (2013) assumes that the native speakers of Swedish, which is very close typologically to Norwegian, do not have a solid line between perfective and imperfective events.

The main objective of the current study will be to compare online processing patterns of English grammatical aspect. In addition to that, I want to see and compare the results of the offline tasks that will presumably represent learners' conscious understanding of the grammar, which can be influenced by various reasons, including teaching approach (Johansson & Lysvåg, 1987, p. 159) as well as individual's assumptions and understanding of linguistic categories, which come from that individual's L1. Thus, my research questions will be the following:

RQ 1: Do native speakers of Russian have strong opposition between English Simple Past and Progressive Past due to the transfer of similar opposition from their L1 on the processing level?

RQ 2: How will Norwegian L1 speakers behave in the online eye-tracking Picture-Sentence Matching task?

RQ 3: Is there any difference between online and offline results in the L1 Norwegian or the L1 Russian group?

3.2. Participants

To answer the aforementioned research questions I recruited approximately 60 participants (ca. 30 individuals in each L1 group). The participants were students on either Bachelor or Master level. There were two main groups of the participants: L1 Russian and L1 Norwegian group.

One of the biggest challenges of carrying out a web-based experiment is a highly limited control of the participants. First, not a few initially recruited participants failed to complete the task they had received on time and therefore they had to be eliminated. Secondly, one of the participants had issues with his web camera settings and could not participate because of inability to record their eye movements. Thirdly, some of the participants never made it through the calibration and thus could not proceed to the experiment itself either. Thus, after the elimination of the recruits that could not complete the task, I had only 42 participants in both groups – 21 in each. Their summary is presented in table 1:

L1	Number	Age range (years)	Mean age (years); SD
Russian	21	18-31	21,85; 3,39
Norwegian	21	19-39	25,47; 4,62

Table 1. The participants in the current study.

Both groups have either Norwegian or Russian as their only L1 and English as their L2. Some of the participants have various L3, but their own self-rated proficiency is weaker and the onset of acquisition is later, compared to L2. All the participants were recruited at either UiT – The Arctic University of Norway (campus Tromsø) or Northern Arctic Federal University (campus Arkhangelsk).

In addition, it can be noted that the Norwegian L1 group is on average 4 years older than the Russian L1 group. This can be explained by the fact that in Russia people study at high school at the age of 17-18 while Norwegians do not graduate until they are 18-19 years old. Moreover, the majority of Russians start their higher education straight after school, whereas some of the Norwegians tend to take gap years and do other activities before starting studies at the University.

For the participation, all subjects were rewarded with a gift card (approximately €15 for the participants residing in Norway and €10 for the participants residing in Russia). All the participants gave their consent after having read the instructions and conditions. Everyone could withdraw their consent and request their data to be deleted at any moment. The participants could also access their own data and ask to change some parts of it, f. ex, information given in the language history questionnaire.

All data collection was conducted in accordance with NSD (Norwegian Center for Research Data) regulations and ethical principles, and the information about data collection for this project was sent to NSD and approved with the following reference number: **837861**. The participants were aware of the possibility of sending a letter of complaint to NSD.

3.3. Methodology

This study uses the experimental paradigm and stimuli from Minor et al. (2020). However, it also uses web-based eye tracking as a main research methodology. This technique involves writing code with the task and the instructions on the JATOS platforms using the *Webgazer.js*.

One of my supervisors – Serge Minor, helped me with the coding part. Webgazer.js uses PC’s web camera as an eye-tracking device – the web camera detects the location of face and eyes and is capable of tracing the eye movements after calibration.

3.4. Stimuli

Both visual and audio stimuli in English were taken from Minor et al. (2020). The native female speaker of English recorded the audio tracks for the experiment.

Both experiments consist of 48 items, where 24 are test items and 24 are fillers. Each item contains two visual displays (a target and a competitor pictures), a spoken preamble and a spoken test or filler sentence. These sentences are in either Past Simple or Past Continuous tenses.

Test sentences were structured in the following way: Subject – Predicate – Object. One of the four main characters presented a grandma, a grandpa, a girl and a boy the subject. The object was a combination of an adjective and an inanimate noun. All the items were followed by a preamble that placed the setting in the past. F. ex: *It was a holiday weekend* or *There were jobs to do around the house*.

Each sentence was recorded and edited so that there were equal starting points for each audio recording. The utterance started 550 ms after the start of the recording. In addition to that, there was a pause of 250 ms between the predicate and the object (direct complement).

The examples of the target sentences are presented in **table 2**. The full list of test items is presented in the Appendix A.

Aspect	Subject	Predicate	Object
Perfective	grandma	knitted	a new jumper
Imperfective	the girl	was drawing	a slender vase

Table 2. Examples of audio stimuli

There were two types of visual stimuli for the test items. One represented an ongoing event (ex. Fig 6) and it is therefore assumed that it is the target for imperfective test sentences. Another one represented a result phase of a completed event (ex. Fig 7) and is considered to be the target for perfective test sentences.



Figure 6. Ongoing event picture.



Figure 7. Completed event picture

After participants heard a test sentence (f. ex., *<It was a crisp winter morning>. Grandma was knitting a new jumper*), their task was to choose between two pictures: an ongoing event and a completed event picture.

When it comes to the filler trials, participants listen to a sentence that also contained a subject, a predicate and an object and had to make a choice between pictures that represent different events performed by the same actor. For instance, a girl performing an event of burning a notebook vs an event of blowing up a balloon, see Figures 8 and 9). In the filler trials, the choice of the target picture was based on the lexical meaning of the verb, while in test trials the choice of the target picture was based on the interpretation of aspectual meaning. The actors (subjects) of the depicted events were grandma, grandpa, a boy and a girl. The whole list of experimental items is presented in Appendix A.



Figure 8. Filler competitor picture.

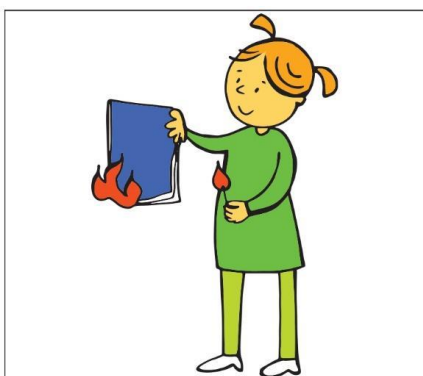


Figure 9. Filler target picture.

The experiment includes 48 trials: 24 test and 24 filler items. The trials were randomized within and between trial blocks. Each block contained two test items (one with a completed event picture as a target and one with an ongoing event picture as a target) and two fillers (one with a completed event picture as a target and one with an ongoing event picture as a target). Blocks followed each other in a random order.

