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**Processing of tense and aspect manipulations on-line in the first and
second language: a self-paced reading study with Russian advanced
learners of English**

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Abstract

The present study investigates how native speakers of British English ($n=12$) and advanced Russian learners of English ($n=24$) handle two types of tense-aspect mismatches: **present perfect mismatches**, where the present perfect form does not match the preceding adverbial (e.g. **Last year, Kate has studied French...*), and **past simple mismatches**, where the past simple form does not match the preceding adverbial (e.g. **Since last year, Kate studied French...*). The study also investigates whether the telicity of the verbs has any effects on the participants' processing behavior. Native English speakers and Russian learners of L2 English all judged the mismatch items as less acceptable than the match items in an off-line judgment task in the present perfect. In the past simple condition, only advanced learners showed a sensitivity. In an on-line self-paced reading task, the native speakers showed a similar sensitivity to present perfect mismatches, but not to past simple mismatches. In contrast, the learners showed no sensitivity to mismatches in any condition on-line. Importantly, however, they showed an effect of telicity. The results for native speakers support corpus findings suggesting that there is a tendency for the present perfect to move away from its resultative sense (Yao, 2014). The results for learners suggest that, contrary to Roberts & Liszka (2013), the presence of grammaticalized aspect in the L1 does not lead to a native-like sensitivity to tense-aspect violations, but may affect their interpretation of the English present perfect and past simple on-line and off-line.

Keywords: aspect, tense, present perfect, L2 processing, L1 processing, self-paced reading, tense-aspect agreement violations, telicity, L1 interference

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List of abbreviations

AJT	Acceptability Judgment Task
ANOVA	Analysis of Variance
BNC	British National Corpus
CEFR	Common European Framework of Reference
ERP	Event-Related Potential
ET	Event Time
IMP	Imperfective
L1	First Language
L2	Second Language
LexTale	Lexical Test for Advanced Learners of English
LHQ	Language History Questionnaire
PFV	Perfective
QPT	Quick Placement Test
RT	Reference Time; Reading Time
SPR	Self-Paced Reading
ST	Speech Time
SF	Sentence Final
TA	Tense and Aspect
TOEIC	the Test of English for International Communication
VP	Verb Phrase

1 Introduction

The acquisition of temporal and aspectual (henceforth TA) distinctions of English, such as present perfect versus past simple, is notoriously difficult for adult learners of English as a second language. A large number of studies has shown a low accuracy rate in the use of English tenses by adult learners in production across different first language (henceforth L1) backgrounds and different second language (henceforth L2) proficiency levels (Teran, 2014; Housen, 2002; Uno, 2014; Rocha, 2004; Slabakova, 2000; Bulut, 2011; Dürich, 2005). While this difficulty is well-attested in production, there is relatively less research on the processing of tense and aspect in comprehension. The present study aims to address this gap by investigating how native speakers of British English process tense and aspect (present perfect vs. past simple; telicity) manipulations on-line and whether advanced Russian learners of English process these manipulations similarly to native speakers or not.

Only one study to date (Roberts & Liszka, 2013) has addressed the processing of the present perfect vs. the past simple employing an agreement violation paradigm using the self-paced reading technique. The participants' (native British English and L1 German and French) ability to detect violations was monitored in an Acceptability Judgment Task and the on-line task aimed to answer whether this metalinguistic knowledge can be applied automatically in real-time comprehension. The current study is an adaptation of Roberts & Liszka's (2013) experiments with a number of changes. First, the L1 of the advanced learners is different. Based on their findings, Roberts & Liszka (2013) suggest that the presence of aspect in L1 in general might mean that learners are more sensitive to the aspect of events in their production and comprehension of their L2. Investigating advanced L1 Russian learners of English allows us to address this claim and to examine the potential role of the learners' first language in their ability to put their explicit knowledge of the present perfect to use. Russian has grammatical aspect (perfective vs. imperfective), but it does not encode the difference between perfect and non-perfect. Thus, testing learners of English with Russian background allows us to ask whether L2 learners can process a feature present in their L1 but that works qualitatively differently as opposed to being unique to the L2.

Second, the current study has also adapted the Roberts and Liszka's (2013) stimuli. Their stimuli were not balanced for the telicity of the predicates and the perfectivity of the sentences. This raises the question whether different results would be obtained if telicity were

controlled for or balanced in the stimuli, particularly with the L1 where this distinction is relevant, such as Russian.

To address these questions, an Acceptability Judgment Task (AJT) and a self-paced reading (SPR) task will be employed. The AJT is used to investigate the participants' explicit grammatical knowledge of the present perfect vs. past simple distinction, and the SPR task investigates how this knowledge is applied implicitly and automatically in real-time comprehension in both groups. In the SPR experiment, the processing cost associated with TA manipulations will be operationalized in terms of reading time (RT). Differently from traditional L2 processing studies, native and advanced learner groups are not compared directly in the statistical analyses, but rather the effects of two variables (TA match and Telicity) are investigated separately in each group. If a main effect of TA match (match vs. mismatch) is found in the native or/and advanced learners group, this will be indicative of their sensitivity to present perfect vs. past simple violations. If a main effect of telicity is found (telic vs. atelic), this will suggest that telicity plays a role in how grammatically correct/incorrect sentences are processed.

This thesis is divided into seven sections. Section 2 presents the theoretical background. In Section 3 the research questions and predictions for the current experiment are discussed. Section 4 covers the design of the study, explaining the method and the procedure in detail. The next two sections deal with the results of the experiment and the discussion on the outcome of the study. Finally, a short conclusion is presented.

2 Background

2.1 Tense and aspect

2.1.1 The concepts of tense and aspect

The acquisition of tense and aspect has long been a subject of intense investigation in first and second language research. In spite of the fact that referring to time is fundamental to human language, humans establish a linguistic encoding of temporal situations in a great variety of ways. This is not particularly surprising, since time and aspect are purely mental concepts used in order to make the environment measurable. However, this variability makes it difficult for language learners and researchers to conceptualize notions related to tense and aspect which leads to general confusion in the subject.

Tense is often described as a deictic category that places an event in time relative to some other time, resulting in future, present and past. Aspect, on the other hand, is a broader concept which deals with how an event unfolds in time (Salaberry & Shirai, 2002). It has been used to identify many different parameters of non-spatial settings, which may include event composition, completion, boundedness, temporal extent, frequency and degree and even speed and ease (Dixon, 2012). The notions of tense and aspect are closely related, because they both express information about time, with tense indicating event's location in time and aspect indicating the texture of the time in which an event has occurred. Aspect is embedded in tense describing how the time in which it occurs is viewed. For this reason, we will approach tense and aspect as a single notion of tense-aspect (TA), keeping in mind that the concepts included in this notion are somewhat different.

This study will use Weist's (2002) framework. Weist (2002) makes a clear distinction between a tense category, *absolute tense*, and three types of TA categories: *relative tense*, *viewpoint aspect* and *lexical aspect* (Aktionsart). Before starting the discussion on these categories, we will have to introduce the notions of event time (ET), speech act time (ST) and reference time (RT). These notions derive from Reichenbach's (1947, 2005) work on temporal logic. An understanding of temporal relations between these points in time is crucial to understanding tensed expressions in English. The first two notions have quite straightforward meanings: event time refers to the time at which the event being spoken of occurred, and speech time refers to the utterance time. Reference time is conceptually more complicated – it refers to the time point to which our attention is being directed.

Absolute tense is a basic category of tense – it places a situation in the line of time: past, present or future. The event time preceding the speech time defines past, event time concurrent with the speech time indicates present, and event time following the speech time specifies future.

Relative tense mentioned by Weist (2002) includes the notion of reference time (RT) which has an additional relationship to speech time, as in English past perfect, where the event time is prior to the reference time prior to the speech time. While this category is called tense, it is also aspectual in nature, because it describes how a speaker views a temporal structure of an event. In English, the present perfect is an example of *relative tense* with event time prior to reference time relation, or “current relevance”. Thus, the distinction between present perfect and past simple is that of aspect and therefore is referred to as TA distinction in this paper.

A different TA category, *viewpoint aspect* (also called grammatical aspect), separates perfective and imperfective viewpoints. This distinction is coming from grammars of Slavic languages, describing parameters of composition, and it is what has been originally referred to as aspect. Perfective viewpoints describe situation as a whole with initial and final points, and imperfective viewpoints describe only a part of a situation, including neither initial, nor final points (Weist, 2002). The literature often fails to make a distinction between perfect and perfective aspects giving rise to controversy on the subject. While there is a certain connection between the two phenomena, they are two separate concepts.

Lexical aspect, or Aktionsart, refers to “the inherent temporal properties of verbs” and in contrast to *viewpoint aspect*, it is a semantic notion (Weist, 2002). The properties of this notion are most commonly defined in terms of Vendler’s (1967, 2005) model of inherent verb semantics, however, there are many other classification systems. The model distinguishes four semantic predicate types: achievements, accomplishments, activities and states. States are + stative, + durative, - telic; activities are - stative, + durative, - telic; accomplishments are - stative, + durative, + telic; achievements are - stative, - durative, + telic. Following this line of thought, states are described as a stable persisting situations, which have no dynamics and do not require additional effort or energy to continue (e.g. *see, love, hate, want*, etc.). Activities are situations that similarly to states are durative and have no inherent goal, but are dynamic in nature and have an arbitrary endpoint (e.g. *run, sing, play, dance*, etc.). Accomplishments denote dynamic situations inherent culmination, in other words they have a single clear inherent endpoint (e.g. *run a mile, make a chair, build a house*, etc.) and achievements have no duration and are reducible to a single point in time (e.g. *recognize, die*,

reach the summit, etc.) (Slabakova, 2000; Shirai & Andersen, 1995:744). States and activities are classified as atelic, since they do not have an inherent endpoint. Accomplishments and achievements are classified as telic as they express situations with an inherent endpoint.

In light of this discussion, we will review how temporal and aspectual systems work in languages relevant to this paper, namely English and Russian.

2.1.2 Tense and aspect in Russian and English

This section sketches the structure of tense and aspect in Russian and English, focusing on the target TA markers.

In English and Russian tense is mandatorily marked grammatically. Both languages have two tenses, present and past with a compound, non-inflected future. The main difference emerges in the domain of aspect. Going back to the TA concepts discussed above, English instantiates *relative tense*, while Russian instantiates *viewpoint aspect*.

Most Russian verbs have two forms, perfective and imperfective, i.e. they encode Asp [+/-perfective]. The perfective form is usually derived from the imperfective form (1)a either by prefixation, by internal modification, by derivations from entirely different roots and sometimes by stress (Dixon, 2012). There is a variety of perfective prefixes which combine lexical meaning with the telicity meaning (Slabakova, 2003). Every verb can be used with a number of them as in (1)c, (1)d and (1)e.

(1)

- | | |
|---|--------|
| a. pisat' 'write' | atelic |
| b. na-pisat' 'write' | telic |
| c. pod-pisat' 'sign a document' | telic |
| d. do-pisat' 'write to the end (something that was started before)' | telic |
| e. vy-pisat' 'order from a catalogue' (among other meanings), etc. | telic |

Some prefixes act as pure telicity markers (1)b and do not add any semantic information to the verb root. In contrast, English does not mark *viewpoint* (grammatical) *aspect* overtly on a verb, relying on the object-marking mechanism (Slabakova, 2003) and adverbials (Pentus & Paducheva, 2010)

(2)

- a. Mary ela jabloki polchasa.
Mary ate.IMP apples for half an hour.
- b. Mary s'ela dva jabloka za tri minuti.
Mary ate.PFV two apples in three minutes.

As an example, the sentence (2)a is imperfective with atelic predicate *ela* and sentence (2)b is perfective with telic predicate *s'ela*. This difference is not marked overtly on the predicate in English, however. The contrast between perfective and imperfective is often discussed in relation to the presence or absence of endpoints: “perfective aspect presents the situation viewed as a single whole and includes its endpoints, while imperfective aspect views the situation as an interval and excludes its endpoints” (Laleko, 2010:99). Reference to endpoints is common in the description of both viewpoint aspect and telicity (lexical aspect), and these notions are connected, but still different.

Telicity is often used to describe the inherent meaning of verbs, so it is a component of a lexical aspect. A telic activity has a specific point, whereas atelic activities do not have any necessary conclusion (Dixon, 2012). Telicity works somewhat differently in English and in Russian. In Russian aspectological tradition, telicity is a property of an “aspectual pair” (Pentus & Paducheva, 2010), although it does not have to be a pair as seen in (1), but rather non-modified (atelic) and modified (telic) forms. In English, there are tests for telicity and it often depends on what is stated beyond the verb and subject (particularly in case of accomplishments and activities). Telicity is discussed as a property that applies at the level of Verb Phrase (henceforth VP), rather than at the level of a verb category.

English also marks aspect, but it is qualitatively different from aspect in Russian. As mentioned earlier, English has a clear perfect/non-perfect aspectual distinction (*relative tense*), i.e. it encodes Asp [+perfect] which is not instantiated in Russian. This distinction is realized by two distinct forms: the present perfect and the past simple respectively as in (3) (Roberts & Liskza, 2013). It is important to keep in mind that the aspectual system of English is more complex than the description above, but the discussion will be focused on the distinctions between the present perfect and the past simple.

(3)

English: Maria has slept.	perfect
Mary slept.	non-perfect

The English present perfect is in contrast to ‘finished time’ interpretation associated with the past simple. It is used of an event or state which was initiated previously to the time of speaking. An event may or may not be continuing up to or beyond the present, depending on the verb used (telic/atelic) and/or accompanying adverb (Dixon, 2012). Comrie (1976:52) explains that perfect aspect is intimately related to the notion of “current relevance”, since it “indicates the continuing present relevance of a past situation”. The correlation of event time (ET), reference time (RT) and speech time (ST) in present perfect can be seen in the Figure 1a. The direction of time is represented from left to right.

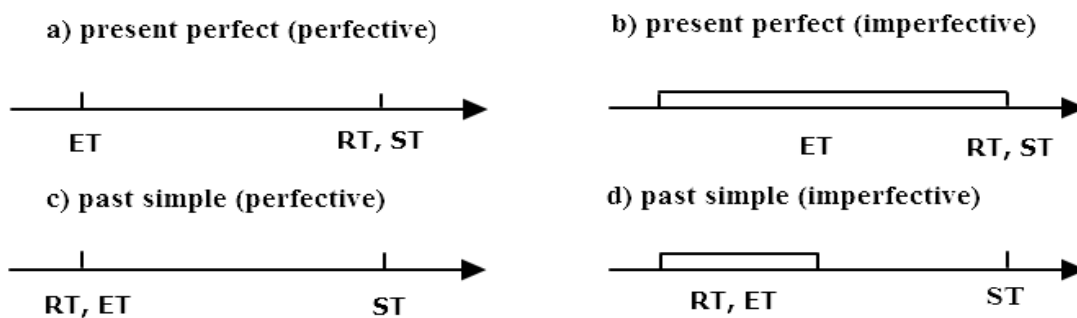


Figure 1. The schema of present perfect and past simple (adapted from Reichenbach, 2005)

In present perfect the present state of affairs is taken as a starting point for a retrospective view on a past event, contrasting with the past simple, where $RT=ET$ (Dürich, 2005). The collocation of RT with ST is interpreted as “current relevance” and is often considered to be the most important feature of the present perfect. The exact location of ET on the temporal line is indefinite and that is why perfect aspect in English cannot be used with an adverb or adverbial clause specifying the time of the past event. However, specification of time is acceptable if the temporal adverbial includes a sense of the present (Comrie, 1976; Bardovi-Harlig, 2002) in *since, up until now, for, etc.* This distinction does not apply to Russian, resulting in identical forms in (4)a and (4)b, where English separates past and perfect forms.

(4)

- a. Since spring, Bert has planted many different flowers. Asp[+perfect]
S vesni, Bert posadil mnogo raznih cvetov. Asp[+perfective]
- b. Last spring, Bert planted many different flowers. Asp[-perfect]
Proshloi vesnoi, Bert posadil mnogo raznih cvetov. Asp[+perfective]

The situation is even more complicated when perfect and past forms are used in imperfective context, since in Russian it is most commonly expressed by present and by past imperfective respectively, as in (5) below.

(5)

- a. Since last year, Kate has studied French every evening. Asp[+perfect]
S proshlogo goda, Kate izuchaet francuzskij kazhdij vecher. Asp[-perfective] T[-past]
- b. Last year, Kate studied French every evening. Asp[-perfect]
V proshlom godu, Kate izuchala francuzskij kazhdij vecher. Asp[-perfective] T[+past]

The fact that English does not distinguish perfective aspect grammatically does not indicate the absence of a possible perfective (or imperfective) meaning of VPs, as can be seen in the aspectual difference between (4)a and (5)a and (4)b and (5)b. Both present perfect and simple past forms can describe two opposing aspectual situations, perfective and imperfective, depending on contexts (Smith, 1997).