Each participant received one of the four lists. The point of creating four different lists was to use each test item in both perfective and imperfective aspect and to place a target picture both on the left and on the right sides of the screen, since it was assumed that it was natural to look at the left picture first for the speakers of languages with left-to-right scripts. Thus, each predicate could appear in both aspects and on both sides of the screen. The number of left/right target pictures as well as the number of perfective/imperfective sentences was counter-balanced in each list. A program was written to distribute these lists among the participants to ensure an equal number of participants in each list.

3.5. Procedure

All recruited participants received a link to the experiment, which focused on processing of L2 English. While participating, everyone sat in front of their laptop or desktop computer and had a web-camera turned on. Visual stimuli were presented on a pc screen (the size of which varied), audio stimuli were presented via speakers or headphones (participants could decide themselves). Before the experiment started, the participants were presented with the terms and conditions of their participation so that they had to give their consent in order to proceed.

After giving the consent, the participants were presented with a set of instructions in participants' L1 (Russian or Norwegian) that included information about the content of the task and what was expected from the participants. The instructions were presented both as plain text and in form of a poster in the participant's L1 (see Appendix B for the English translation of the poster).

After familiarizing themselves with the instructions, the participants had to adjust their position so that the web camera could track their eye movements. Afterwards they started to calibrate their web-camera by clicking on the dots appearing on their screen. There were first 15 dots that the participants had to click on and then there were two dots checking the calibration – the participants needed to simply look at them. In the case of unsuccessful calibration, the participants were asked to try again. After a successful calibration, participants proceeded to the experiment.

The first trial was a filler item. First, the participants listened to a preamble while looking at the fixation dot in the middle of the screen. After the preamble, two pictures appeared on the screen and 500 ms later, an audio stimulus started; the pictures remained on the screen while the participants listened to the sentence. Participants had to choose the picture that matched the sentence according to their opinion. After trials number 12, 24 and 36 the program recalibrated the web-camera and the experiment proceeded after successful calibration. In case the calibration was not successful, the participants had a chance to recalibrate.

After completing all 48 trials, the participants were redirected to a language history questionnaire (see Appendix C for the list of questions) and the English proficiency test (Oxford placement test – see Appendix D). These tasks were programmed in Nettskjema – a web-based tool, developed at the University of Oslo, which is used for conducting surveys. Nettskjema was chosen since it guarantees data protection, unlike many other survey tools. Experiment A took approximately 30 minutes for each participant. After the experiment the participants were

rewarded with a gift card, the value of which depended on the country of their current residence.

3.6. Predictions

In this section, I discuss my predictions. When it comes to the native speakers of Russian, I hypothesized that they would have a certain pattern of preferences related to Past Progressive and Past Simple in L2 English – they were expected to match the pictures, representing ongoing events with sentences with imperfective meaning and choose the stimuli, depicting completed events when presented with sentences with perfective verbs. This is expected mostly because of the already existing research on L1 processing of grammatical aspect (see Minor et al., 2020), where Russian L1 speakers showed that they perceive the verbs themselves as either perfective or imperfective, irrespectively of context and lexical meaning of a verb, but just on the basis of the grammar that exists in Russian. Since the opposition is very clear, I expected high accuracy in choosing the target picture on both online and offline levels.

When it comes to the Norwegian native speakers, I assumed that they could be quite consistent in the case of imperfective aspect, since both *was doing...* clearly indicates an event in process. The structure is plain and does not give the basis for multiple interpretations. However, in the case of the perfective aspect, I could not expect similar consistency. Having only one concept in L1 for expressing two things can create ambiguity and make L2 acquisition more complicated. Therefore, I hypothesize that they will behave similarly to L1 English speakers who cannot show any preference since Past Simple is neutral.

I expect that there might be a few factors influencing the choice. First, Norwegians could overgeneralize to either perfective or imperfective aspect due to the ambiguity of the Norwegian Past Tense, which can both denote ongoing and progressive events. However, no empirical evidence on aspect processing is currently available and it is only possible to make assumptions on the data available. As for the level of a conscious choice (the offline picture-sentence matching task), it is expected that L1 Norwegian speakers will show similar patterns as in the online task.

Speaking about the conscious Picture-Sentence matching task, which the participants were completing while their eye movements were tracked, I hypothesize that the results will mostly coincide with the eye movements, especially in the Past Continuous condition, since this form is unambiguous and applying the rules of the grammar of English is quite easy in this case.

The case of Past Simple condition seems somewhat more interesting. If I look up the rules of using this form, I will find the following: “The simple past is a verb tense that is used to talk about things that happened or existed before now”, (Grammarly, 2020). From the definition, it is quite clear that Past Simple does not give any specifications on aspect, and if a participant starts applying the rules, they may be unsure of what to choose. However, I still expect to find CLI influence from participants L1 on the offline level meaning that the results for the Past Simple condition will be similar on online and offline levels.

4. Results

In this chapter, I will present the results of the experiments that were carried out. In order to perform statistical analysis and to make the graphs and the plots I used R Studio (R Core Team, 2022) – a free software for statistical computing and graphics. In section 4.1. I will give a more detailed picture of the participants and compare their proficiency level on both self-rated and proficiency task levels. In sections 4.2. I will give the results the experiment

4.1. Participants' proficiency

In order to validate the comparison of the two groups of students, the language history questionnaire included the question about self-rated English proficiency level. The summary is presented in the bar charts below (Figure 10):

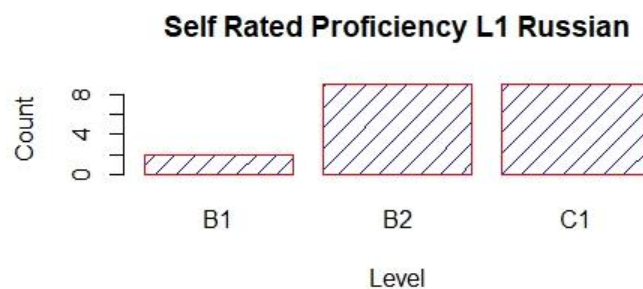


Figure 10. Self-rated proficiency L1 Russian.

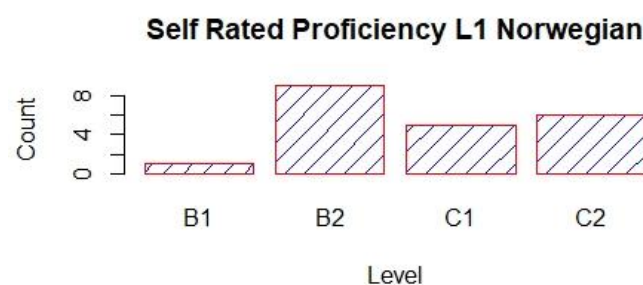


Figure 11. Self-rated proficiency L1 Norwegian.