While still rather inconclusive, various models of acquisition (e.g. the Aspect Hypothesis, Andersen & Shirai, 1996) and language production findings suggest that past simple and particularly present perfect have a perfective canonical value, which is the main reason for the perfective-perfect confusion. In Comrie's (1976: 56–60) description of the perfect, this type of present perfect can be referred to as the “perfect of recent past” (e.g., *Bill has just (this minute) arrived.* p. 60), “perfect of result,” (e.g., *I have had a bath.* p. 56) the “experiential perfect,” (e.g. *Bill has been to America.* p. 57). A less canonical imperfective use of present perfect describes situations leading up to the ST and Comrie (1976:70) mentions that this sense of present perfect “seems to be characteristic of English”. In the literature it is referred

to as the “perfect of persistent situation” (e.g., *I’ve shopped there for years*) in Comrie (1976: 60), “duration of state/habit up to the present moment” (e.g. *I have lived here for ten years*) in Leech (1969:153) and “continuing unbroken until now” (e.g. *We have won the game for half a year straight*) in McCoard (1978:143).

To sum up the differences and similarities in tense-aspect marking in Russian and English, both languages distinguish [+/-past] for tense and both languages have aspectual distinctions that do not map onto each other. Table 1 shows the differences in how tense and aspect is mapped out in the two languages.

Table 1. *Mapping of aspect and tense in English and Russian*

English	Present perfect	Past simple
Russian	Past perfective	
	Present	Past imperfective

While past tense in Russian separates perfective and imperfective predicates, it does not distinguish between the past simple and present perfect, which makes acquiring the abstract conceptual differences between these aspects a challenging but crucial task for Russian learners of English.

2.2 Tense and aspect in L2

2.2.1 Production of tense and aspect in L2 English

The acquisition of the TA system in L2 English production poses challenges to speakers of numerous languages, for example L1 Spanish (Teran, 2014), L1 Danish and French (Housen, 2002), L1 Japanese (Uno, 2014), L1 Portuguese (Rocha, 2004), L1 Turkish (Bulut, 2011), L1 German (Dürich, 2005) and of course L1 Russian (Chernaya & Derevyanko, 2010). The present perfect stands out in the literature as a particularly complex TA marker, as it is a more complex form both morphologically (two verbs are required to express it) and semantically (two points in time are related). Another difficulty is the two-fold nature of its functions, namely the encoding of both perfective and imperfective senses. The research on acquisition of past and perfect TA markers has been approached from two perspectives: an investigation of patterns in development of English verb morphology in relation to inherent semantics of

the verbs (lexical aspect) and an investigation of TA acquisition in the context of the presence vs. absence of a feature in learners' L1.

There has been a long discussion of whether and how semantic properties of verbs have an effect on the acquisition of aspectual concepts in L1 and L2. The Aspect Hypothesis (Andersen & Shirai, 1996) suggests that there is indeed a correlation, and that past-tense verbal morphology does not appear with all types of verbal predicates at the same time. As Bardovi-Harlig (2002:130) explains, "the emergence of past-tense verbal morphology is guided by the lexical (or inherent) aspect of verb predicates." For English, it has been proposed that at least at the early stages of L2 development the use of past and perfect tense morphology is predominantly associated with telic predicates - achievements, and accomplishments (Housen, 2002). At the final stages of L2 development, the use of past and perfect tenses becomes dependent on the grammatical and discourse-pragmatic values of the target language, rather than the aspectual values of the predicates. However, if the acquisition of tense and aspect markers is affected by telicity of the predicates, this could potentially result in differences in the processing of telic and atelic predicates on-line, and assessing them off-line in L2 learners irrespective of their L1. This could even affect native speakers, since L1 learners are also influenced by the inherent semantic aspect of verbs. This assumption in the Aspect Hypothesis is related to the learner's cognitive predisposition towards associating certain verb types with a certain TA form. If functions of past and perfect are indeed inherently perfective, then the production and processing of imperfective past sentences could be more demanding.

The next argument is related to a possible effect of the L1 on the acquisition of L2 tense and aspect distinctions. As Kihlstedt (2002) points out, adult learners approach their L2 with existing grammatical knowledge in their first language. She argues that learners "might be sensitive to a concept of time and aspect encoded morphologically in their first language and search for its counterpart in the target language" (Kihlstedt, 2002:325). According to Teran (2014), most learners' output in relation to English TA markers shows some kind of interference and/or influence from their L1 background over their use of L2. The analyses of L2 production of English showed that learners often use a TA marker typically used in their L1, which is often attributed to "transfer" or "cross-linguistic influence" (Teran, 2014:2).

The analyses of errors in the production of TA markers by Russian learners of English generally support these arguments. Chernaya & Derevyanko (2010) discuss "competing pairs", for instance, the present perfect and past simple, which learners often use

interchangeably. Other “competing pairs” include past simple and past progressive and present perfect and present simple. Learners often erroneously use the past progressive in the context of past simple when it has an imperfective sense. Similarly, learners erroneously use the present simple in the context of present perfect when it is imperfective, which suggests that at least in production, imperfective past and perfect pose a special problem.

To summarize, there is a great amount of studies that focus on acquisition of the present perfect vs. past simple distinction in English through analyzing the production patterns of learners of different levels. Many studies focus on the universal trends of the development of these TA markers and on the difficulties L2 learners encounter as well as the relation between these difficulties and learners’ L1. These developmental trends and acquisition difficulties in the production raise the questions of whether TA markers pose any problem in comprehension and how learners’ processing of TA marker differ from that of native speakers. The next sections address this question, starting with a general overview of sentence processing.

2.2.2 Sentence processing in L1

Monolingual sentence processing studies have attempted to answer how adult native speakers of a language process the structure of sentences and how they understand their meaning. Investigations on syntactic ambiguity resolution and structural complexity have shown that native speakers process language input incrementally, which means that they do not wait to integrate each constituent of the input. The contextual and semantic information is also integrated rapidly and can alter how a sentence is processed (Van Gompel, 2013).

The information on how native speakers process ungrammatical sentences of various kinds sometimes come from L2 processing studies where native speakers are used as a control group. It is assumed that native speakers are sensitive to all kinds of morphosyntactic violations, even in structurally complex sentences.

2.2.3 Sentence processing in L2

The literature generally agrees that there are differences between L1 and L2 processing. For example, studies of referential processing have found that L2 learners often have problems establishing dependencies on-line between pronominals and their potential antecedents (Felser & Cunnings, 2012). Mixed results have been found for the processing of relative clause attachment ambiguities (Papadopoulou & Clahsen, 2003; Felser et al., 2003) and garden-path sentences (Dussias & Cramer Scaltz, 2008). Furthermore, processing of morphosyntactic violations, for example, gender, number or TA agreement violations, is yet another paradigm

where non-targetlike behavior is commonly observed (Jiang, 2004; Keating, 2009; Roberts & Liszka, 2013; Gillon-Dowens et.al, 2010; Sabourin & Stowe, 2008).

While the differences are found quite often, the sources of these differences remain controversial. The central debate revolves around the question whether “learners who have acquired their L2 after puberty can ever acquire grammatical knowledge to a native-like level” (Roberts, 2013:233). There is a number of competing models that try to explain differences in L2 processing from different perspectives. Clahsen and Felser (2006) state that while local dependencies can be processed in a native-like way, grammatical dependencies across clauses will be processed differently from a native speaker, no matter the learner’s L1. They have proposed the Shallow Structure Hypothesis (SSH), which states that L1 and L2 processing is fundamentally different in that the syntactic analysis performed by L2 speakers during language comprehension is not as in depth as that performed by native speakers. However, there are findings that question this hypothesis, showing that L2 learners are able to process long distance violations even if a given feature is unique to the L2 (Foucart & Frenck-Mestre, 2012).

The effect of the L1 on processing, the presence versus absence of a given feature in particular, is commonly discussed in L2 processing studies as a factor that affects whether learners can attain native-like processing behavior or not. Some studies lead authors to conclude that after a critical or sensitive period learners are no longer able to acquire abstract grammatical features not available in their L1. This view is reflected in the Failed Functional Features Hypothesis (FFFH), proposed by Hawkins and collaborators, who suggested that if “parameter settings differ between an L1 and a target L2 there will be considerable restrictions on the extent to which an L2 learner can build a mental grammar like that of a native speaker” (Hawkins & Chan, 1997:189). As an example, Jiang (2004) used the SPR paradigm to investigate how Chinese learners of English process various subject-verb agreement manipulations. While their performance on a written grammar tests showed that the participants had the formal knowledge about the subject-verb agreement, unlike native speakers, their processing time was not affected by number disagreement. It was suggested that learners’ insensitivity might have occurred due to the fact that grammatical number is seldom encoded in their L1.

A different view on L1 transfer is offered by Schwartz & Sprouse (1996) and White (1989, 2003) who introduced the Full Transfer Full Access Model. This model suggests that during the initial stages of L2 acquisition the representation of grammatical features is based on the features available in the L1. Furthermore, it is assumed that during the course of L2 development learners have access to underlying universal grammar and new features required

by the L2 can be acquired, regardless of the age of acquisition. In other words, the model expects L1 transfer effects especially at the initial stages of L2 acquisition, but it also suggests that learners are able to acquire a native-like mental representation of L2 abstract features.

Two studies using ERPs (Gillon-Dowens et al., 2010) and eye-tracking (Keating, 2009) have investigated gender agreement processing between the noun and the adjective in L2 Spanish. In both studies sensitivity to agreement violations was compared for native Spanish speakers and English–Spanish late learners. Gillon-Dowens et al. (2010) studied highly proficient learners, immersed in their L2 for at least 12 years, and Keating (2009) studied classroom learners of different proficiency levels. Both studies found sensitivity to grammatical gender agreement within the determiner phrase and attributive adjectives similar to native speakers, suggesting that late L2 learners can reach native-like processing even for features that do not exist in the learner’s L1. Keating (2009) found sensitivity to mismatches only in advanced group, which suggests that L2 proficiency plays a big role and supports Full Transfer Full Access Model.

However, the question of L1 transfer is not always as simple as discussing an effect of presence versus absence of a feature in L1. In many cases a feature is present in the L1 (e.g. [+gender] or [+aspect]), but involves the use of different phrase-structure configurations, invokes the use of different grammatical features in a grammatical rule or even differs on a conceptual level. Not everyone agrees on how similar structures that work differently affect L2 processing. This question is of particular interest for the present paper, since it attempts to investigate how L1 speakers of Russian, a language with a rich aspectual system, handle aspect and tense in English.

Sabourin and Stowe (2008) examined how Dutch native speakers and learners of Dutch with German and French L1s process verbal dependencies and grammatical gender mismatches. German speakers showed a P600 effect to both constructions, but French speakers only showed a P600 effect within the verbal domain. Although the feature gender is present in French, lexical gender assignment and agreement does not work the same way as in Dutch. The authors suggested that this dissimilarity can block appropriate processing. Similarly, Tokowicz and MacWhinney (2005), who examined beginning English–Spanish learners, found small but reliable P600 effects in response to violations in structures that were similar in L1 and L2 (i.e. tense marking) and structures that were unique to the L2 (i.e. gender agreement), but not in structures that were different across languages (i.e. nominal number

agreement). These findings suggest that features that are present in L1, but work differently in L2 could prevent language learners from attaining native-like behavior.

A different view is offered by Roberts & Liszka (2013) – the sensitivity of a French group to perfect/non-perfect violations was explained by the presence of overtly marked aspect in French (even though it does not work in identical ways). They suggested that aspectual distinctions in L1 create a general heightened sensitivity to aspect violations in L2 even if aspectual mappings do not work similarly.

To summarize, the results of studies presented above have reached contrasting conclusions regarding the factors affecting L2 processing and regarding late learners' capacity to process unique/dissimilar features in a native-like way. Many studies discuss the issue of knowledge integration without explicitly offering the reason behind this issue. Some findings show that structures unique to L1 are not processed in a native-like way, but structures that are present in L1 are, even if they work differently. Other findings show the opposite. These varied results suggest that there are many factors affecting the outcome of adult L2 learning, such as the type of structure under investigation, how it is instantiated in the L1, proficiency level, type of L2 environment (instruction versus immersion) and so on.

2.2.4 Processing of tense and aspect in L1 and L2 English

L1 English

While there are a lot of corpus and production studies that investigate the trends in the usage of perfect and non-perfect in varieties of English (Biber et al. , 1999; Elsness, 1997, 2009; Yao, 2014; Hundt & Smith, 2009), little is known about how tense and aspect are processed in L1 English comprehension.

Steinhauer & Ullman (2002) focus on processing of tense violations (past simple vs. present simple) as in (6) by native English speakers. The participants' processing of correct sentences (6)a was compared to their processing of sentences with a temporal mismatch between the fronted adverbial and the following verb as in (6)b while their ERP responses were recorded:

(6)

- a. Yesterday, we ate Peter's cake in the kitchen
- b. * Yesterday, we eat Peter's cake in the kitchen

In items with tense violation the researchers found LAN and (400–500 ms) and P600 (600–900 ms) components, which suggests that native readers are sensitive to temporal mismatches of that kind in on-line sentence comprehension.

L2 English

There are many studies asking whether L2 learners are able to process different types of morphosyntactic agreement similarly to native speakers, for example gender agreement (Sabourin & Stowe, 2008; Tokowicz and MacWhinney, 2005; Gillon-Dowens et al., 2010; Keating, 2009; Foucart & Frenck-Mestre, 2012) or number agreement (Jiang, 2004). However, only handful of studies deal with TA distinctions.

In a study of L2 processing of tense and aspect, Chan (2012) employed the SPR paradigm to investigate whether L1 Korean, Chinese and German L2 learners of English are able to process temporal anomalies on-line in qualitatively similar ways to native speakers of English. Temporal violations of different types were constructed in the past simple condition (*Yesterday several large snakes escape...and Tomorrow several large snakes escaped...*) and aspectual violations of different types were constructed in the progressive condition (*Currently the baby laughing... and Lately the baby is laughing...*). The study found that native speakers were sensitive to the errors in the past simple condition and the progressive condition, Korean learners were also sensitive to violations in both past and progressive conditions, German learners detected errors in the past condition but not in the progressive, and Chinese learners showed increased processing cost for progressive violations, but not for past violations. Chan (2012) concluded that there is a strong tendency for L1 transfer and differences in reading time between groups can be explained by the presence or absence of a particular structure in the L1 (progressive marker or tense morphology).

With regards to perfect/non-perfect processing, only one study to date (Roberts & Liszka, 2013) has addressed the processing of present perfect employing an agreement violation paradigm with self-paced reading technique. Roberts & Liszka (2013) examined how native speakers of British English and French and German L2 learners of English processed the simple past and present perfect sentences containing temporal-aspectual mismatches. As illustrated in (7)b and (8)b mismatches were triggered by sentence-initial temporal adverbials that did not align with the temporal scope specified by inflected verbs:

(7) Present perfect

- a. Since last week, James has gone swimming every day. Now he's getting bored of it.
- b. * Last year, James has gone swimming every day. Now he's getting bored of it.

(8) Past simple

- a. Last week, James went swimming every day. Now he's getting bored of it.
- b. *Since last week, James went swimming every day. Now he's getting bored of it.

The reading times were analyzed at the verb and three subsequent regions. Native speakers of English were sensitive only to violations in the present perfect condition. The violations in the past simple condition did not result in higher processing cost, in spite of the fact that native speakers assessed the past simple mismatch condition as significantly less acceptable than the corresponding match condition in the off-line Acceptability Judgment Task. It was suggested that the past simple violations (*Since last week, James went swimming...*), while semantically odd, may not be fully ungrammatical because the time span referred to by the adverbial at least includes the past time, which is not the case with the present perfect condition (**Last year, James has gone swimming...*). Similarly to native speakers, both German and French learners were able to assess the mismatch items in both the present perfect and the past simple as less acceptable than the match items in an off-line judgment task. However, they processed the experimental items differently from native speakers and differently from each other in the on-line task. French learners found the mismatch conditions more difficult to process than the match conditions of both the past simple and the present perfect items. German learners did not show a processing cost for either the past simple or the present perfect mismatch items. The difference between German and French groups was taken as suggestive of transfer. Unlike French *passé composé* (compound past) that functions similarly to English present perfect, German *perfekt* mainly infers a simple past interpretation. Another interesting suggestion offered by Roberts & Liszka (2013) is that speakers of languages with encoded aspect (any type of aspect) are more likely to be sensitive to the aspect of events in the comprehension of their L2: "...it may be that apart from perfect aspect, it is the difference in whether their first language distinguishes aspectual differences grammatically (French: *im/perfective*) or not that underlies some of the differences in performance..." (Roberts & Liszka, 2013:429) This idea can be investigated in the present paper, since Russian makes a clear distinction between perfective and imperfective aspects, albeit not perfect aspect.

To summarize, very little is known about how aspect in general, and perfect/non-perfect distinction in particular is processed by L2 learners of English. This is surprising, considering

the amount of studies focusing on the problems in the production of TA markers by advanced L2 learners. Investigating the processing of TA markers could potentially broaden our understanding of the reasons behind these well-attested difficulties in production.

3 The current study

3.1 The purpose of the current study and general predictions

The purpose of this study is twofold: first we examine how native speakers of British English process TA manipulations off-line and on-line, and second, we investigate whether advanced Russian learners of English process TA markers in a qualitatively similar way to native speakers. To this end, AJT scores and reading time patterns of native speakers of English and Russian advanced L2 learners of English will be analyzed.