As it can be seen from the figure 11, the judgments of the Norwegian L1 group are slightly more diverse since they include more levels (especially the highest one – C2), whereas the Russian native group seems to be more modest. However, as we know, an individual cannot always give an adequate estimation of their language skills. This is why a language proficiency test (the Oxford placement test) was completed. The test consisted of 18 multiple choice

questions that cover different vocabulary and grammar topics on B1-C2 levels (CEFR scale) As a result, the mean accuracy for the Norwegian L1 group equals 92,8% (SD = 6.09), while the Russian L1 group scored 93,9% (SD = 8,57) on average.

Unfortunately, I cannot perform the unpaired t-test in order to say whether the groups are equal since, according to the Shapiro-Wilk normality test, the data is not distributed normally (p-value is smaller than 0.05). Therefore, I can only rely on group means and on visualizing the data. The boxplot (Figure 8) below represents the accuracy rates for both groups.

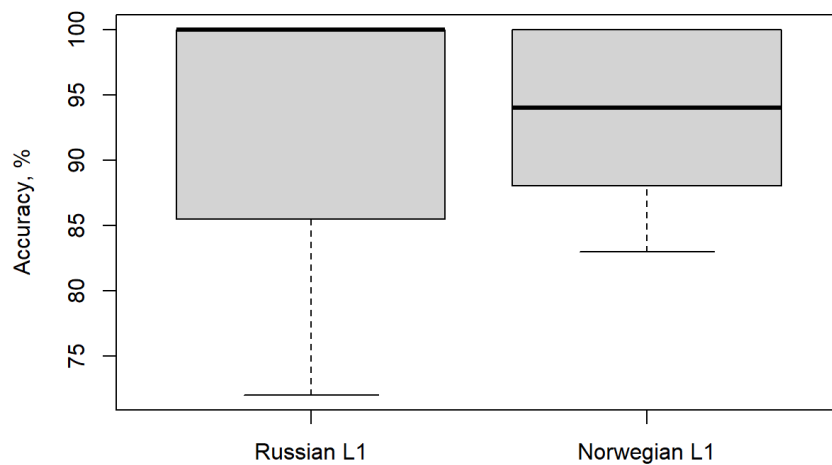


Figure 12. The results of the L2 English proficiency task.

According to the boxplot, the groups are quite similar on average; however, the Russian L1 group is more variable. However, the majority of both groups are placed on the same level thus; I can say that the groups can be matched by the proficiency level.

4.2.1. Results

As it was mentioned in the methodology section, the experiment included tracking the participants' eye movements while they were completing the picture-sentence matching task. Both online and offline data was collected simultaneously. For the sake of convenience and the ease of comparison, I will be presenting two groups of participants together.

4.2.1.1. Offline response

Since the experimental task was based on the opposition between English Simple Past and Progressive Past with respect to ongoing and completed events, the participants' objective was to match stimuli in progressive with ongoing event pictures and stimuli in past with completed

event pictures. This was the yardstick used to define participants' accuracy rates, even though matching Simple Past sentences with ongoing event pictures cannot be considered as incorrect in English. The accuracy rates of the offline task are presented in the table 3:

L1 Group	Accuracy rates for sentences in Past Simple	SD	Accuracy rates for sentences in Past Progressive	SD
Russian	91%	0.29	98%	0.13
Norwegian	25%	0.43	95%	0.21

Table 3. Offline task accuracy rates.

According to this data, we see that both Russian and Norwegian L1 groups perform with at-ceiling accuracy when it comes to Past Progressive condition. Very high results are also achieved in the Russian L1 group in Simple Past condition. However, the Norwegian L1 group performs with very low accuracy rates in Simple Past condition. The significance of the results for each condition was evaluated using an intercept-only binomial generalized linear mixed model with items and participants as random effects. The analysis showed that the accuracy rates in all the conditions were significantly below (Norwegian L1, Simple Past condition) or above (all the other conditions) chance. These results are summarized in Table 4.

L1 Group	Past Simple	Past Progressive
Russian	$z=7.78, p<0.001$	$z=3.65, p<0.001$
Norwegian	$z=-3.5, p<0.001$	$z=2.62, p=0.009$

Table 4. Analysis of offline accuracy.

4.2.1.2 Online response

The participants' gaze patterns were analyzed with the help of cluster-based permutation analysis – a statistical methodology, which is often used for analyzing behavioral data from methodologies such as EEG, MEG or Visual World eye tracking. (Maris & Oostenveld, 2007). This testing approach is suitable for these methodologies since it allows drawing conclusions on event-related data, which is multidimensional – it is important to check the time of the gaze, i.e. temporal dimension, and the point of the gaze, i.e. the spatial dimension (FieldTrip, 2022). One of the advantages of this method is that it does not require pre-selecting a narrow

time window for analysis. This analysis was previously used in Visual World eye-tracking studies such as Minor et al. (2022), Oakes, et al. (2013), Yang et al. (2020) etc.

The cluster-based permutation analysis was applied to test whether the preference for the ongoing event picture was significantly above or below chance. The different conditions (Simple and Progressive) were analyzed separately, as well as the different languages. All looks outside of the two pictures were excluded prior to the analysis.

The analysis involved several steps. First, for each participant and trials, the data were divided into 50 ms time bins, starting from the verb onset and finishing after 5 seconds, and the proportion of looks to the ongoing event picture was calculated. Given the relatively long average duration of a fixation and the relatively low frequency of webcam-based eye-tracking data, the resulting data were fully binary (i.e., for each time bin the proportion of looks was either 1 or 0).

Second, a binomial generalized mixed effects model was applied to each time bin to identify the time bins where the looks to the ongoing event picture were significantly above or below chance (50%). The output of the models included a z-statistic for each time bin. In each model, participants and items were included as random effects.

Third, the algorithm identified clusters of several consecutive bins where the proportions of looks at the ongoing event picture was significantly higher or lower than 0.5. The z-values for these times bins were summed up in order to get the sum-statistic for the whole cluster.

Finally, the data were randomly permuted 1000 times. On each permutation, for each participant either all the 1's were transformed into 0's and vice versa, or none were - with 0.5 probability. The same analysis as above was applied to the permuted data to identify clusters and their sum-statistics. The largest sum-statistics were stored. After 1000 permutations, this generated a distribution of sum z-values under the null hypothesis that there was no positive or negative preference for the ongoing event picture. This made it possible to calculate the p-values for the z-statistics of the clusters in the original data by calculating the proportion of values in the null hypothesis distribution that are equal to or more extreme than the observed z-value. This analysis revealed significant clusters in all four conditions that were analyzed. The results are summarized in Table 5.

L1 Group	Condition	Cluster boundaries	sum z	p-value
Russian	Simple Past	1450-2750 ms	-90.16	p<0.001
Russian	Past Progressive	1300-3700 ms	204.53	p<0.001
Norwegian	Simple Past	1700-2950 ms	77.03	p<0.001
Norwegian	Past Progressive	1450-3600 ms	186.45	p<0.001

Table 5. Analysis of gaze patterns (looks to the ongoing event picture).