The present study poses the following research questions:

- 1) a) Are native speakers of British English sensitive to present perfect vs. past simple violations off-line as measured by AJT and b) does the telicity of the predicates affect how native speakers of British English assess grammatical and ungrammatical sentences off-line?
- 2) a) Are advanced Russian learners of English sensitive to present perfect vs. past simple violations off-line as measured by AJT and b) does the telicity of the predicates affect how advanced Russian learners of English assess grammatical and ungrammatical sentences off-line?
- 3) a) Are native speakers of British English sensitive to present perfect vs. past simple violations on-line as measured by reading times in SPR task and b) does the telicity of the predicates affect how native speakers of British English process grammatical and ungrammatical sentences on-line?
- 4) a) Are advanced Russian learners of English sensitive to present perfect vs. past simple violations on-line as measured by reading times in SPR task and b) does the telicity of the predicates affect how advanced Russian learners of English process grammatical and ungrammatical sentences on-line?

The relationship between explicit and implicit knowledge is commonly discussed in L2 processing studies (R. Ellis et al., 2006; Roberts & Liszka, 2013; Jiang, 2004). Explicit knowledge can be accessed only with controlled effort and, thus, is typically used in off-line tasks that allow for careful planning and monitoring. Language processing, on the other hand, implies automatic, non-reflective, implicit responses to stimuli and commonly measures implicit knowledge. Before investigating processing behavior of the participants, it is important to investigate whether native speakers and advanced learners have the explicit knowledge of the present perfect vs. past simple distinction.

Many studies address the production of the present perfect and the past simple in native English speakers, highlighting the difference between British and American English, and also shifts in usage (Elsness, 1997; Yao & Collins, 2013; Hundt & Smith, 2009; Yao, 2014). For example, it has been suggested that the past simple may be taking over parts of the former functional territory of the present perfect, but also that the present perfect is being combined with temporal adverbials that clearly indicate past time reference (Hughes et al., 2005; Engel and Ritz, 2000). Despite these studies, not much is known about how these forms are processed in L1 comprehension. Similarly, many studies deal with the production of aspect and tense in L2 English, but experimental research on the processing of aspect and tense on-line by L2 learners is sparse and experiments aiming to answer how Russian learners process TA markers are non-existent. The present study therefore attempts to address this gap by examining first, how English TA markers are processed by native speakers of British English and second, how they are processed by advanced Russian learners. Russian, a language that belongs to a family with a rich aspectual system, makes a clear distinction between perfective and imperfective. Previous studies suggest that the presence of aspect in the L1 might make learners more sensitive to the aspect of events in production and comprehension of their L2, because they pay attention to the aspect of an event in order to produce the correct morphological form (Roberts & Liszka, 2013). We investigate this claim, keeping in mind that while Russian has a grammatical category of aspect, it does not encode perfect/non-perfect distinction. The question is therefore whether L2 learners can process a structure that works qualitatively differently in their L1 opposed to being unique.

The TA markers under scrutiny are the present perfect and the past simple, which form a distinction in English, but not in Russian. Drawing on Roberts & Liszka (2013), present perfect and past simple items appear in grammatical and ungrammatical conditions, resulting in a variable called a TA match. The basic assumption is that if the learners have fully acquired the semantics of the underlying morphological marking of these TA markers, they should be sensitive to the mismatch between a fronted temporal adverbial (e.g. *Last year/Since last year*) and the tensed clause that follows (e.g. **Kate has studied French.../*Kate studied French...*) in both off- and on-line comprehension.

However, the original study does not control for the lexical aspect of predicates and the perfectivity of sentences. The present perfect and past simple forms have been found to be more typical with telic predicates (e.g. Housen, 2002), and the perfective has been suggested to be canonical for these TA markers. This suggests that the past and perfect tenses might be

associated with perfective aspect in learners with L1s that have *viewpoint aspect* (perfective/imperfective distinction), but lack *relative tense* (e.g. present perfect). In this case, the present perfect and simple past imperfective sentences in English, requiring imperfective interpretation in L1, could pose problems even for advanced learners, when assessing sentences in off-line tasks, or processing sentences in on-line tasks. In contrast to previous tense and aspect processing studies, the current experiment therefore adds telicity as a variable in order to balance telicity and perfectivity.

Based on previous results, we predict the following:

Predictions 1. TA match

In the off-line acceptability judgement task (AJT), both the native English and the Russian L2 learner groups are expected to distinguish grammatical and ungrammatical sentences for both present perfect and past simple items, following Roberts & Liszka (2013).

In the on-line self-paced reading (SPR) task, Roberts & Liszka (2013) found native speakers to be sensitive to the mismatch condition, but only for the present perfect experimental items. Therefore, we expect to replicate this finding: the mismatch condition in the present perfect (e.g. **Last year, Kate has studied French...*) is expected to incur a higher processing cost than the match condition in native speakers. They are expected to be non-sensitive to violations in the past simple (e.g. **Since last year, Kate studied French...*) experimental items.

In the case of L2 learners, if a general presence of an aspectual system in the L1 is a crucial factor, then we should expect native-like processing in adult Russian L2 learners of English. If, on the other hand, the presence of perfect/non-perfect distinction in particular (in L1) is a key factor, then Russian learners should show no sensitivity to violations.

Predictions 2. Telicity

In the off-line AJT, we predict that telicity will not have any effect on the judgments of the native speakers. The Russian L2 learners, on the other hand, are expected to have problems assessing present perfect atelic items.

In the on-line SPR task, telicity is not expected to affect the processing of the grammatical sentences in the native speaker group for either present perfect or past simple experimental items. However, it may influence how ungrammatical present perfect sentences are processed due to differences in the temporal frames of the telic and atelic predicates. As for

ungrammatical past simple sentences, native speakers are expected to be non-sensitive to violations in this group regardless of telicity of the predicates.

For the Russian L2 learner group, we predict that telicity of the predicates and the perfectivity of the sentences will have an effect on the processing behavior in the present perfect items. If, as argued by the Aspect Hypothesis, the present perfect has a canonical perfective value, L2 learners are expected to have some difficulty processing atelic present perfect sentences in an imperfective context.

Table 2 and Table 3 summarize the predictions.

Table 2. *Summary of the predictions for the native speaker group*

Predictions for the native speaker group			
	AJT	SPR	
		TA match	Telicity
Present perfect (e.g. Since.../*Last...+ present perfect form)	Sensitivity to mismatch irrespective of telicity	Sensitivity to mismatch	Effect of telicity in mismatch condition
Past simple (e.g. Last.../*Since...+ past simple form)	Sensitivity to mismatch irrespective of telicity	No sensitivity	No effect

Table 3. *Summary of the predictions for the Russian L2 learner group*

Predictions for the Russian L2 learner group			
	AJT	SPR	
		TA match	Telicity
Present perfect (e.g. Since.../*Last...+ present perfect form)	Problems in atelic condition	?	Effect of telicity irrespective of TA match
Past simple (e.g. Last.../*Since...+ past simple form)	Sensitivity to mismatch irrespective of telicity	?	Some effect of telicity

To explore these issues, we employed the same techniques as Roberts & Liszka (2013), namely a self-paced reading task (on-line) paired with comprehension questions, followed by an acceptability judgment task (off-line). Both tasks were performed to receive a better picture of explicit grammatical knowledge and implicit grammatical computation.

Furthermore, the participants filled in a background questionnaire about general participant

background, language history, and language usage. Finally, the LexTale vocabulary and proficiency test (Lemhöfer & Broersma, 2012) was administered to the learner group.

4 Method

4.1 Participants

4.1.1 English native speakers

The native speaker group consisted of 12 native speakers of British English (mean age 20;8 years, range 19-27 years). Participants came from England, Scotland or Northern Ireland and were tested in Sweden. Functional bilinguals could not participate. Participants were recruited through social media (Facebook), mostly from the Erasmus 2015-2016 group. They were exchange students staying in Sweden for one semester and were tested during their first month in Sweden. Participants were compensated for their participation with a cinema ticket (or alternatively with 150 SEK). No participants were excluded from the analysis.

Native speakers of British English were chosen as a control group, because the distinction between present perfect and preterit is drawn differently in British English and other varieties of English. Numerous corpus-based studies of present day English that include regional variation (Biber et al., 1999, Elsness, 2009) have consistently demonstrated that present perfect is more commonly used in British than in American English. Acceptability judgment tests (Elsness, 2009) have also shown that the preference for the present perfect is much more marked in British than in American English. British English informants in Elsness (2009) often gave a low score to preterit used in the past situation with the current relevance, while American English informants accepted both alternatives or preferred preterit over present perfect. This difference suggests that British English informants might be more sensitive to aspects violations.

4.1.2 Russian learners of L2 English

The learner group consisted of 24 native Russian speakers judged to be advanced learners of English (mean age 23;5 years, range 19-29 years). The participants were recruited at the Department of International Education and Language Communication of Tomsk Polytechnic University, Translation and Additional Language Training Program. Participants could not be enrolled in language and linguistics program and could not have lived in an English-speaking country for more than 6 months. The learners had different majors and they were studying English in the evenings as an extra education. Two groups (eleven and thirteen students) were tested on two different occasions and they were classified as advanced by the course administrator.

Two participants were excluded from the analyses, because they fell more than 2.5 standard deviations below the group's mean on the Acceptability Judgment Task, and were judged unable to distinguish the past simple from the present perfect in the off-line test. The excluded participants also scored relatively low on the comprehension questions in the on-line test. This led to an advanced learner group of 22 participants (mean age 23;3 years, range 19-29). An independent samples t-test showed that the learner group was significantly older than the native speaker group, $t(26) = 2.98, p = .006$. Differences in age between the participant groups is not uncommon in L2 studies, considering that reaching advanced proficiency level in L2 may take some time.

Participants filled in an adapted version of the Language History Questionnaire (LHQ 2.0; Li, Zang, Sai and Puls, 2013), see Appendix 2. The participants self-rated their language skills on a 7-point scale (7 = native-like proficiency). Reading ability received the highest ranking above 5 indicating good proficiency, while speaking, writing, and listening were ranked lower between above average and good. Twenty-one participants listed Russian as their only native language and one participant listed Russian and Buryat as their native languages. The participants also mentioned knowledge of German, French, Kazakh, Chinese, Czech, and Spanish, but they could not speak these languages at an advanced level. The participants indicated that they read in English daily from 40 to 520 minutes every day, including reading for school and reading for entertainment. The majority also expressed that they wish they had native speakers in their environment to improve on their language abilities.

The Lexical Test for Advanced Learners of English (LexTale; Lemhöfer & Broersma, 2012) was chosen as a test of general English proficiency (see 4.3.5 for a discussion). The test was administered on-line to the participants in the learner group. Responses were recorded and calculated automatically. The mean LexTale accuracy score was 75.63 ($SD = 8$; range: 60-88.75). LexTale's suggested score for an advanced user (C1-C2 on CEFR) is 80%-100%. However, this group is defined as advanced for the purpose of this paper. All scores were normally distributed and no outliers were found.

Table 4 lists the relevant language background and biographical information of the learner group.

Table 4. *L2 learners' language background and biographical information (n=22)*

Learner information	Mean	Range	SD
Age	23;3	19-29	2.7
Comprehension question scores ¹ (out of 100%)	90	69-100	9
Self-rating of L2 English			
Reading	5.2	4-7	0.7
Writing	4.5	3-6	0.9
Speaking	4.7	3-6	1
Listening	4.3	2-5	0.8
Length of exposure to English (years)			
age of onset reading (years)	12;2	7-20	3.9
age of onset writing (years)	8;10	6-13	2
age of onset speaking (years)	9;2	6-13	2
age of onset speaking (years)	9;10	5-18	3.2
age of onset listening (years)	9;7	5-18	3.2
Daily English reading (minutes)	151	40-520	116.4
LexTALE score (out of 100%)	75.6	60-88.8	8

4.2 Self-paced reading

Self-paced reading (SPR) is a frequently used method for studying sentence processing. During SPR reading time is recorded for each designated segment (i.e. a word or a phrase) in a sentence or a group of sentences. A participant presses a designated button and the first segment of a sentence appears on the screen. With each subsequent press of the button a new segment appears. The time it takes a participant to read each segment is recorded for analyses. The method is referred to as self-paced because participants determine themselves how long to spend reading each segment.

There are several different formats that define how the stimulus is presented to the participant. With the centered display every segment appears in the center of the screen and overwrites the previous segment. This design is often described as less natural way of reading, since there is no access to the previous and upcoming sentence information that is available during normal reading (Jegerski, 2014). The display can also be cumulative, which means that once a stimulus segment is revealed, it stays visible on the screen. The problem with this design is

¹ This is the mean accuracy score for comprehension questions following critical items

that the participants tend to develop a strategy where they open several segments at once, before reading them.

In a noncumulative display, only one segment is visible at a time and every time a new segment is revealed the previous one turns back to dashes (e.g. Sagarra & Herschensohn, 2010). As illustrated in Figure 2, each dash represents a letter, and words are separated with spaces which resembles readers’ ability to see the whole sentence in peripheral vision during natural reading. An ability to parafoveally process a word to the right of a fixation locus has been found to be beneficial, particularly when text consists of high frequency words (White, Rayner, & Liversedge, 2005). While the word to the right is not available in parafovea with a noncumulative display, the ability to extract information about the word length could be considered beneficial. According to Just et al. (1982), this paradigm most closely resembles natural reading in the sense of replicating the results of eye-tracking data. This format is often referred to as the “*moving window(s)*” technique because successive button presses cause the unmasked segment of text to proceed like a moving window across the computer screen” (Jegerski, 2014:22). For these reasons, a noncumulative linear display was chosen for the current study.

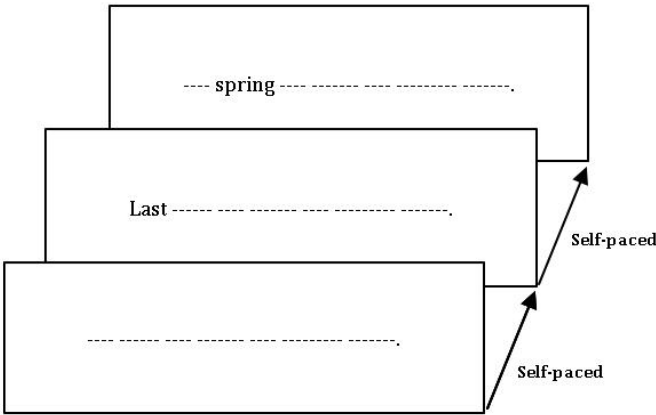


Figure 2. Example of a noncumulative linear trial for the self-paced reading task (adapted from Sagarra & Herschensohn , 2010)

The SPR method is based on the assumption that “the amount of time taken to read a word reflects the amount of time needed to process the word” (Jegerski, 2014:23). The time between one button press to another is considered as the time spent reading and integrating the segment. Hence relatively longer reading times are interpreted as indications of processing difficulty and shorter reading times are often related to various facilitation effects. According

to Marinis (2003), the SPR reading time data can indicate what segments of the sentence are difficult to process, when the participant is surprised or encounters an unexpected word or phrase and/or when the participant has to reanalyze his or her initial interpretation of the sentence. However, SPR data should be interpreted very carefully, since it tells us only where in the stimulus an effect has occurred, but not what cognitive processes were engaged at that moment.

As all other methodologies, SPR has some advantages and disadvantages. Starting with the advantages, SPR is inexpensive compared to eye-tracking and ERP. Second, SPR is very efficient. SPR experiments can be uploaded to multiple computers and, if necessary, run with multiple participants at once. SPR is also portable, which makes it possible to conduct experiments where no advanced laboratory is available. Next, the quality of data in SPR method is not influenced by such external factors as occluded eyelids, extensive blinking, eye glasses, contact lenses, mascara and eye-liner as in eye-tracking. Some otherwise eligible participants might have to be turned away or some extra measures need to be taken which is rarely the case with SPR. The absence of these factors is connected to the fact that the amount of missing data is usually lower with SPR and noisy data is not an issue. Finally, the participants in the SPR experiment are usually not aware of the fact that their response is measured in seconds, while participants enrolled in eye-tracking studies know that their eyes are being monitored. Even if the precise aim of the research is hidden, this awareness may lead to unnatural reading behavior, however, it is not very common and can be avoided (Keating, 2014).

Those advantages of SPR, however, come at a certain cost. SPR can be considered less natural, since texts need to be divided into segments and participants need to press a button to proceed to the next segment. Special attention needs to be paid to segmenting when preparing the stimuli in order to capture a potential effect without introducing task-specific confounds. In SPR tasks segments disappear from view once read which prevents participants from re-reading words. This can introduce some additional strain on working memory, particularly in non-local dependencies (Foucart & Frenck-Mestre, 2012), and some potentially informative processes which happen during normal reading, like regressions, may be missed. Next, SPR yields just one measure of reading per segment and while this can be an advantage, it is also often considered a drawback. Multiple measures of processing behavior available in eye-tracking provide insight into how readers respond to agreement anomalies and other processing difficulties – whether they slow down on the verb to continue reading or whether

they regress to reread the previous words. SPR technique, allows us to detect sensitivity to grammatical anomalies usually in the form of increased reading times in the spillover region, but it does not indicate how exactly readers respond to processing difficulties (Keating, 2014).

4.3 Design

4.3.1 Design of the self-paced reading task

The self-paced reading experiment has a factorial design with two two-level within-subject factors (2x2): TA match (*match* and *mismatch*), that is the relation between a temporal adverbial and immediately following verb; and telicity of a verb phrase (*telic* and *atelic*). In Roberts & Liszka’s (2013) study, the violations between the present perfect and the past simple constitute a factor named *Type* with two levels: match and mismatch. In the current study the corresponding factor is named *TA match* for reasons of clarity. The differences in the processing behavior between groups (*native* and *L2 learner*) will be discussed, but not directly compared in the statistical analyses. Similarly, present perfect and past simple items are analyzed separately, because regions of interest do not match in these two conditions. The design of the study is illustrated in Table 5.

Table 5. Stimuli structure with TA match (*match* vs. *mismatch*) and Telicity (*telic* vs. *atelic*) as factors (2x2)

Native speakers				
	Present perfect		Past simple	
	match	mismatch	match	mismatch
atelic	Since..., Kate has studied...	Last year, Kate has studied...	Last year, Kate studied...	Since..., Kate studied...
telic	Since..., Bert has planted...	Last spring, Bert has planted...	Last spring, Bert planted...	Since..., Bert planted...

Russian L2 learners of English				
	Present perfect		Past simple	
	match	mismatch	match	mismatch
atelic	Since..., Kate has studied...	Last year, Kate has studied...	Last year, Kate studied...	Since..., Kate studied...
telic	Since..., Bert has planted...	Last spring, Bert has planted...	Last spring, Bert planted...	Since..., Bert planted...

4.3.2 Materials for the self-paced reading task

The materials consisted of 32 experimental items in four different versions, referred to as conditions, yielding 128 possible sentences which were mixed with 40 filler sentences, see Appendix 1. The structure of the materials used in Roberts and Liszka (2013) was adopted for the current study. First, past simple (10)_{ac} and present perfect (9)_{ac} versions were created for each experimental sentence. Each experimental item consisted of two sentences: a critical sentence followed by a wrap-up sentence.

All experimental items had a temporal adverbial (a prepositional phrase or temporal adverb) which indicated the time being talked about. The experimental manipulation was created by either matching the aspect of the immediately following verb with the adverbial, or not. Doing so created a mismatch between the temporal restrictions imposed by the temporal adverbial and the restrictions imposed by the past simple and present perfect morphology and grammatical structure. For example, in order to construct a present perfect mismatch, a specific time expression, such as *yesterday*, *last spring*, *at first*, *when she was ten years old* were placed in the topic position. The present perfect *has/have + past participle* does not match the temporal restrictions of the adverbial in (9)_d **Last spring, Bert has planted many different flowers*. Similarly, prepositions expressing that an action still is ongoing such as *since* and *for* were used to construct a past simple mismatch. As a result, there are sentences with a missing auxiliary when the verb has the same form in simple past and past participle, as in **Since last year, Kate studied French every evening*, and sentences where the auxiliary is missing and the verb is in the incorrect form, as in **Since last Christmas, Jane wrote three children's books*.

The majority of the sentences in Roberts and Liszka's (2013) study were found to be atelic (79%), creating an imbalance in the stimuli. The stimuli contained 24 experimental items and therefore 24 critical VPs. 13 of them were states and 5 activities, while only 2 were accomplishments and 4 achievements. Therefore, the experimental items were reworked for the current study to balance for telicity. This led to 16 perfective sentences with telic predicates and 16 imperfective sentences with atelic predicates. The telic VPs were composed of 10 achievement verbs (e.g. *crash*, *win*, *lose*, *buy*, *adopt*) and 6 accomplishment verbs (e.g. *plant*, *write*, *organize*, *improve*). The atelic VPs were composed of 12 state verbs (e.g. *like*, *enjoy*, *want*, *feel*, *love*) and 4 activity verbs (*play*, *study*, *eat*, *go*). Some items were used more than once (*meet*, *want*, *think*, *be*). In order to determine the telicity of VPs, operational tests for verb classification developed by Shirai and Andersen (1995) were employed, see

Appendix 3. These tests are based on a number of previous studies on inherent-aspectual classification (e.g. Comrie, 1976; Vendler, 1967).

Examples 9-10 illustrated the experimental conditions. There are four items per each experimental condition.

(9)

Present Perfect

- a. Since last year, Kate has studied French every evening (*atelic, match*)
- b. * Last year, Kate has studied French every evening (*atelic, mismatch*)
- c. Since spring, Bert has planted many different flowers (*telic, match*)
- d. *Last spring, Bert has planted many different flowers (*telic, mismatch*)

(10)

Past Simple

- a. Last year, Kate studied French every evening (*atelic, match*)
- b. *Since last year, Kate studied French every evening (*atelic, mismatch*)
- c. Last spring, Bert planted many different flowers (*telic, match*)
- d. *Since spring, Bert planted many different flowers (*telic, mismatch*)

Four counterbalanced presentation lists were created. One group of participants saw a stimulus item in the first condition; another group saw it in the second condition, and so on. In other words, each of the 32 experimental items was seen in all four conditions, but only in one condition per participant. As can be seen from (9)ab and (10)ab, all four versions are lexically matched, apart from adverbial clauses/phrases and auxiliaries. The order of stimuli for each presentation list was pseudo-randomized, which means that each list had a fixed order. This technique was preferred because total randomization could cause several experimental sentences to appear one after another thus attracting participants' attention. The lists were then rotated across participants such that each list was seen by 6 participants in L2 group and by 3 participants in native speaker group.

The mixed-lists design was preferred over full within-subject design for several reasons. First, reading the same item in various versions would cause repetition effects, when participants respond to a stimulus in unnatural ways because they have seen it before. It was necessary to ensure that differences in reading patterns and processing costs were not caused by priming and ordering effects. Displaying the same item in different conditions would increase the likelihood that participants become consciously aware of the target of the experiment. Second, this design permits the use of different experimental items, since each item will be viewed only once. Higher number of varied items allows us to include extra conditions and it generally cancels out random effects associated with by-item variation. The possibility that some other factors are responsible for the obtained results is also decreased, because each item contributes to every condition equally.

When designing the stimuli, several word-level considerations were made. Care was taken to keep critical regions in each version as similar as possible without making them identical. It was important to have some consistency between experimental items while keeping them varied enough to avoid participants becoming aware of the subject of investigation and to avoid fatigue caused by repetitive stimuli. Since processing of a critical region in a sentence oftentimes continues onto the following region (Keating & Jegerski, 2015), the spillover region was also considered.

Word frequency was controlled for. To ensure that processing cost was not caused by participants not knowing the word, we included only highly frequent words in critical word positions and spillover regions. For this purpose, a word frequency lists from the British National Corpus (BNC; Davies, 2004-) was employed. The verbs located in the critical regions were among the 2,000 most frequent words, and the words in the spillover regions among the 5,000 most frequent words.

Next, homographs and cognates were avoided, since these variables are known to affect reading speed (Jegerski, 2014; Keating, 2009; Dufour & Kroll, 1995). For instance, the words *visit*, *actress*, *film*, *businessman*, *rose*, etc. were replaced or removed because of their similarity to the equivalent Russian L1 lexical item.

Care was also taken to combine verb phrases in semantically natural ways to avoid processing costs caused by semantically unexpected combinations. To this end, the BNC “list” search option, which shows the most common collocations for an entered word or phrase, was employed.

Finally, the stimuli were spelled and constructed according to the rules of British English, since the native speaker group consisted of native speakers of British English. All experimental items were checked by a native speaker of British English with a professional background in linguistics, in order to verify the match-mismatch status as well as to ensure overall accuracy and appropriateness of the stimuli.

Along with the critical stimuli, a set of 40 grammatically correct filler sentences was created. Some filler items were designed to be superficially similar to the target items, including tense and aspect manipulations and consisting of two sentences, similarly to the critical items. However, the majority of the fillers were rather varied in terms of construction to minimize task effects.

The post stimulus task in the form of comprehension questions was employed after each experimental item and filler sentence to ensure that cognitive processes are engaged throughout the experiment and the participant does not end up pressing buttons without concentrating on the task. Meaning-based comprehension questions were judged to be more appropriate as a distractor task than acceptability judgments, because a metalinguistic task, can affect the reading strategy and cause certain reading time effects (Jegerski, 2014; Leiser et. al., 2011). Comprehension questions were binary choice items counterbalanced with regard to the number of “Yes” versus “No” answers. An effort was made to design questions that did not introduce any confounding effects. For example, the comprehension questions never targeted experimental manipulations and never repeated target forms. The questions were quite varied, often unexpected and frequently involved synonyms and paraphrasing.

4.3.3 Materials for the Acceptability Judgment Task

An untimed Acceptability Judgment Task (AJT) was used to collect complementary data to demonstrate how participants use their knowledge in off-line comprehension. This task was meant to measure the participants’ explicit knowledge of tense and aspect in order to compare it with their implicit knowledge measured by the on-line task. Similarly to the self-paced reading task, the AJT included 32 critical sentences, 16 in the present perfect condition and 16 in the past simple condition.

The intention was originally to use the same stimuli as in the self-paced reading task. However, due to the nature of the on-line task, all of the sentences had fronted adverbials, as in *Since the summer, Michael has played soccer every day*, which can potentially affect the judgments in the off-line test. Since the purpose of the AJT was to measure the ability to

detect aspect mismatches in an off-line test in general (not only fronted sentences), 16 sentences with fronted adverbials were taken from the on-line task stimuli and 16 sentences with non-fronted adverbials as in *Emily has earned a lot of money this year*, were constructed to fit the conditions discussed above. This resulted in a balanced set with two two-level within-subject factors (2x2): TA match (*match* and *mismatch*), that is the relation between a temporal adverbial and immediately following verb, and telicity of a verb phrase (*telic* and *atelic*). Similarly to the SPR task, native speaker and L2 learner groups are not directly compared in the statistical analyses. Present perfect and past simple items are also analyzed separately. Overall, the design of the AJT mirrors the design of the SPR task, apart from the balancing of fronted/non-fronted sentences.

4.3.4 Language History Questionnaire 2.0

The language history questionnaire used in this study was based on LHQ 2.0, designed by Li, Zang, Sai and Puls (2013) which was developed using the most commonly asked questions in previously published studies with second language learners. The questionnaire was shortened to fit the time frame given for the experiment by the university administration, and to avoid unnecessary questions for this particular community. The resulting questionnaire (Appendix 2) includes questions on general participant background, language history and language usage.

4.3.5 LexTALE: vocabulary and proficiency test for the advanced learner group

LexTALE stands for Lexical Test for Advanced Learners of English (Lemhöfer & Broersma, 2012). It is an un-speeded lexical decision task in which the participants have to decide whether the string of letters they see on the screen is a real English word. The task consists of 60 words, 40 of which are real English words varying in difficulty and frequency and 20 are non-words “created either by changing a number of letters in an existing word (e.g., *proom*) or by recombining existing morphemes (e.g., *rebondicate*)” (Lemhöfer & Broersma, 2012:329). This task was chosen as an indication of general English proficiency for several reasons. It has been established that LexTALE is more reliable than self-ratings as a measure of language proficiency. The results are comparable to the extensive proficiency tests such as the Quick Placement Test (QPT) and The Test of English for International Communication (TOEIC), but it takes only about 3.5 minutes to complete. Furthermore, it is easy to implement with many available options. In this experiment the test was administered on-line.

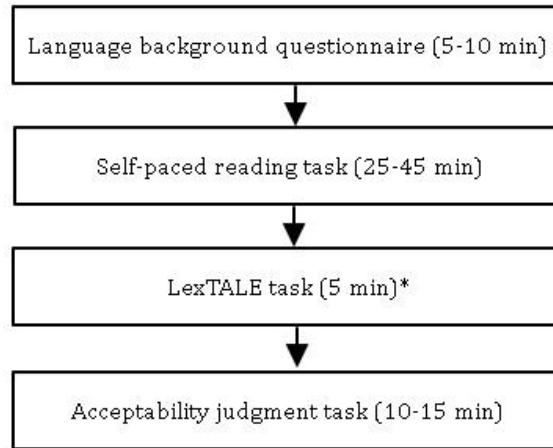
Items were presented one by one on the screen and the participants pressed “yes” (green) or “no” (red) buttons using their mouse. The percentage of correct responses in word and non-word category was calculated separately, added up and divided by two. The score was displayed automatically on the screen after the test was finished.

4.4 Apparatus and Procedure

The participants in the native speaker group were tested one by one in a silent room in a library and the experiment was run on the researcher’s private laptop. The procedure was slightly different for the Russian L2 learner group. The Russian participants were tested in a computer room at Tomsk Polytechnic University. All software was installed on the classroom computers in advance and all necessary preparations were made with the assistance of the university IT specialists. Since the computer room had 13 computers, the participants were separated into two groups – 13 students were tested on the first day and 11 were tested on the second day. The instructions for the experiment were given in advance and the experiment was run simultaneously on all computers. The procedure differed slightly from that of native speaker group because it was requested by the administration of the Language and Linguistics Department of Tomsk Polytechnic University to run the experiment simultaneously in the designated time under the supervision of the course teachers and the administrators.

Before the start of the experiment, all participants were provided with a broad outline of the experimental procedure and a general aim of the study. They were informed that they could withdraw at any time and have their data destroyed in case of dissatisfaction.

At the beginning of a session the participants were asked to fill out a language background questionnaire to elicit biographical information. After that, they proceeded with the self-paced reading experiment, followed by the Acceptability Judgment Task. The AJT was administered after the self-paced reading in order to avoid cross-contamination effects like priming (Jegerski, 2014) on the reading time results. The L2 learners were also required to complete the LexTALE task, which they did after the SPR task but before the AJT. This procedure was piloted before the actual experiments to ensure that the software works as intended and the instructions are understood correctly by both native and non-native participants. Figure 3 summarizes the procedure.



*Only administered to L2 learners

Figure 3. The experiment procedure

With regard to the self-paced reading task, participants read sentences presented on a computer screen in a word-by-word non-cumulative self-paced moving window paradigm (Just, Carpenter, & Wooley, 1982). Each trial began with the entire sentence displayed on screen masked by dashes (-) replacing each letter. The participants pressed the space bar to reveal the next word, simultaneously causing the previous word to revert to dashes. The sentences were presented on a Windows computers running the LINGER software version 2.94 (Rohde, 2004; available at <http://tedlab.mit.edu/~dr/Linger/>). LINGER automatically records all button presses to measure reading times with millisecond accuracy.

At the beginning of an experimental session, participants read a thorough explanation of the task with examples and after that they received three practice trials to familiarize themselves with the self-paced reading technique. Then the participants proceeded with the experiment. Binary comprehension questions followed each sentence and the participants were instructed to answer them by pressing the ‘F’ key for yes, and the ‘J’ key for no. In the instruction text preceding the trials participants were asked to read the sentences for meaning, to be able to answer these questions as quickly and accurately as possible.

In the Acceptability Judgment Task, participants were instructed to read each sentence and then to assess its acceptability on a scale from 1 (least acceptable) to 6 (most acceptable).

At the end of the experimental session, participants were asked to read through a consent form and sign it. The complete experimental session lasted approximately 35-45 minutes for the British participants, and 60-70 for the Russian participants.

4.5 Data analyses

In order to prepare the data from the Acceptability Judgment Task for the analysis, we calculated the aggregate means for each condition and ± 2.5 standard deviations for all subjects in each condition. The participants who fell below or above the 2.5 standard deviations from the group's mean were excluded from the analyses, resulting in the removal of two participants from the Russian L2 learner group. Two-factor repeated measures ANOVAs were conducted within each language group to examine the main effects and interactions between Telicity and TA match factors. The analysis was done both by subjects and items, since all participants saw the same items in all conditions, which means that a single item could have an effect on the outcome. Language type (native speaker vs. L2 learner) is not a variable in the analyses, but we compare behavioral patterns of two groups in the discussion. All statistical analyses were performed in R Studio version 3.1.3. (R Core Team, 2015).

On the SPR task, the data was collected with the help of Lingalyzer, a program designed to assist in analyzing reading time and question answering data gathered using LINGER. While there was an equal number of regions in all experimental items that were compared, it was not possible to have the words of equal length in all regions due to the sentence constraints. Words length generally varied from four to seven letters and short function words were never compared to content words. However, such differences in word length may introduce additional confounds that make results difficult to interpret. Furthermore, participants read at different rates, which may add interparticipant variability to the computation of group means (Keating & Jegersky, 2015). To counter these problems, raw reading times were transformed into residual reading times (Ferreira & Clifton, 1986). To this end, a linear regression equation was computed for each participant to predict the reading time as a function of word length using all experimental sentences. These reading times predicted by a regression equation were then subtracted from the raw reading times for each region of interest, resulting in residual reading times. Positive values indicate that a reading time is slower than expected, while negative values indicate that a reading time is faster than expected. Both raw and residual times are presented as figures in the Results section, but the analyses are run on the residual reading times. Doing so is expected to counter the effects of word length in content words and account for interparticipant variability.

First, Lingalyzer created a data file displaying raw and residual reading times, as well as z -scores for the raw and residual reading times. To calculate z -scores, separate means and

standard deviations are computed for each pairing of experiment, condition, and region. Thereafter, the data is sorted by condition, and a separate file is created for each part of the data that will undergo independent statistical analyses. Each of these separate data sets contained 704 rows of data, with 2,816 rows of data for all four regions of interest in the advanced learner group and 384 rows of data with 1,536 rows of data for all four regions of interest in the native speaker group.