In the end, there are four plots, which separately illustrate Simple and Progressive conditions for each language. Visualized averaged looks on the screen at the Past Progressive stimuli are presented in figures 13 and 14.

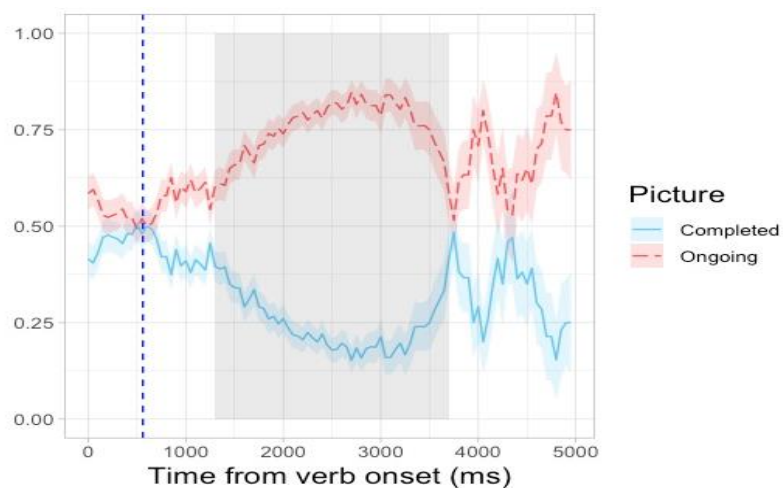


Figure 13. L1 Russian: Past Progressive

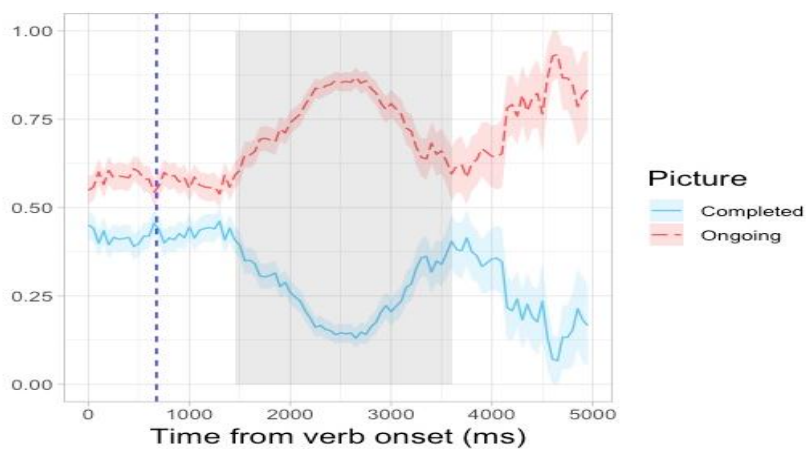


Figure 14. L1 Norwegian: Past Progressive

Visualized averaged looks on the screen at the Past Simple stimuli are presented in figures 15 and 16.

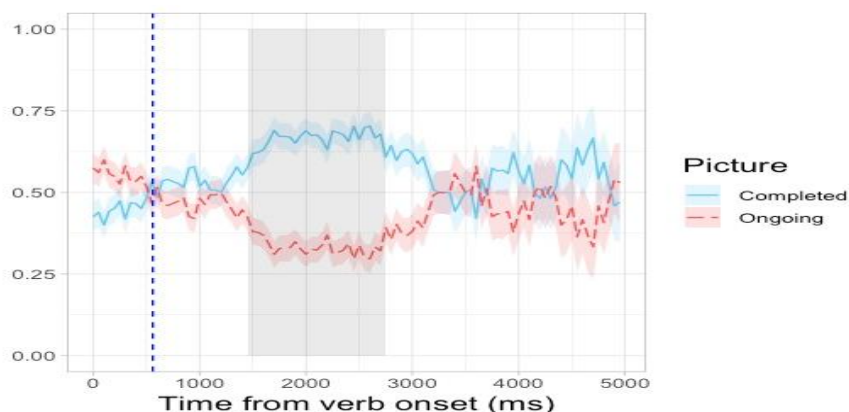


Figure 15. L1 Russian: Past Simple

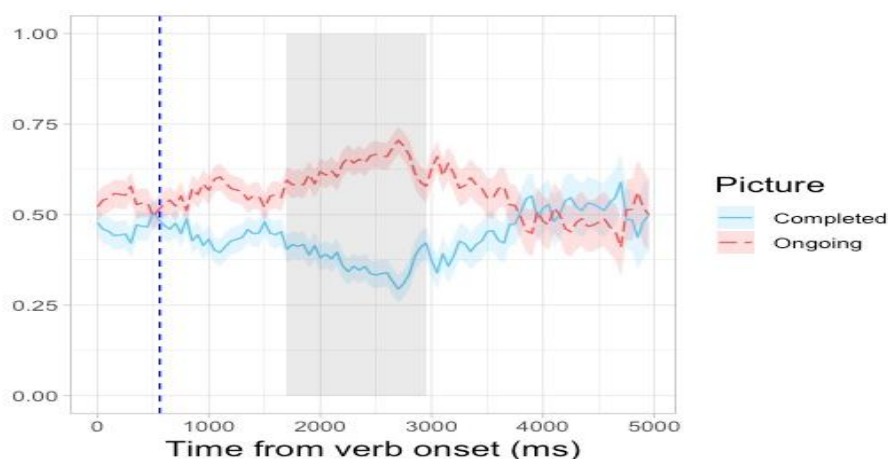


Figure 16. L1 Norwegian: Past Simple

In all the pictures (13-16) gray shaded areas denote time clusters where the probability of gazes at the ongoing event picture is significantly different from chance ($p < 0.001$ for all the clusters), which means that the result is significant. The blue vertical dashed lines represents the average verb offset.

Therefore, figures 13 and 14 clearly indicate that both Russian and Norwegian L1 learners of L2 English interpret sentences in Past Progressive as an ongoing event, similarly to native speakers of English (from Minor et al., 2020). It is also noticeable that these results go in line with the offline task.

From pictures 15 and 16, it is obvious that two L1 groups have different patterns of interpretation, neither of which patterns similarly to the pattern of L1 English speakers (also Minor et al., 2020). While the L1 Russian group has a strong preference for the completed event

pictures, the L1 Norwegian group treats Past Simple stimuli similarly to the Past Progressive ones. Comparing the online and offline results of the Russian L1 I can see that they go in line with each other. The L1 Norwegian group, on the contrary, does not show as strong consistency as the L1 Russian group. Even though they demonstrate clear preference for an ongoing event picture when presented with a stimulus in Past Simple, they do not show this at-ceiling preference in the offline picture-sentence matching task, opting for the ongoing event picture in 75% of the cases.

Another observation that has to be mentioned about the graphs (fig. 13 and 14) is that the Past Progressive condition seems to be the one in which the decision is taken easier – the preference for the ongoing picture is very high and consistent in both L1 groups. It can also be noticed earlier, compared to the Past Simple condition, in which the effect is weaker and less consistent – after the subconscious decision has been made, the participants seem to think about the correct choice, since the lines on the graphs are quite mixed after ca. 3500 ms, while it stays clear in the Past progressive condition.

5. Discussion

This chapter will be devoted to the analysis and the discussion of the results of the experiment, described in the previous chapter. I will give the discussion of the results of the experiments in section 5.1. In section 5.2, I will try to answer the research questions that were listed in section 3.1. I will talk about possible limitations of the study and suggest ways of solving them in section 5.3.

5.1. General discussion

Summing up the results of this study, I can say that both the native speakers of Russian and Norwegian exhibited a strong and consistent preference for the ongoing event picture when presented with a sentence with the main verb in the Past Progressive tense. This pattern resembles that of the native speakers of English tested in Minor et al. (2020). When it comes to the Russian L1 group, we can hypothesize that they may have experienced facilitative CLI from Russian, mapping the Past Imperfective form of their L1 onto the English Past Progressive. These observations are in line with the Feature Reassembly Hypothesis (Lardiere, 2009) and the Cline of Difficulty (Slabakova, 2009): when no or little reassemble is required and when contexts are similar, the acquisition goes smoothly. At the same time, the Norwegian L1 group, where no facilitation from the L1 was expected has also performed in a target-like manner. We can hypothesize that this is attributed to learning rather than CLI. A possible explanation for the non-challenging nature of the acquisition of Progressive Past for the Norwegian L1 group is connected to the fact that this English structure has only one meaning – expressing ongoing events that take place in the past. Moreover, the morphological expression of the Progressive is salient, there is no allomorphy or ambiguity connected to this structure. Progressive -ing has been reported to be acquired as one of the first English morphemes in Roger Brown's seminal work on L1 acquisition, which has been attributed to the transparency of the form-meaning pairing as well as the high frequency of the morpheme. We can argue that the same may be true for our Norwegian group – and that both tested L2 groups reached ceiling performance with respect to the Past Progressive condition.

It is worth mentioning that both L1 groups seem to show preference for the ongoing event picture quite early – shortly after the onset on the lexical verb. We know from previous research that L1 processing is incremental and the speakers are able to generate predictions on the fly base even at the word-internal level (see Tanenhaus et al., 1995; Minor et al., 2022). The observations from this experiment (figures 13, 14) may serve as an indication that L2

processing is also incremental and the L2 speakers understand that the sentence has the imperfective meaning when they receive the relevant cues (the copula *was* and the onset of the lexical verb).

The offline choice task also indicates that the L2 speakers choose an OE picture upon hearing a sentence involving Past Progressive - their performance is at ceiling level (the L1 Russian L1 group chose the OE picture 98% of the time, while the Norwegian L1 group 95% of the time). This target-like behavior shows that L2 speakers (even learners whose L1 does not have a similar grammatical property, like Norwegian) acquire Past Progressive without difficulty. As mentioned earlier, the English progressive form is one of the first to appear in L1 child productions – progressive *-ing* appears when children are approximately 30 months old (Brown, 1976). These observations suggest that the progressive structure in English is quite easy for acquisition, and L1 and L2 speakers manage to acquire it without significant difficulties.

Turning now to the results in the Past Simple condition, we can say that the results look less uniform. First, the L1 Russian and L1 Norwegian groups perform very differently – showing opposite preferences in terms of their looking patterns and offline choice. While native speakers of Russian have a strong tendency to associate Past Simple with completed events, the Norwegian L1 group does the opposite and shows a preference for the ongoing event pictures. Looking back at the system of grammatical aspect in Russian, we can hypothesize that the L1 Russian participants map the paradigmatic opposition between perfective and imperfective aspect from their mother tongue onto the grammatical representation in the L2. As will be discussed in more detail below, we suggest that the English Past simple is fully compatible with a completed event interpretation, and it may be the case that the input does not give them enough evidence to the opposite. Since English Simple Past can denote both completed and ongoing events, it is understandable why L1 Russian speakers try to fit their L1 opposition – there are no counterevidence to it in English. I can therefore suggest that despite an obvious similarity between Russian imperfective aspect and English progressive, having the whole opposition in the end may have non-facilitating effect on L2 acquisition.

The situation gets slightly more complicated when it comes to the Norwegian L1 group. As it was mentioned in the background chapter (section 2.6.4), the Norwegian Past tense can be interpreted as either an ongoing or a completed event (Tonne, 2006). Therefore, I might assume that the Norwegian Past tense is more of a neutral aspect, similarly to the one in English,

where extra context is required in order to detect the aspect of a sentence. However, if this was the case, the Norwegian L1 group would pattern similarly to the native speakers of English, whereas in the results I see the strong overgeneralization towards the ongoing event pictures. Therefore, this observation leads to the idea that the past tense in Norwegian can be imperfective, rather than neutral. I can also hypothesize that the L1 speakers of Norwegian need some particular marker of completeness (f.ex, preposition *up* – *to drink up*, *to eat up* etc.) or a perfect tense. However, in order to confirm both claims, separate studies on Norwegian L1 and L2 English processing are required.

Moreover, having the same preference to ongoing event picture in both Past Simple and Past Progressive condition can also indicate a limited sensitivity to aspectual differences, which was also found in Athanasopoulos & Bylund (2013) for the native speakers of Swedish. Therefore, it can be assumed that the native speakers of language, which lack grammaticalized means of expressing aspectual meaning (such as Swedish or Norwegian), are in much less sensitive to the differences between ongoing and completed events, compared to the speakers of languages with grammaticalized distinction of aspectual meanings. However, this claim needs further investigation.

It is also important to mention that Norwegian past tense and English Simple Past resemble each other a lot since the structures are very similar, especially in the affirmative sentences; the verbs in both languages have similar conjugation patterns. This structural similarity could also confuse the native speakers of Norwegian, who might believe that similarity of the structures on the surface results in the similarities in meaning. Therefore, if Norwegian Past is indeed more of an imperfective aspect, it could lead to non-facilitating transfer effects.

However, there is always a chance that the ongoing event pictures were preferred to the completed event pictures because they generally describe the action best. For instance, the image with grandma holding a jumper can lead to a few possible interpretations – she could have not only knitted a jumper, but also received it as a present or bought in a store. The same idea of multiple interpretations can be applied to any other completed event picture, whereas the ongoing event picture shows the exact action and there is hardly any room for variations in interpretation. It is also one of the possible explanations why L1 Norwegian speakers with an unmarked past tense prefer the ongoing event pictures in both Past Simple and Continuous conditions. If it is the case, then the discussion can lead back to the neutrality of the Norwegian

past tense. Unlike English with its' progressive forms, Norwegian has no grammaticalized means of differentiating between completed and ongoing events as it can therefore be assumed that the past tense in Norwegian is even more neutral than the Past Simple in English.