The next step of preparing the SPR data for statistical analyses included trimming, which involves the identification and removal or replacement of outliers. The cleaning of reaction time data is particularly important when using parametric statistical tests that are conducted on aggregate means, like ANOVA, since it minimizes “the effects of those data points which appear to have been influenced by external factors unrelated to language processing, such as minor distractions and disruptions during the SPR experiment, which can obscure real reading time effects through the addition of extraneous variance and the resulting reduction in experimental power” (Jegerski, 2014:38). To this end, the standard deviation of ± 2.5 was used as a cutoff in each stimulus region and in each condition for each participant group.

First, the most extreme outliers were identified and cut off at 4,000 ms (Havik et al., 2009). Then, reading times that fell below or above the cutoff of ± 2.5 standard deviations were replaced with the cutoff value used to identify outliers which was more moderate, but still relatively high/low (Keating & Jegersky, 2015). Replacing outliers with mean values was also considered. However, moderate outliers might still reflect processing difficulty, and neutralizing them would mean they are completely untrustworthy. On the other hand, extreme outliers over 4,000 ms (cutoff set for non-native readers by Havik et al., 2009) are most likely uninformative and therefore, absolute cutoff was used. The criteria described above affected 1.85% of the data points for the Russian learners and 2.21% of the data points for the English native speakers.

After trimming the data, aggregate means were calculated and two-factor ANOVAs with repeated measures on both factors were conducted within each language group to investigate the main effects and interactions between Telicity and TA match. It is important to note that similarly to the AJT discussed above, language type (native speaker vs. L2 learner) is not treated as a factor in the analyses, but behavioral patterns in two language groups are compared descriptively in the discussion. The decision not to include the language group as a variable was made in order to keep an analyses simple (2x2). As with the AJT, we used R Studio version 3.1.3. (R Core Team, 2015) to perform all statistical analyses.

It is common in L1 and L2 self-paced reading studies to eliminate reading time data that correspond to incorrect distractor question responses (Jegerski, 2014). However, in this study reading time data from trials with incorrect distractor task responses was included into the analyses. While the critical items were controlled for frequency and difficulty, the comprehension questions were not. On the contrary, some of the questions were quite tricky, included more advanced synonyms and paraphrasing and required attention to details. It was done on purpose to keep the participants cognitively engaged and interested in the task. Therefore, incorrect answers could mean a failure to understand a question correctly, but not necessarily a lack of attention or nonstandard comprehension behavior, at least in the learner group.

Four regions of interest in the present perfect group include the auxiliary, the Verb, Verb+1 and Verb+2. Four regions of interest in the past simple group include the Verb, Verb+1, Verb+2, and SF (sentence final). Each of these regions was treated as a distinct measure, with separate descriptive and inferential statistics.

5 Results

5.1 Off-line tasks

5.1.1 Comprehension questions - accuracy

All of the experimental sentences in the SPR experiment were followed by comprehension questions. The responses to these questions were recorded and mean accuracy scores were calculated for each participant and for each group.

The mean accuracy score for critical items for the English native speakers was 96.4% ($SD = 4.81$; range: 84-100%) and for the L2 learner group 90% ($SD = 9$; range: 69-100%). Both groups had high mean scores which indicates that all participants attended and understood most of the experimental sentences and comprehension questions. However, an independent samples t-test showed that group means differed significantly, $t(32) = 2.04, p = .006$. L2 learners answered fewer questions correctly than native speakers and variation was greater in this group.

This gap was even bigger for the filler items, where differently from experimental items, words were not controlled for frequency and difficulty, resulting in more varied and complex sentences. The mean accuracy score for filler items for English native speakers was 96.83 ($SD = 4.1$; range: 88-100%), which shows that native speakers were not affected by higher complexity at all. The mean accuracy score for filler items for L2 learners was 81% ($SD = 10.9$; range: 50-97.5%) Participants were not excluded on the basis of the mean accuracy scores.

5.1.2 Acceptability Judgment Task

For all analyses, an ANOVA was run on the data separately in the native and L2 groups, with two within-participant factors – TA match (*match* and *mismatch*) and Telicity (*telic* and *atelic*). Although the past simple and the present perfect items were mixed together in the experimental lists, the results are reported separately for each condition. An alpha level of .05 was used as a significance criterion for all statistical tests.

5.1.2.1 Present perfect condition. Native speaker group

Figure 4 shows the mean acceptability judgment scores for the present perfect items in the native speaker group.

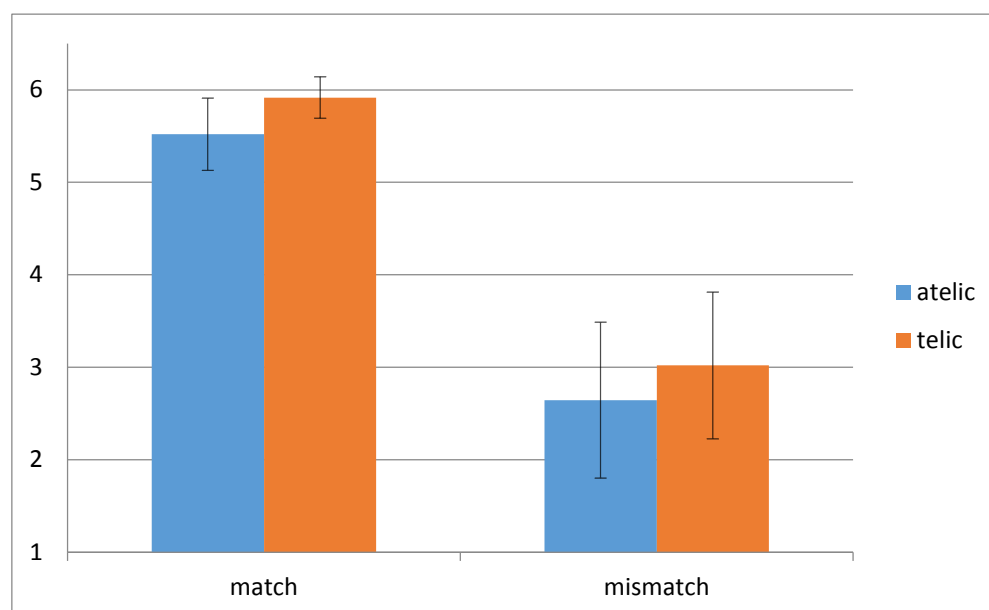


Figure 4. Present perfect acceptability test results of the native speaker group, 1-6 scale (1 = least acceptable, 6 = most acceptable)

The analysis showed a main effect of TA match by both participants and by items, $F_1(1,44) = 259.14, p < .001, \eta_p^2 = .85$; $F_2(1,12) = 147.14, p < .001, \eta_p^2 = .92$; and a main effect of Telicity by participants only, $F_1(1,44) = 4.62, p = .04, \eta_p^2 = .1$; $F_2(1,12) = 2.62, p = .13, \eta_p^2 = .17$, but no interaction, $F_1(1,44) = 0.003, p = .95, \eta_p^2 < .01$; $F_2(1,12) = 0.002, p = .96, \eta_p^2 < .01$. The native speaker group found the match conditions in present perfect much more acceptable than the mismatch conditions. They also showed a tendency to judge sentences with atelic VPs as less acceptable than sentences with telic VPs in both the match and mismatch conditions.

5.1.2.2 Present perfect condition. Advanced L2 learners group

Figure 5 shows the mean acceptability judgment scores for the present perfect items in the advanced learners' group.

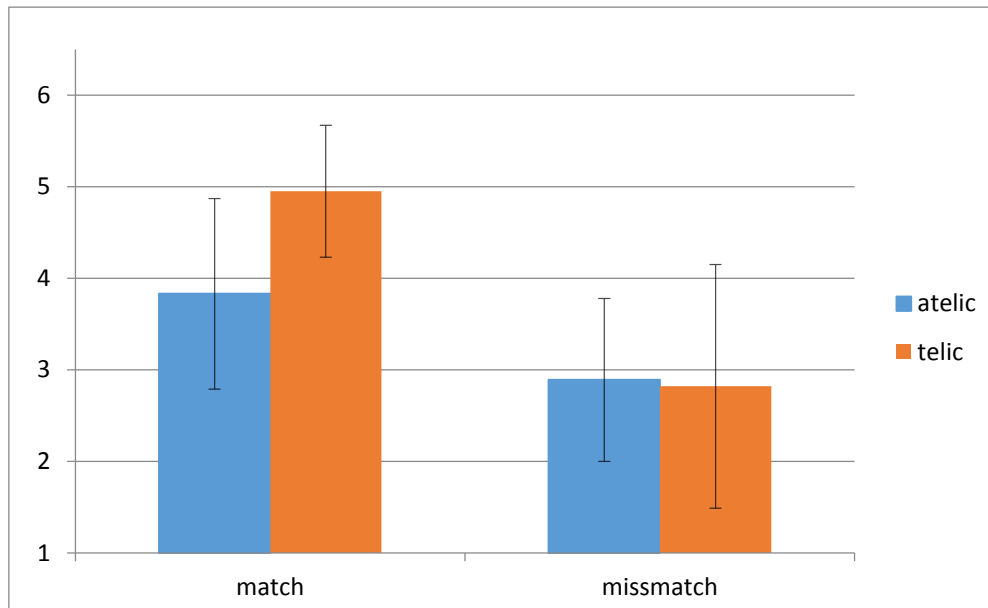


Figure 5. Present perfect acceptability test results of the learner group, 1-6 scale (1 = least acceptable, 6 = most acceptable)

The TA match x Telicity interaction is significant by both participants and items, $F_1(1,84) = 6.26, p = .01, \eta_p^2 = .07$; $F_2(1,12) = 11.72, p = .005, \eta_p^2 = .49$. The t-tests for correlated samples were conducted to compare acceptability judgment scores in four conditions.

Similarly to native speakers, the learners found telic mismatch sentences less acceptable than telic match sentences, $t_1(42) = 6.59, p < .001$; $t_2(6) = 12.25, p < .001$. Atelic mismatch sentences were also judged significantly less acceptable in mismatch condition both by participant and by item, $t_1(42) = 2.7, p = .01$; $t_2(6) = 3.14, p = .02$, but Figure 5 suggests that the L2 group had a problem assessing atelic sentences in the present perfect. Atelic sentences were judged as significantly less acceptable than telic in the match condition by participants and by items, $t_1(42) = -4.17, p < .001$; $t_2(6) = -3.69, p = .01$. No significant difference between telic and atelic items was found in the mismatch condition, $t_1(42) = 0.17, p = .86$; $t_2(6) = 0.4, p = .7$.

To sum up, although no direct statistical comparison has been made, it seems that both learners and native speakers found the mismatch conditions equally unacceptable, but advanced learners generally found the present perfect matched conditions less acceptable than native speakers. Atelic sentences were often judged to be less acceptable than telic sentences

by both groups. In spite of some quantitative differences, both L2 learners and native speakers are sensitive to temporal-aspectual violations in the present perfect condition.

5.1.2.3 Past simple condition. Native speaker group

Figure 6 shows the mean acceptability judgment scores for the past simple items in the native speaker group.

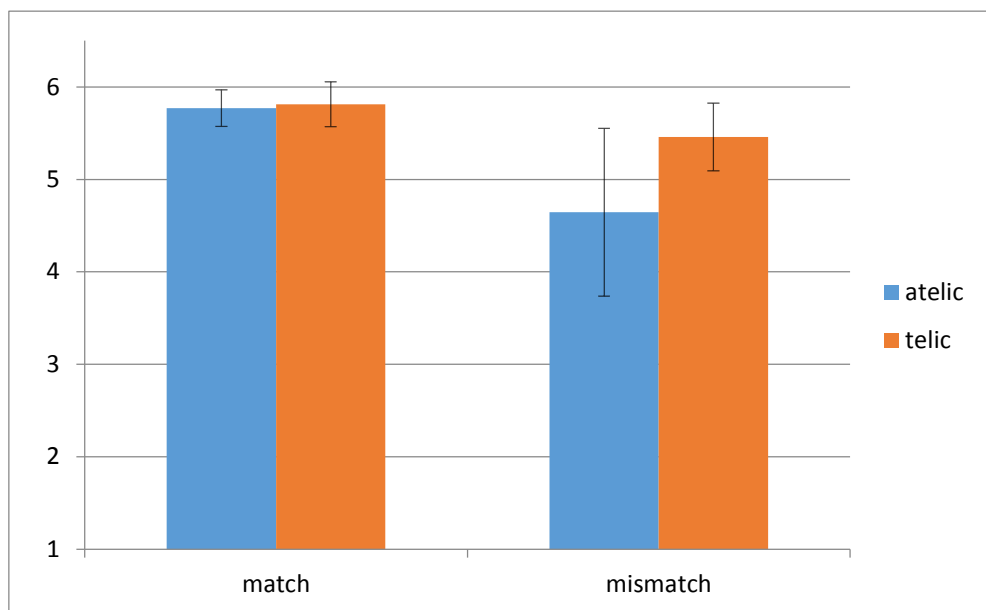


Figure 6. Past simple acceptability test results of the native speaker group, 1-6 scale (1 = least acceptable, 6 = most acceptable)

The analysis showed that TA match x Telicity interaction is significant by both participants and items, $F_1(1,44) = 6.76, p = .01, \eta_p^2 = .13$; $F_2(1,12) = 6.3, p = .03, \eta_p^2 = .34$. The t-tests showed that atelic mismatch items were judged to be significantly less acceptable than atelic match sentences, $t_1(22) = 4.2, p < .001$; $t_2(6) = 4.37, p = .005$. There is a significant difference between telic match and telic mismatch sentences by participants only, $t_1(22) = 2.79, p = .01$; $t_2(6) = 2.17, p = .07$. However, as can be seen on the Figure 6, telic mismatch sentences were only slightly less acceptable than telic match sentences, indicating that native speakers did not consider telic mismatch sentences to be particularly unacceptable. In mismatch condition atelic sentences were judged significantly less acceptable by participants and by items, $t_1(22) = -2.88, p = .008$; $t_2(6) = -2.8, p = .03$. No significant difference between telic and atelic items was found in match condition, $t_1(22) = -0.46, p = .65$; $t_2(6) = -0.42, p = .68$.

5.1.2.4 Past simple condition. Advanced L2 learners group

Figure 7 shows the mean acceptability judgment scores for the past simple items in the advanced learners' group.

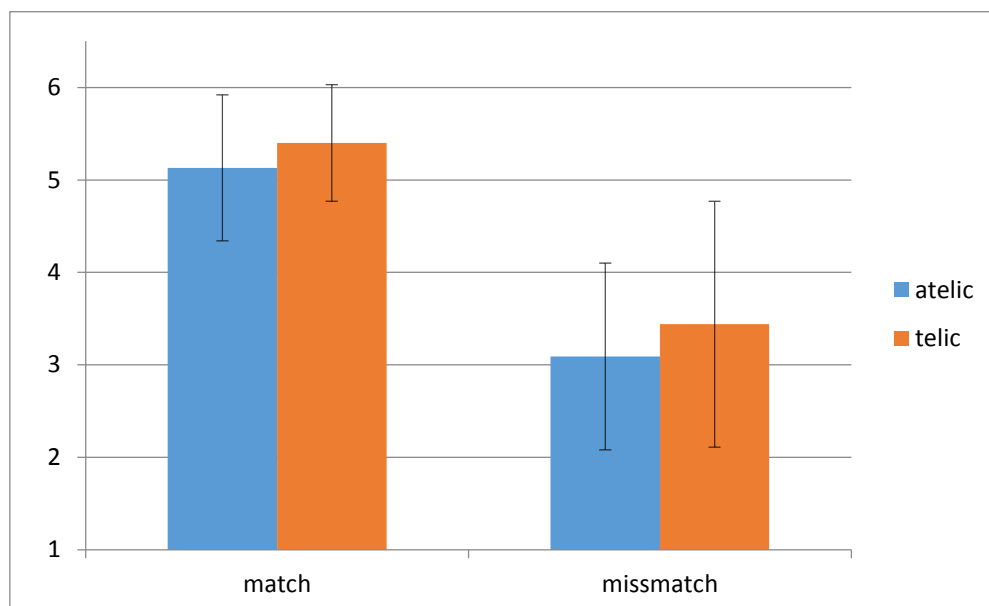


Figure 7. Past simple acceptability test results of the learner group, 1-6 scale (1 = least acceptable, 6 = most acceptable)

The analysis found a main effect of TA match by both participants and by items, $F_1(1, 84) = 91.75, p < .001, \eta_p^2 = .52$; $F_2(1,12) = 105.56, p < 0.001, \eta_p^2 = .89$. Mismatch items were found to be much less acceptable than match items irrespective of telicity. Atelic items were judged to be slightly less acceptable than telic items in both match and mismatch conditions, similarly to the native participants, but the difference between telic and atelic conditions did not reach significance, $F_1(1, 84) = 2.25, p = .13, \eta_p^2 = .03$; $F_2(1,12) = 2.56, p = .13, \eta_p^2 = .18$. The interaction effect was non-significant, $F_1(1, 84) = 0.04, p = .84, \eta_p^2 = .03$; $F_2(1,12) = 0.06, p = .81, \eta_p^2 = .00$.

Summarizing, native participants were less sensitive to sentences with violations than L2 learners in the past simple condition, particularly in telic items. Both groups showed a tendency to assess atelic sentences as less acceptable than telic sentences.