Remarkably, none of the group patterns with L1 speakers of English (from Minor et al., 2020) in this condition, showing overgeneralization towards one of the meanings, while English L1 speakers cannot make any preferences when it comes to Past Simple. This leads back to the debate on the nature of Past Simple in English – whether it denotes a perfective or a neutral aspect. The results from the native speakers prove the neutrality, while the opposite results that come from the L2 speakers from aspect and non-aspect language give some extra evidence to it – we observe that the structure itself does not give enough evidence to define it. The only possible instance of using Simple Past only are the stative verbs (*love, believe* etc.), since the grammar of English (the standard that is usually taught for L2 speakers) restricts their use to the simple tenses. Furthermore, since the participants in this experiment were highly proficient L2 speakers of English, it is also remarkable that they cannot achieve target-like interpretations despite being on such a high proficiency level.

English Past Simple seems to be an unmarked and highly ambiguous structure that is rather hard to acquire, because even highly advanced L2 learners do not pattern any similarly to the L1 speakers. Therefore, I can assume that the input from L1 English is not sufficient to realize the nature of the Past Simple. However, since this structure is unmarked and requires context even for the L1 English speakers, who cannot give a particular explanation for the structure, it is not surprising that L2 speakers of English try to take source for the structure explanation elsewhere, for instance, in their L1.

5.2. Research Questions

In this subsection, I will give the particular answers to my research questions.

RQ 1: *Do native speakers of Russian have strong opposition between English Simple Past and Progressive Past due to the transfer of similar opposition from their L1 on the processing level?*

Given the results of the experiment, I can state that the L1 speakers of Russian interpret Past Simple and Past Progressive in L2 English as the opposite units, since there is a clear preference for the ongoing event pictures in Past Progressive condition while the preference for the completed event pictures is typical in the Past Simple condition. These results confirm the

hypothesis that suggests that for the L1 Russian speakers there is a prominent opposition between Past Simple and Past Progressive, which is not exactly true for the grammar of English. Therefore, partly facilitating (for Past Progressive), partly non-facilitating (for Past Simple) transfer effects are attested.

In addition, when it comes to SLA, it is clear that the marked features are harder to acquire and more difficult to inhibit, compare to the unmarked ones – the marked structure is likely to result in CLI. Similar example – Norwegian L1 speakers with V2 word order transfer it into L2 English with SVO word order (Westergaard, 2003). This study has similar observations – the marked imperfective/perfective opposition appears when L1 Russian speakers interpret the neutral Simple Past in L2 English.

***RQ 2:** How will Norwegian L1 speakers behave in the L2 English online eye-tracking Picture-Sentence Matching task?*

The L1 speakers of Norwegian seem to have no preferences for completed event pictures in both Past Simple and Past Progressive conditions, showing very strong preference for the ongoing event pictures in both cases. While the reason behind choosing the ongoing event picture in Past Progressive condition is clear and is explained by the simplicity of English Past Progressive, the preference for ongoing event picture in Past Simple condition requires some explanation. That leads back to the fact that the Norwegian past tense can be interpreted as either an ongoing or a completed event and it requires some specifying details to define whether the action is completed or ongoing. However, as I discussed earlier, if it was the case, the Norwegian L1 speakers would interpret English Past Simple similarly to the native speakers of English, which is not happening, which means that Norwegian past can actually be imperfective. However, more research is needed to confirm this claim.

***RQ 3:** Is there any difference between online and offline results in the L1 Norwegian or the L1 Russian group?*

The native speakers of Russian seem to have very similar results at the processing and offline choice levels, which means that their conscious judgments and understanding of the grammatical structures of English past tenses coincide with their mental representations, even though they do not necessarily coincide with the target-like ones.

Speculating about the native speakers of Norwegian, important to mention that their judgments coincide when it comes to the Past Progressive condition. However, with the Past

Simple condition, their judgements seem to vary slightly. Looking at the figure 10a in section 4.2.1.2, we see obvious preference for the ongoing event, whereas the ongoing event pictures reaches only 75% of the offline choices.

5.3. Limitations

After carrying out the experiments and analyzing the data, I understood that there are some certain limitations and things that could possibly be improved. Firstly, the number of participants is very small and it is quite hard to make solid conclusions about the whole populations, basing only on 42 participants (21 in each L1 group). This especially true because the online methodologies require more data in order not to lose the precision. Therefore, this study would much more valid if each L1 group contained at least 60 participants, especially given the fact that the online methodology allows recruiting many more people than the offline options.

Furthermore, it would be very useful to check whether the semantic interpretations that were tested change over time – what are the starting point interpretations and how feature reassembly proceeds as the proficiency increases. In this case, a longitudinal or cross-sectional study could be used so that the different proficiency levels could be compared. Again, cross-sectional study would be possible within this project if the bigger number of participants had been recruited.

Moreover, the experimental design could restrict the participants to a particular paradigm. As I already mentioned, English L1 speakers treat Simple Past as a neutral aspect, whereas in this experiment it is expected it to be interpreted as a perfective aspect. It believe it would be important to carry out a follow-up study, using stimuli with strictly perfective meanings.

Finally, in order to claim the presence or the absence of L1 influence in L2 speakers' processing patterns it would be crucial to investigate the baseline, i.e. how these L2 speakers process the similar concept in their L1. When it comes to the L1 Russian group, the research like this has already been carried out and I can indeed be sure that the L2 processing patterns take their source in Russian perfective/imperfective opposition. However, there were no empirical studies on the L1 Norwegian processing, only some theoretical corpus research and elicited production tasks. Thus, I am not able to claim that these results do come from L1 Norwegian, even though it is a very likely scenario. In order to overcome this limitation in

future, a proper study on the processing of grammatical aspect in L1 Norwegian has to be carried out.

However, these limitations are a good reason to continue the research on the processing of grammatical aspect in L2 English and it will be possible to consider these limitations in the further studies.

Conclusion

This thesis has investigated cross-linguistic influences in the acquisition of Past Simple and Past Progressive in L2 English by the L1 speakers of Russian and Norwegian. In addition, this thesis has studied the processing patterns of grammatical aspect of the same speakers.

It is well known, that similarities between languages result in facilitating transfer effect, while the differences lead to non-facilitating effect (Odlin, 1989). Therefore, if the concepts and ways of their representation in one's L1 differs even slightly from the L2, the process of SLA becomes hard. If an L2 speaker needs to reassemble the features from the L1 in order to achieve target like patterns in L2, the dominance of L1 can result in non-target-like L2 patterns that have something in common with the speaker's L1.