5.2 Self-paced reading

5.2.1 Raw reading times

Similarly to the accessibility judgment task, the results of self-paced reading experiment are presented separately for past simple and the present perfect items, since the critical regions differ

by one word between the past simple and the present perfect, as the latter comprises an auxiliary plus past participle. First, the results will be presented in raw reading times for each condition for each group separately in order to give a general idea of the participants' raw reading patterns in on-line processing task. The y-axis has been adjusted to the same scale for direct comparison across conditions. The standard deviations (SD) in the figures below are indicative of the variability in the data sample.

Native English group

The figures below demonstrate that native speakers processed the present perfect sentences in mismatch condition slower than the present perfect sentences in match condition, slowing down the most on the verb. Atelic mismatch had higher processing cost than telic mismatch. In past simple items, there seems to be no sensitivity to mismatch in telic items. However, atelic mismatch items were processed slightly slower than atelic match items.

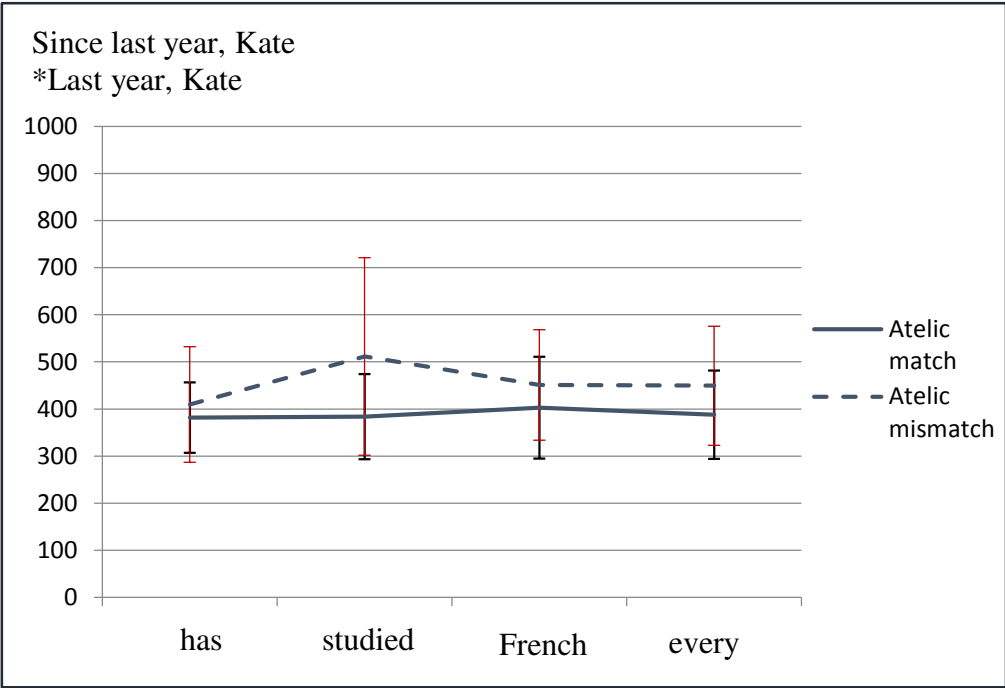


Figure 8. Raw reading times of atelic match-mismatch items in present perfect condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

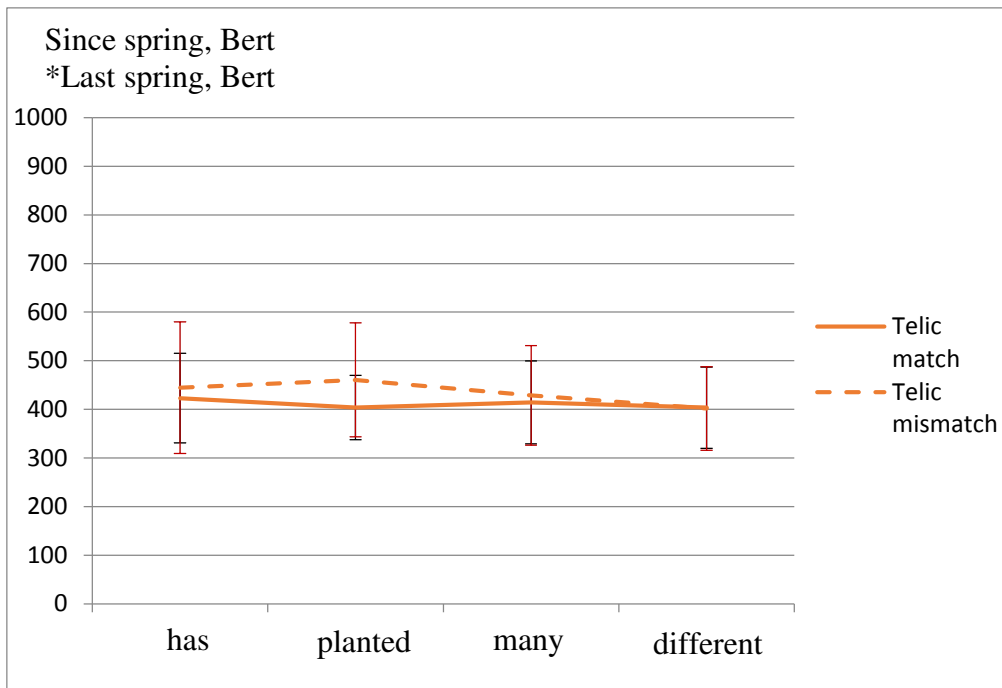


Figure 9. Raw reading times of telic match-mismatch items in present perfect condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

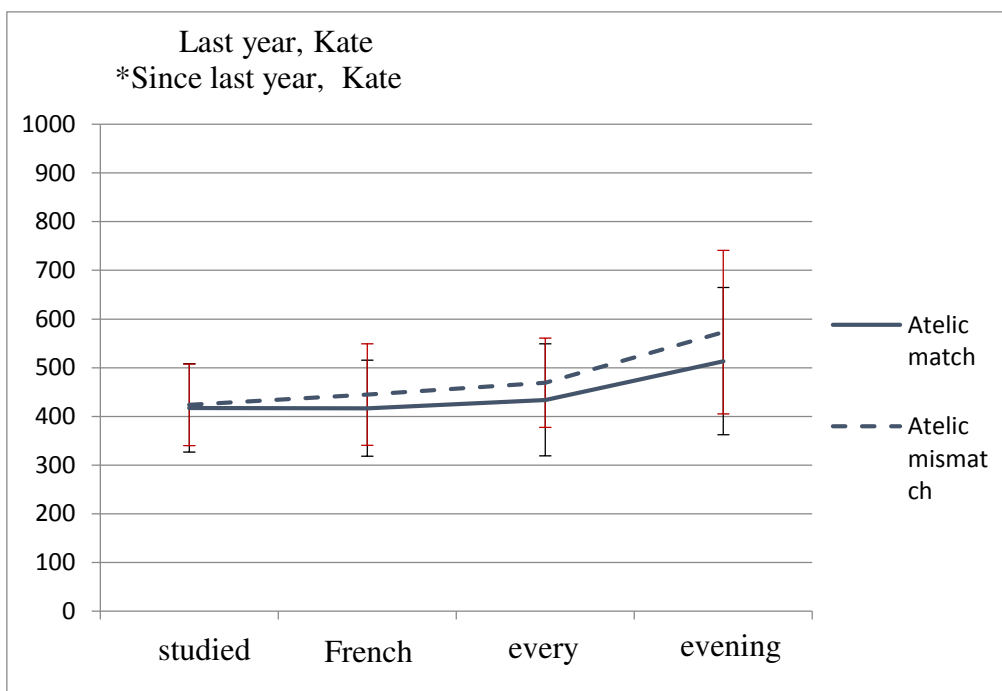


Figure 10. Raw reading times of atelic match-mismatch items in past simple condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

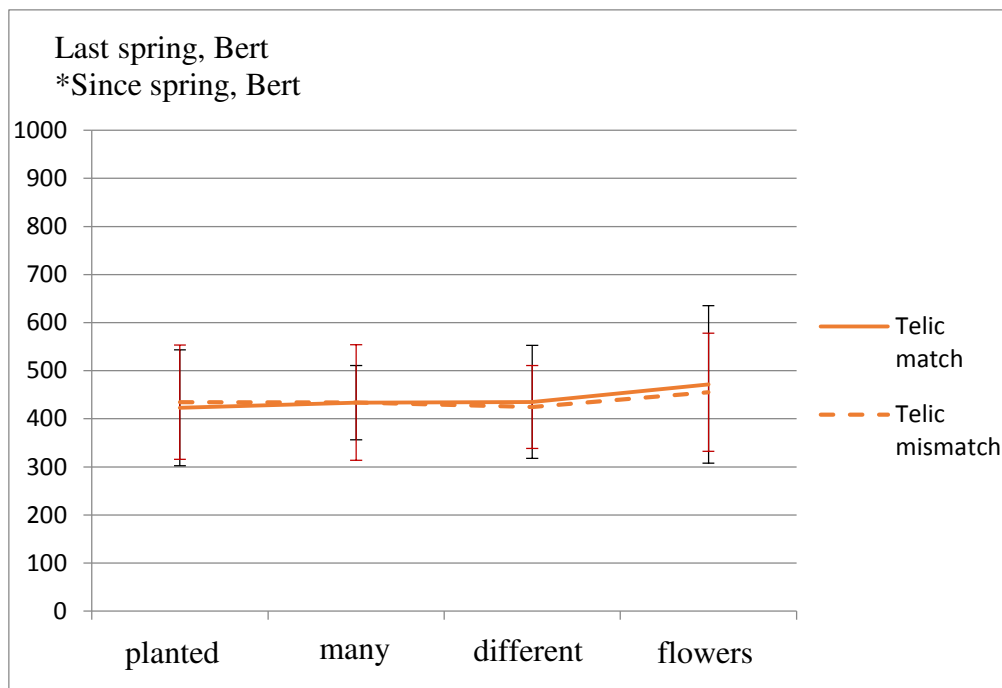


Figure 11. Raw reading times of telic match-mismatch items in past simple condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

Advanced learner group

The figures below show that Russian L2 learners processed match and mismatch sentences similarly across all conditions. While the overall reading pattern looks quite similar, there are some differences in how atelic and telic sentences are processed. In atelic sentences, V+2 region is often processed slower relative to the verb than in telic sentences.

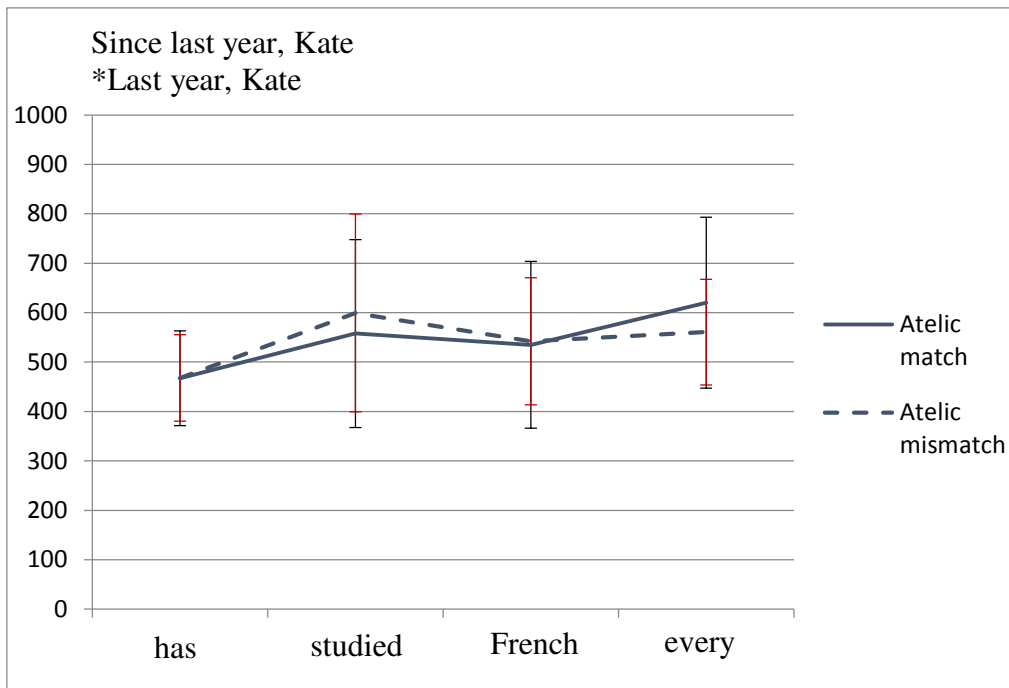


Figure 12. Raw reading times of atelic match-mismatch items in present perfect condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

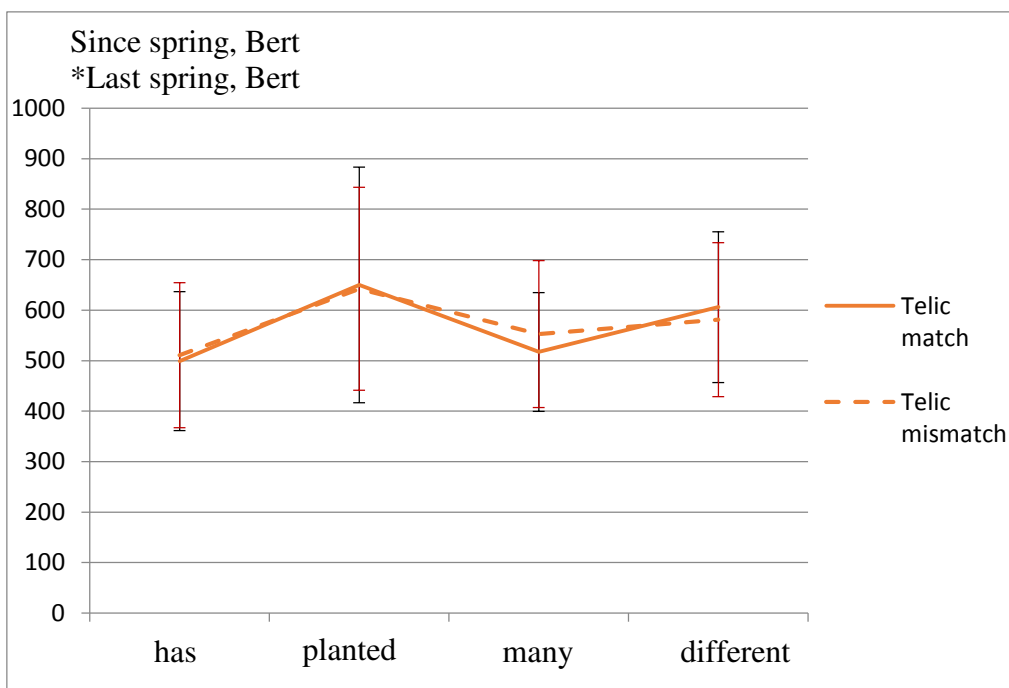


Figure 13. Raw reading times of telic match-mismatch items in present perfect condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

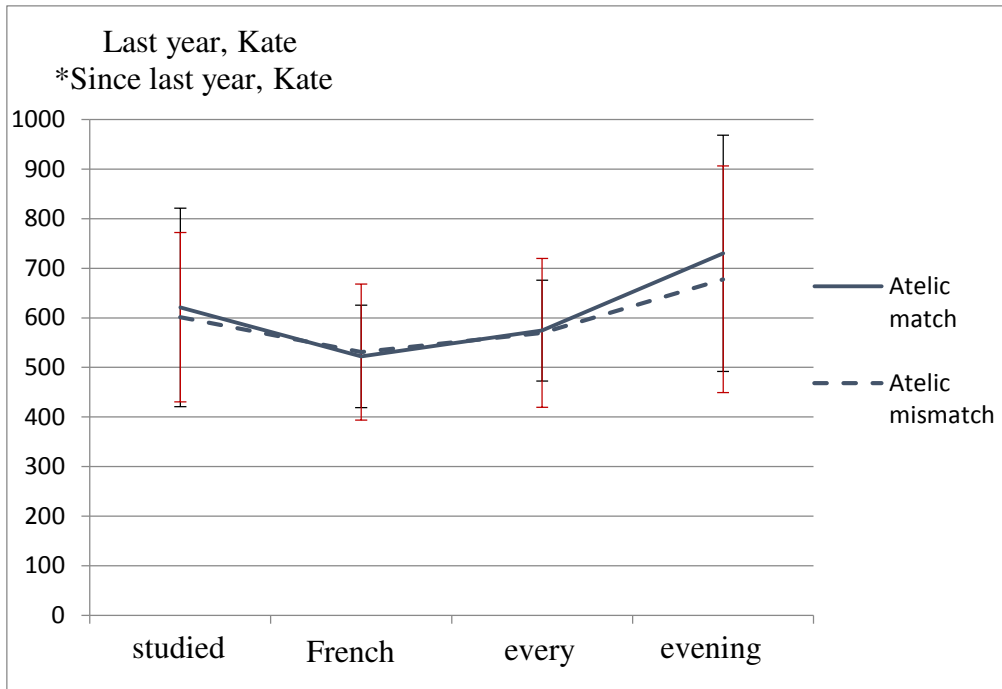


Figure 14. Raw reading times of atelic match-mismatch items in past simple condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

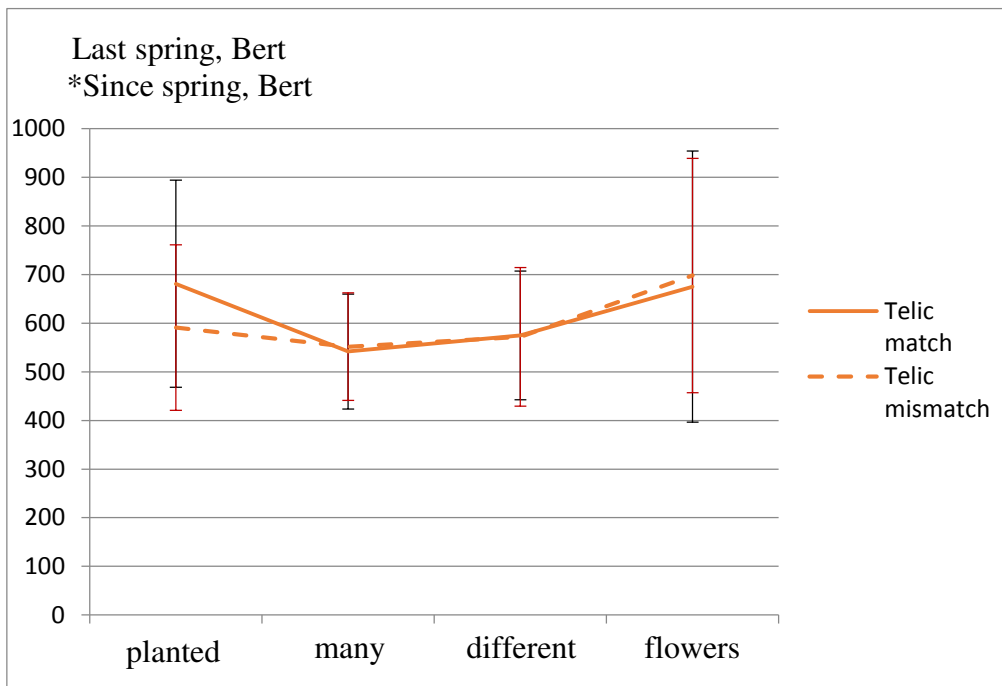


Figure 15. Raw reading times of telic match-mismatch items in past simple condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

5.2.2 Residual reading times

The data for the mean residual RTs can be found in the Appendix 4 sorted by condition for each word region and language group for present perfect and past simple items. The analyses were performed on the residual reading times. For all analyses, ANOVAs were run on the data separately in the native and L2 groups, with two within-subject factors –TA match (*match* and *mismatch*) and Telicity (*telic* and *atelic*). All effects were statistically significant at the .05 significance level. A full summary of the statistical analyses can be found in Appendix 5.