The aspectual system of English was traditionally described as the system with the perfective/imperfective opposition (Smith, 1997) However, according to the newer research, L1 English speakers interpret Past Continuous as an ongoing event and thus imperfective aspect and cannot make a solid consistent interpretation of Past Simple (Minor et al., 2020). That is why Past Simple is referred to as a neutral aspect.

As an aspect language, Russian has an imperfective/perfective opposition, meaning that all the verbs are marked with aspectual meaning (Binnik & de Swart, 2012). When it comes to the L1 processing, the native speakers clearly interpret imperfective verbs as ongoing events and perfective verbs as completed events (Minor et al., 2020).

Norwegian, in turn, is a non-aspect language, that does not have any grammaticalized means of expressing differences between completed and ongoing events and a sentence in past tense can denote both, if no specific context is given (Tonne, 2006).

Given that these two languages have fundamentally different aspectual systems, I hypothesized that the L1 speakers of Russian and Norwegian will behave differently interpreting Past Simple and Past Progressive L2 English. I assumed that the Russian L1 group would transfer the imperfective/perfective opposition, even though Past Simple \neq perfective aspect. I also hypothesized, that the L1 speakers of Norwegian would behave similarly to the L1 English speakers in the Past Simple condition since past tense in Norwegian is also unmarked and can have both perfective and imperfective meaning. Moreover, the structures in Norwegian past in English Simple Past are quite similar. For the Past Continuous condition, I hypothesized preference for the ongoing event pictures because this structure has only one meaning which is easy to match with a particular event type.

In order to check my assumptions I recruited 42 L2 English speakers (21 were the native speakers of Russian and 21 were the native speakers of Norwegian). All are university students. Both groups are equally proficient in L2 English.

In this thesis used the experimental paradigm and the stimuli from Minor et al. (2020), implementing it on the L2 speakers instead of the L1. The methodology, which is used in this study, is web-based Visual World eye tracking. The experiment consisted of 24 test trials and 24 fillers, where the participants had to complete Picture-Sentence matching task. In the test trials the participant were presented with sentences in either Past Simple or Progressive that they had to match with completed and ongoing event pictures respectively – within this study the completed event picture was set as a target for the stimuli in Past Simple. In addition to that, the participants had to complete English placement test and language history questionnaire.

The study confirmed my hypothesis about the transfer of perfective/imperfective opposition from L1 Russian into L2 English (see figures 13 and 15). However, the Norwegian L1 group patterned as native speakers only in Past Progressive condition (see figure 14), whereas in the Past Simple condition they gave strong preference to ongoing event pictures (see figure 16).

Thus, I can conclude that the highly proficient L2 speakers (both L1 Norwegian and L1 Russian groups) of English experience non-facilitating transfer. When it comes to the L1 Russian group, I can talk about the interpretation of the Past Simple sentences as completed events, which is not exactly target-like. Norwegians, on the contrary, interpreted the Past Simple sentences as ongoing event, which differs from L1 English interpretations.

Moreover, this study lead to the general idea of the complexity and ambiguity of Past Simple in English – it proved to me unmarked so that L2 speakers cannot do anything but transfer the representations from their L1. The input that English does not manage to convince L2 learners that the transferred from L1 representations are not correct.

The results from the offline task coincide with the eye tracking – the Russian L1 group shows very high accuracy in both conditions, whereas the Norwegian L1 group shows at ceiling accuracy in Past Progressive condition and very low accuracy in Past Simple condition (with respect to the preset of a target picture). That is the opposite to the results of the L1 Russian group.

Although the results of this study seem to go in line with the previous empirical and theoretical research, especially from the perspective of the Russian L1 group (in this case it is quite clear that non-target like interpretations come from the L1), it is still unclear why the Norwegian L1 group overgeneralizes English Simple Past to imperfective aspect. In order to resolve this issue it is crucial to carry out a study that would deal with the aspect processing in L1 Norwegian.

Summing up the results of the usage of the web-based eye tracking, which is the relatively new methodology, I can say, that this method proved to be very useful for my study. The results that I gained were reliable and in line with the previous research. In addition to that, it allowed me to collect data remotely, without even having to be present in the lab with every single participants. Having to collect the data from L1 Russian speakers would mean the absolute necessity to travel to Russia. This saved a lot of time and money since the participants could complete their task simultaneously and in the convenient time.

However, this methodology also turned out to have certain disadvantages. Apparently, due to the lack of the personal communication and appointed time points, some of the originally recruited participants dropped out due to the inability to complete the study within the deadline.

Another problem is that the experiment could not be conducted on some of the personal computers. For instance, some of the dropped out participant mentioned that their web cameras were incompatible with the experiment and simply could not connect. Another participant mentioned, that it was rather inconvenient to complete the task, especially the calibration part on a 50-inch wide screen. In other words, the inability to use a single personal computer, can be a problem, although it is not very critical

Nevertheless, the methodology has proven itself as a suitable option for the majority of the participants and therefore I can say that it is a very suitable option for the remote research on the L1 and L2 processing.

As for the further exploration of the acquisition and processing of the aspectual differences in L1 and L2, there are quite a few options. First, as I have already mentioned, it is essential to investigate how L1 Norwegian speakers process the past tense in their own language (f. ex., the opposition between pre-grammaticalized forms such as *å holde på å gjøre noe* and regular past tense). In this study I assumed that non-target like interpretation of English Past Simple takes its roots in the participants' L1. However, this assumption requires future investigation.

In addition to that, the study that investigates the processing differences in neutral-perfective paradigm (f. ex., verbs with preposition up) can also be a possible follow up, which will contribute to the understanding of the processing of aspect. It will also help to obtain more evidence on the nature of Past Simple in English. Another possible form of investigation is doing the production task, instead of the comprehension, where the participants will have to describe the pictures.