The residual reading time data is visualized in figures below, starting with the present perfect condition and followed by the past simple. Residual reading times generally result in a similar pattern as raw reading times, except for the V+2 region in the telic sentences. This difference is caused by the longer average word length in V+2 region, which residual RTs are accounting for.

Present perfect items. Native speaker group

Considering that the match and mismatch manipulation was realized on the tensed clause, analyses for present perfect items were run on the segments from the VP (starting with the auxiliary verb) and then across the three segments following it, the past participle and the two subsequent words. Analyzing the segments following the verb was necessary to catch any spill-over effects and to investigate the effects of telicity on the processing behavior. Since the telicity of a sentence is dependent on internal and external arguments and adjuncts and not only on a verb type and semantics of the verb, analyzing the regions following the verb was necessary to receive a full picture. The *F*, *p* and *partial eta*² values are reported below.

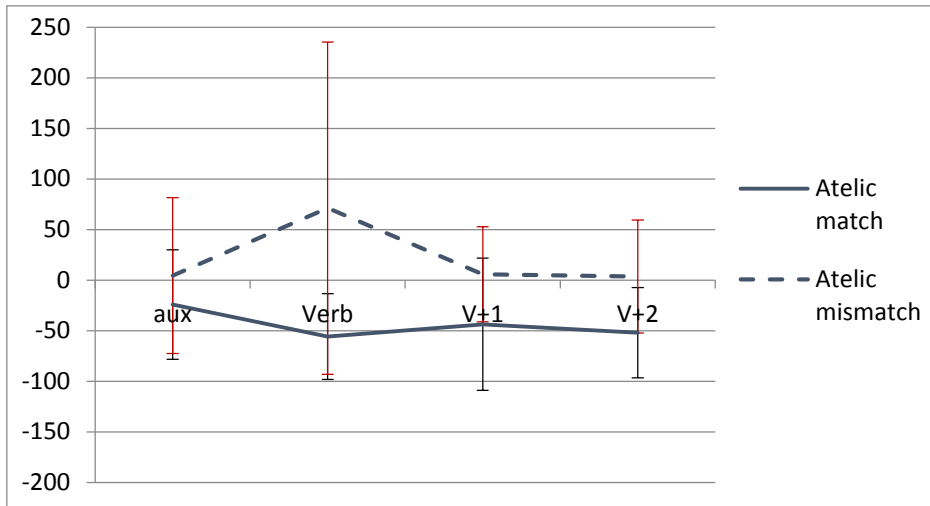


Figure 16. Residual reading times of atelic match-mismatch items in present perfect condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions.

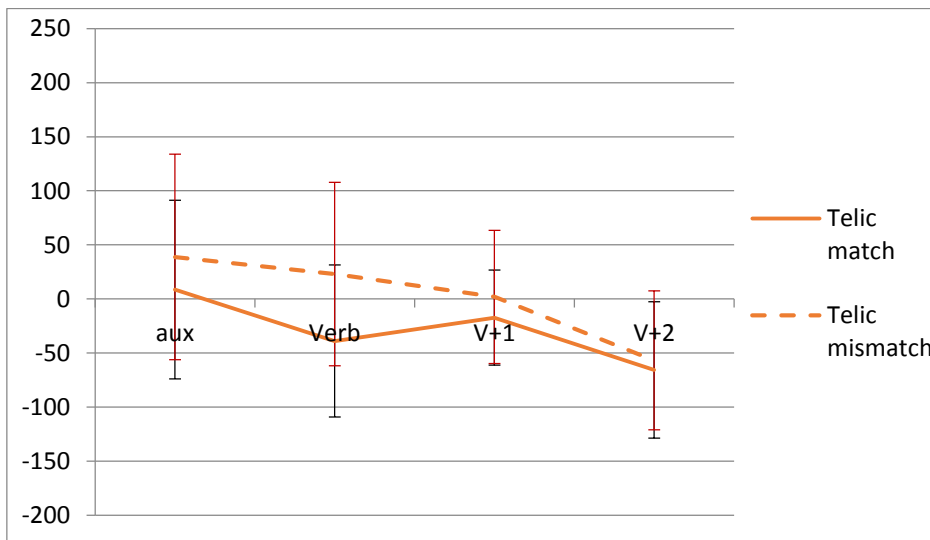


Figure 17. Residual reading times of telic match-mismatch items in present perfect condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

The auxiliary region: no main effect of TA match, $F(1,44) = 1.68$, $p = .2$, $\eta_p^2 = .04$, and no main effect of Telicity, $F(1,44) = 2.21$, $p = .14$, $\eta_p^2 = .05$. The verb region: main effect of TA match, $F(1,44) = 10.47$, $p = .002$, $\eta_p^2 = .19$, no main effect of Telicity, $F(1,44) = 0.28$, $p = .6$, $\eta_p^2 < .01$. The V+1 region: main effect of TA match, $F(1,44) = 4.62$, $p = .037$, $\eta_p^2 = .1$, no main effect of Telicity, $F(1,44) = 0.51$, $p = .48$, $\eta_p^2 = .01$. The V+2 region: TA match factor was marginally significant, $F(1,44) = 3.76$, $p = .058$, $\eta_p^2 = .08$, main effect of Telicity, $F(1,44) = 4.94$, $p = .031$, $\eta_p^2 = .1$. There was no significant interaction between TA match and Telicity in any of the regions, aux: $F(1,44) = 0.001$, $p = .97$, $\eta_p^2 < .01$; Verb: $F(1,44) = 1.23$, $p = .27$, $\eta_p^2 = .02$; Verb+1: $F(1,44) = 0.9$, $p = .35$, $\eta_p^2 = .02$; Verb+2: $F(1,44) = 1.98$, $p = .17$, $\eta_p^2 = .04$.

While there was no significant difference between the match and the mismatch conditions or between the telic and the atelic conditions on the auxiliary region, native participants processed verbs in the mismatch condition significantly slower than verbs in the match condition. As shown in Figure 16 and Figure 17, the difference between RTs in match and mismatch conditions in telic items is minimized by the V+2 region, while the processing cost in the V+2 region in atelic mismatch items stays relatively high compared to atelic match. There was no significant difference in processing telic and atelic items in match and mismatch conditions, except the V+2 region.

Present perfect items. Advanced learner group

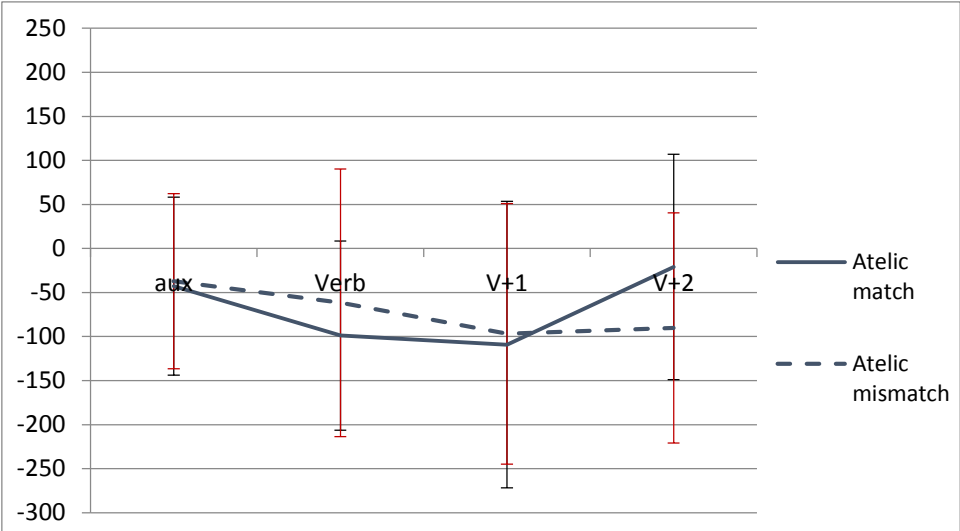


Figure 18. Residual reading times of atelic match-mismatch items in present perfect condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

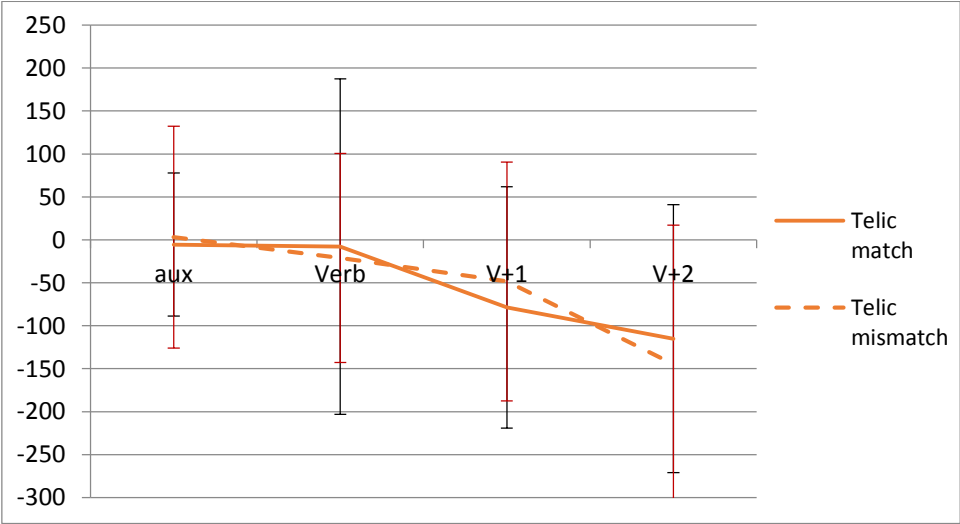


Figure 19. Residual reading times of telic match-mismatch items in present perfect condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

The auxiliary region: no main effect of TA match, $F(1,84) = 0.1, p = .75, \eta_p^2 < .01$, and no main effect of Telicity, $F(1,84) = 3.02, p = .09, \eta_p^2 = .03$. The verb region: no main effect of TA match, $F(1,84) = 0.15, p = .7, \eta_p^2 < .01$, main effect of Telicity, $F(1,84) = 4.354, p = .039, \eta_p^2 = .05$. The V+1 region: no main effect of TA match, $F(1,84) = 0.46, p = .51, \eta_p^2 < .01$, no main effect of Telicity, $F(1,84) = 1.56, p = .22, \eta_p^2 = .02$. The V+2 region: no main effect of TA match, $F(1,84) = 2.58, p = .11, \eta_p^2 = .03$, main effect of Telicity, $F(1,84) = 5.802, p = .01, \eta_p^2 = .06$. The analyses found no interaction across the regions of interest, aux: $F(1,84) = 0.004, p = .95, \eta_p^2 < .01$; Verb: $F(1,84) = 0.64, p = .43, \eta_p^2 < .01$; Verb+1: $F(1,84) = 0.08, p = .78, \eta_p^2 < .01$; Verb+2: $F(1,84) = 0.4, p = .52, \eta_p^2 < .01$.

In contrast to the native speakers, L2 learners did not distinguish between the match and mismatch conditions. However, they treated telic and atelic items somewhat differently. The analysis showed that atelic verbs were processed faster than telic verbs. There is an opposite tendency in the V+2 region, where L2 learners showed slower RTs in atelic items, but faster RTs in telic items.

To sum up, native speakers showed a tendency to process telic and atelic sentences similarly and match and mismatch sentences differently in present perfect items. Telicity had an effect on the processing of items in the mismatch condition, with mismatches in atelic sentences causing higher processing cost than mismatches in telic sentences. The L2 learners group demonstrated a different behavior, grouping by Telicity rather by TA match. They did not show any sensitivity to aspectual violations, but they demonstrated slightly different patterns in processing of telic and atelic sentences. When reading both match and mismatch atelic sentences, L2 learners read fast in the beginning of the sentences, but slowed down in the V+2 region. When reading both matched and mismatched telic sentences they slowed down on the verb, and gained speed on the subsequent regions.

Past simple items. Native speaker group

For the past simple items analyses were run on the segment in which the inflected verb was presented, as well as the three following segments (verb+1, verb+2, verb+3 (SF)).

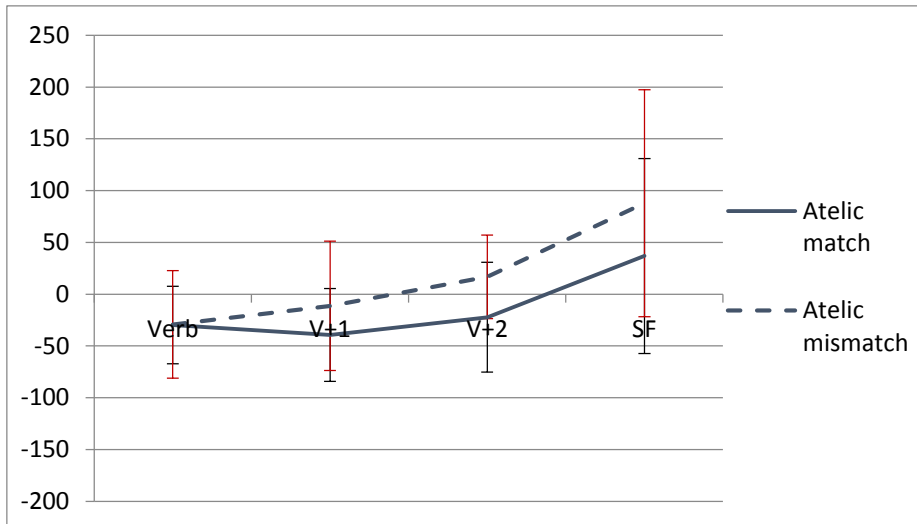


Figure 20. Residual reading times of atelic match-mismatch items in past simple condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

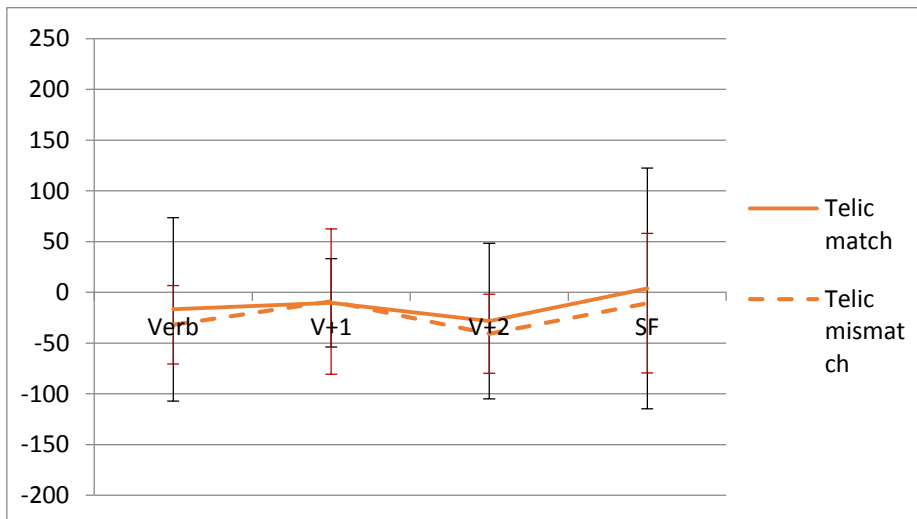


Figure 21. Residual reading times of telic match-mismatch items in past simple condition for the native speaker group. The error bars represent SD in match (black) and mismatch (red) conditions

The verb region: no main effect of TA match, $F(1,44) = 0.186$, $p = .66$, $\eta_p^2 = .004$, and no main effect of Telicity, $F(1,44) = 0.091$, $p = .76$, $\eta_p^2 = .002$. The V+1 region: no main effect of TA match, $F(1,44) = 0.8$, $p = .38$, $\eta_p^2 = .02$, no main effect of Telicity, $F(1,44) = 0.92$, $p = .34$, $\eta_p^2 = .02$. The V+2 region: no main effect of TA match, $F(1,44) = 0.7$, $p = .4$, $\eta_p^2 = .02$, main effect of Telicity, $F(1,44) = 4.12$, $p = .04$, $\eta_p^2 = .09$. The SF region: no main effect of TA match, $F(1,44) = 0.4$, $p = .53$, $\eta_p^2 < .01$, main effect of Telicity, $F(1,44) = 5.23$, $p = .02$, $\eta_p^2 = .11$. There was no significant interaction between Temporal match and Telicity in any of the regions, Verb: $F(1,44) = 0.22$, $p = .64$, $\eta_p^2 < .01$; Verb+1: $F(1,44) = 0.67$, $p = .42$, $\eta_p^2 = .02$; Verb+2: $F(1,44) = 2.7$, $p = .1$, $\eta_p^2 = .06$; SF: $F(1,44) = 1.3$, $p = .26$, $\eta_p^2 = .03$.