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Appendices

Appendix A – List of trials

Type	Preamble	Sentence
test	It was a bright and sunny day	Grandma was planting/planted a pretty flower
test	It was the first period at school	The boy was sharpening/sharpened a thin pencil
test	There was going to be a party later	Grandpa was ironing/ironed a clean shirt
test	It was a holiday weekend.	Grandma was hanging/hung a beautiful painting
test	It was a holiday weekend.	Grandpa was fixing/fixed the old fridge
test	There were jobs to do around the house.	The girl was painting/painted a high wall
test	It was a crisp winter morning	Grandma was knitting/knitted a new jumper
test	It was the first period at school	The girl was drawing/drew a slender vase
test	There were jobs to do around the house.	Grandpa was drilling/drilled a big hole
test	It was a crisp winter morning.	Grandpa was building/built a big snowman
test	It was the middle of the day	The boy was sweeping/swept the narrow corridor
test	It was a bright and sunny day	Grandpa was digging/dug a deep pit
test	It was a crisp winter morning.	Grandpa was lighting/lit a cosy fire
test	It was time for lunch.	Grandma was slicing/sliced a juicy watermelon
test	It was early in the morning.	The boy was cleaning/cleaned the front room
test	It was a playtime at school	The boy was coloring/colored a pretty picture

test	The weather was nice and warm.	Grandma was watering/watered a green bush
test	It was early in the morning.	The girl was buying/bought a new phone
test	It was the middle of the day	Grandpa was demolishing/demolished an old house
test	It was the middle of the day	Grandma was locking/locked the side door
test	it was a rainy day outside	Grandma was baking/baked a lovely cake
test	It was time for lunch.	The girl was eating/ate a tasty fish
test	It was a dark night with no hint of a breeze.	The boy was burying/buried a wooden chest
test	The weather was nice and warm.	The girl was opening/opened a big window
filler	It was playtime at the school	The girl wanted to put together the pretty toy castle
filler	it was a rainy day outside	Grandma was successful in cracking open the nut
filler	There were jobs to do around the house	The boy was done with taking apart a wooden stool
filler	It was early in the morning.	The girl worked on cutting out a flower
filler	It was early in the morning.	Grandpa was unconcerned that the old bridge had been destroyed
filler	It was a bright and sunny day	Grandpa occupied himself in the strawberry patch
filler	It was early in the morning.	The girl began to drink a glass of milk
filler	It was a bright and sunny day	The girl was proud that she managed to swim across the river
filler	The weather was nice and warm.	The boy planned to saw up the log for the fire
filler	The weather was nice and warm.	Grandpa was tired after chopping down the tree

filler	it was a rainy day outside	Grandpa relaxed and read a book
filler	It was the first period at school	The girl was happy with her newly cut out flower
filler	There were jobs to do around the house.	The boy wanted to take apart the old wooden stool
filler	it was a rainy day outside	Grandma was halfway through cutting the sleeve off the shirt
filler	The weather was nice and warm.	The girl started to blow up the green balloon
filler	It was early in the morning.	The girl was ready with the milk for breakfast
filler	It was a crisp winter morning.	The girl decided to burn a blue notebook
filler	It was a playtime at school	The boy was pleased with his super tall tower
filler	It was a holiday weekend.	The boy got started on constructing a tower out of blocks
filler	it was a rainy day outside	Grandma was impressed with a beautiful dress she had sewn
filler	It was a holiday weekend.	Grandpa concentrated on preparing dessert
filler	It was time for lunch.	The girl was ready to eat an orange
filler	The weather was nice and warm.	The boy enjoyed himself photographing nature
filler	It was early in the morning.	Grandpa was satisfied that the candle was blown out

INSTRUCTIONS

READ CAREFULLY AND ASK ALL YOUR QUESTIONS BEFORE
THE EXPERIMENT STARTS

15 MINUTES

THAT'S HOW LONG OUR
EXPERIMENT IS. WE CAN TURN
OFF A PHONE AND FOCUS ON THE
TASK, RIGHT?

COMFORT

LEAN ON THE CHAIR BACK AND
SIT STRAIGHT

CALIBRATION

HELP US SET UP THE WEBCAM. CLICK
ON THE DOT IN THE MIDDLE OF THE
SCREEN. STAY FOCUSED!

SIT STRAIGHT

WE NEED TO RECALIBRATE THE
WEBCAM FROM TIME TO TIME.
FOLLOW THE DOTS, AND THE
EXPERIMENT WILL CONTINUE

TASK

YOU WILL HEAR A SHORT TWO-
SENTENCE STORY. CLICK ON THE
PICTURE THAT MATCHES BEST

READY?

3 - 2 - 1

LET'S GO!

Appendix C – Language History Questionnaire (English translation)

1. What is your age?
2. What is your mother tongue (in case you have more than one – write all of them)
3. What language/languages do you use in your family?
4. Have you ever been to an English-speaking country?
 - a. Yes, for touristic purpose. I mostly used English on my trip
 - b. Yes, I studied in a language school in an English-speaking country
 - c. Yes, but I mostly spoke a language, other than English.
 - d. Yes, I lived in an English-speaking country
 - e. No
5. If you answered “yes” to the previous question, tell how much time you spent in an English-speaking country.
6. Do you speak any other foreign languages?
7. If you answered “yes” to the previous question, mention what other languages you speak, on which level and how often and in which circumstances you use them.

Appendix D – English Placement Test

1. They _____ in the park when it started to rain heavily.
 - a. walked
 - b. were walking**
 - c. were walk
 - d. are walking
2. You _____ pay for the tickets. They’re free.
 - a. have to
 - b. don’t have
 - c. don’t need to**
 - d. doesn’t have to
3. Jeff was ill last week and he _____ go out.
 - a. needn’t
 - b. can’t
 - c. mustn’t
 - d. couldn’t**
4. These are the photos _____ I took on holiday.
 - a. which**
 - b. who
 - c. what
 - d. where
5. Mark plays football _____ anyone else I know.

- a. more good than
 - b. as better as
 - c. best than
 - d. better than**
6. I promise I _____ you as soon as I've finished this cleaning.
- a. **will help**
 - b. am helping
 - c. going to help
 - d. have helped
7. This town _____ by lots of tourists during the summer.
- a. visits
 - b. visited
 - c. is visiting
 - d. is visited**
8. He said that his friends _____ to speak to him after they lost the football match.
- a. not want
 - b. weren't
 - c. didn't want**
 - d. aren't wanting
9. I wasn't interested in the performance very much. _____.
- a. I didn't, too.
 - b. Neither was I.**
 - c. Nor I did.
 - d. So I wasn't.
10. Take a warm coat, _____ you might get very cold outside.
- a. otherwise**
 - b. in case
 - c. so that
 - d. in order to
11. _____ this great book and I can't wait to see how it ends.
- a. I don't read
 - b. I've read
 - c. I've been reading**
 - d. I read
12. She _____ for her cat for two days when she finally found it in the garage.
- a. looked
 - b. had been looked
 - c. had been looking**
 - d. were looking

13. I don't remember mentioning _____ dinner together tonight.
- a. go for
 - b. you going to
 - c. to go for
 - d. going for**
14. It's cold so you should _____ on a warm jacket.
- a. put**
 - b. wear
 - c. dress
 - d. take
15. Paul will look _____ our dogs while we're on holiday.
- a. at
 - b. for
 - c. into
 - d. after**
16. She _____ a lot of her free time reading.
- a. does
 - b. spends**
 - c. has
 - d. makes
17. They're coming to our house _____ Saturday.
- a. in
 - b. at
 - c. on**
 - d. with
18. I feel very _____. I'm going to go to bed!
- a. nap
 - b. asleep
 - c. sleepy**
 - d. sleeper