Native participants did not show any significant difference between the match and the mismatch conditions or between the telic and the atelic conditions on the first region where the mismatch was initially encountered. There was also no statistically significant difference between the conditions in the V+1 region. The regions V+1, V+2 and SF in atelic mismatch condition is processed slower than in atelic match condition, which suggests of late sensitivity to the mismatch. The main effect of Telicity was found rather than the main effect of TA match, because there was no difference between telic match and mismatch RTs.

Past simple items. Advanced learner group

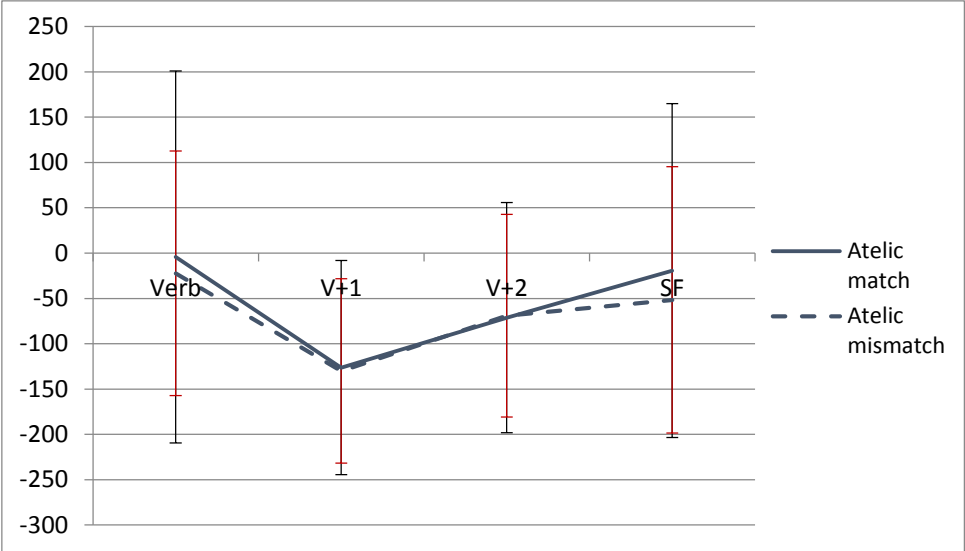


Figure 22. Residual reading times of atelic match-mismatch items in past simple condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

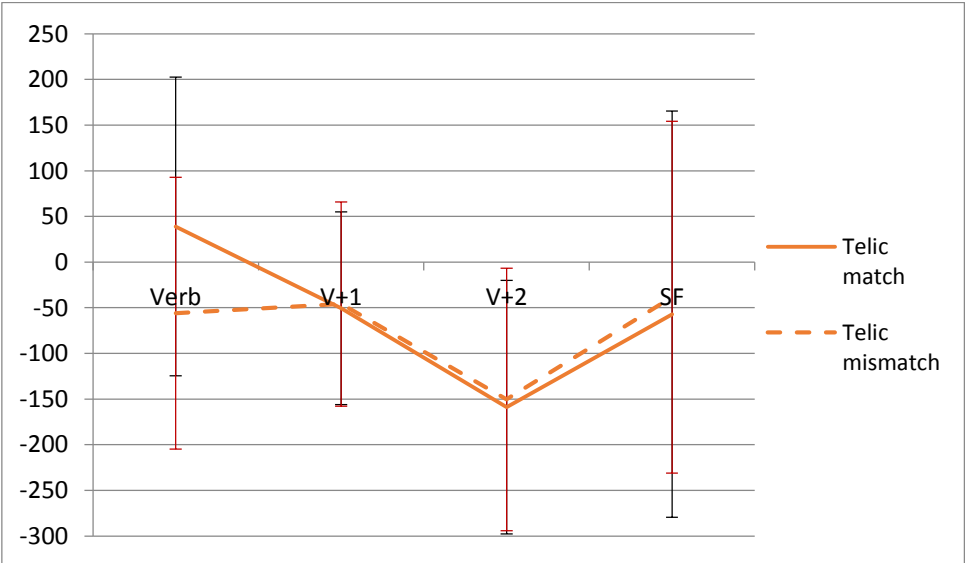


Figure 23. Residual reading times of telic match-mismatch items in past simple condition for the learner group. The error bars represent SD in match (black) and mismatch (red) conditions

The verb region: no main effect of TA match, Verb: $F(1,84) = 2.57, p = .11, \eta_p^2 = .03$, and no main effect of Telicity, $F(1,44) = 0.091, p = .76, \eta_p^2 = .002$. The V+1 region: no main effect of TA match, $F(1,84) = 0.02, p = .9, \eta_p^2 < .01$, main effect of Telicity, $F(1,84) = 10.77, p = .002, \eta_p^2 = .12$. The V+2 region: no main effect of TA match, $F(1,84) = 0.04, p = .85, \eta_p^2 < .01$, main effect of Telicity, $F(1,84) = 9.18, p = .003, \eta_p^2 = .1$. The SF region: no main effect of TA match, $F(1,84) = 0.03, p = .86, \eta_p^2 < .01$, no main effect of Telicity, $F(1,44) = 0.09, p = .76, \eta_p^2 < .01$. The analyses found no interaction across the regions of interest, Verb: $F(1,84) = 1.19, p = .28, \eta_p^2 = .01$; Verb+1: $F(1,84) = 0.005, p = .95, \eta_p^2 < .01$; Verb+2: $F(1,84) = 0.01, p = .91, \eta_p^2 < .01$; SF: $F(1,84) = 0.4, p = .52, \eta_p^2 < .01$.

Similarly to the present perfect condition, there were no differences between the match and mismatch conditions in the L2 learner group. Atelic match sentences were processed similarly to atelic mismatch, but differently from telic match and mismatch sentences. The difference in processing atelic and telic sentences resembles the pattern found in the present perfect condition – in atelic sentences the higher processing cost falls in the end of a sentence, while in telic sentences it falls in the beginning of a sentence on the verb or immediately after the verb.

To summarize, the native group was sensitive to the violations in atelic mismatched sentences, but not in telic. They also read atelic and telic sentences in the match condition slightly differently – atelic sentences have higher processing cost in the end of the sentences (V+2, SF). L2 learners demonstrated qualitatively similar processing patterns in telic/atelic match and telic mismatch conditions, but behaved differently from native participants in atelic mismatch condition.

6 Discussion

The purpose of this study was to investigate how native English speakers and Russian L2 learners of English process tense-aspect manipulations in off-line and on-line tasks. First, it aimed to determine how English native speakers and Russian L2 learners behave when they encounter tense-aspect agreement violations (present perfect vs. past simple). Second, it investigated whether the telicity of predicates has any significant effect on the way native and L2 learner participants process the sentences and whether it influences processing patterns of match and mismatch sentences equally. A tertiary goal was to investigate the relationship between explicit and implicit knowledge by discussing the results from off-line and on-line tests in both groups.

In the off-line acceptability judgement task (AJT), both learners and native speakers found the mismatch conditions equally unacceptable in the present perfect items. However, as predicted, present perfect atelic match items appear to cause some difficulties in the learners' group. In the past simple items, contrary to the predictions, English native speakers show almost no sensitivity to the mismatch in the telic items. Russian L2 learners are sensitive to the mismatch in the past simple items, irrespective of the telicity.

In the on-line SPR task, native English speakers are sensitive to the temporal mismatch in the present perfect condition, demonstrating higher sensitivity in atelic items than telic items. As expected, they are not sensitive to the mismatch in the past simple condition in telic items, but contrary to the expectations, show some sensitivity in atelic items. The telicity of the predicates had an effect on processing behavior in mismatch conditions, but not in match conditions. Russian L2 learners show no sensitivity to the violations in either of the conditions. However, there was a difference in processing patterns of telic and atelic sentences in both match and mismatch conditions.

6.1 Acceptability judgment data in native speakers and L2 learners

The results indicate that in the acceptability judgment test both advanced learners and native speakers distinguished between match and mismatch items in the present perfect condition. Atelic present perfect items (e.g. *Since last year, Kate **has studied** French every day*) were expected to be problematic for advanced Russian learners of English, following the suggestion that present perfect is associated with perfective interpretation in their L1. These items did indeed receive lower mean scores in the L2 learner group than the telic present perfect items (e.g. *Since spring, Bert **has planted** many different flowers*), and had higher

variability, which may indicate a general uncertainty towards the atelic present perfect sentences.

This result is not surprising considering that the present perfect form used in “perfect of persistent situation” contexts (Comrie, 1976/1998) requires the present tense form in Russian. If the present perfect is indeed linked with the perfective interpretation, imperfective present perfect could cause a semantic clash for the Russian learners.

In the native speaker group telicity did not have any big effect on their judgments in the present perfect sentences, which shows that the un-prototypical nature of this structure does not affect native speakers’ ability to assess correct sentences.

In the past simple condition, both native speakers and L2 learners gave high scores to sentences in the match condition irrespective of telicity. Differently from the present perfect, imperfective past simple did not cause any confusion in the L2 learner group and was deemed acceptable. The finding that atelic sentences in the mismatch condition in the past simple (e.g. **Since last year, Kate **studied** French every day*) were found to be less acceptable, as well as atelic sentences in the match condition in the present perfect (e.g. *Since last year, Kate **has studied** French every day*), implies that the adverbial *since* in an imperfective context might be rather used with the present simple form by Russian learners.

In Roberts & Liszka’s (2013) study, native participants assessed the mismatch condition in both present perfect and past simple sentences as significantly less acceptable than the corresponding match conditions. While in the current study, native participants behaved similarly with the present perfect sentences, they showed almost no difference in assessing match and mismatch condition in the simple past, particularly with telic items. The variation is also low, which shows that native speaker participants generally agreed that sentences in this condition (**Since spring, Bert **planted** many different flowers*) sounded fine. Atelic sentences, on the other hand, were judged to be less acceptable, but even then, the acceptability scores were higher than those of L2 learners. In other words, L2 learners find simple past items in the mismatch condition less acceptable than native speakers do, which is rather counter-intuitive. Following Roberts & Liszka’s (2013) discussion, this could be explained by the trend for some varieties of British English to use adverbs denoting the current relevance with past simple in spoken discourse similarly to North American English usage. The decline in the use of the present perfect in British English may be one of the reasons behind the difference between the groups in the past simple telic items. The L2

learners have learned the rule that adverbs denoting current relevance should not be used with the past simple, and as the results demonstrate, they are able to apply this rule in perfective contexts when metalinguistic judgment is required. However, the difference between the rules presented in grammar textbooks for L2 learners and actual use of language is apparent (Elsness, 2009) and the lack of naturalistic exposure to L1 leads to this non-native-like behavior.

The variation in the L2 learner group is generally much higher than the variation in the native speaker group which is expected since learners' knowledge of English is much less homogeneous than that of native speakers. The English present perfect is argued to be a complex category from the perspective of language acquisition and it is well attested that the acquisition of the present perfect is delayed in both first and second language acquisition (Davydova, 2011). This construction is also more complex at a conceptual level than, for example, gender and number agreement. The understanding of the nuances of perfect/non-perfect distinction might require an extended period of natural exposure to L1. This was demonstrated by Liszka (2004, 2005) who tested L1 Chinese, German, and Japanese speakers of advanced L2 English on the acquisition of the (British) English present perfect. The study showed that in roughly 50% of the cases in a form-interpretation task advanced learners produced non-present perfect form in present perfect contexts. This complexity is reflected in the results of the current AJT test, where L2 learners behave similarly to native speakers only in telic conditions in present perfect items.

6.2 Self-paced reading task findings for native speakers

In Roberts & Liszka's study (2013), only the mismatch condition in the present perfect sentences caused a processing cost for the native speakers (**Last year, Kate has studied... vs. *Since last year, Kate studied...*). This result was described as "the unexpected processing cost asymmetry", because the mismatch conditions were assessed as significantly less acceptable than the corresponding match conditions in the off-line acceptability judgment task in their experiment, and the on-line processing patterns were expected to mirror the off-line task results. In the current study, even in the off-line acceptability judgment task past simple mismatch conditions (particularly telic) were judged to be only slightly less acceptable, which indicates that there is indeed a difference in the strength of ungrammaticality between the two manipulations (present perfect vs. past simple).

The present study replicated Roberts & Liszka's (2013) SPR task results, insofar as the main effect of TA match was found in several regions in the present perfect manipulation. The sensitivity to the mismatch comes into effect on the Verb, where the gap between the match and mismatch conditions is particularly large in the atelic items. In the telic sentences the participants recover from the mismatch when the sentences unfold. In the atelic items, however, a higher processing cost lingers until the end of a sentence.

In the past simple items, on the other hand, Roberts & Liszka (2013) found no sensitivity to violations. Similarly, the current study did not find any sensitivity to mismatches in the telic condition, but a higher processing cost was found in the atelic condition. There was a quite small but consistent difference in the reading speed of the atelic match and atelic mismatch items, appearing on V+1 and continuing to V+2 and SF. This finding is somewhat unexpected, considering that the majority of predicates in Roberts and Liszka's critical items were atelic and all sentences in the atelic condition were borrowed from their stimuli (with minor changes in the post-verb region). However, the sensitivity found in the atelic mismatch condition in the past simple items in the current study was quite weak. Even if native speakers from Roberts & Liszka's study were sensitive to the corresponding items, any possible effect could have been blended in and be unnoticed in the analysis, since atelic predicates were mixed with occasional telic predicates in their stimuli.

The finding that native speakers showed no or slight sensitivity to past simple mismatches converges with corpus studies suggesting that the present perfect has been losing ground to past simple (Elsness, 1997, 2009; Hundt & Smith, 2009). Furthermore, the difference in off-line assessments and on-line processing between atelic and telic mismatch predicates corroborate the results of a number of corpus-based studies (e.g. Yao, 2014), demonstrating that there is a tendency for present perfect to become less favored by telic situations with direct results and more favored by atelic situations. Yao's (2014) analysis of corpus data demonstrated that there is a tendency for the present perfect to move away from its resultative sense in both British and American English towards the extended interval sense.

As mentioned, native speakers were more sensitive to temporal mismatches in atelic conditions than in telic conditions on both present perfect and past simple items. The simple explanation behind this finding could be that the lexical items used in the atelic sentences affected the processing patterns. Assuming that atelic verbs are less commonly used in past simple and present perfect forms, the general lower frequency of these particular combinations could have resulted in additional processing cost.

A brief post hoc corpus (BNC) investigation was therefore conducted to see whether atelic verbs used in the present study are used less often in present perfect (*have/has+past participle*) and past simple forms than telic verbs. In order to calculate the occurrences of these verbs in the present perfect form, *have [verb].[vvn*]* and *has [verb].[vvn*]* filters were used and the tokens were summarized. *[vvn*]* filter limits the search to the past participle form of the verb. To calculate the occurrences of the verbs in the past simple form, we used the filter *[verb].[vvd*]*, which limits the search to the past tense of a verb (excluding past participle). The verb *to be* (x2) from the atelic group was removed from the calculations, because its occurrences were unproportionally high.

The verbs from the atelic condition (e.g. *enjoy, feel, study, play*) were indeed less common in the present perfect form with 987 tokens on average versus 1,564 tokens for verbs in telic condition (e.g. *plant, buy, loose, help*). However, the occurrence of atelic verbs in past simple form was higher than that of telic verbs, with 17,102 tokens versus 4,841 tokens, respectively. Thus, while higher sensitivity to mismatches in atelic conditions could be attributed to the fact that these verbs are less common in present perfect items, this explanation is not very likely in the case of past simple items. Moreover, if lexical frequency of a verb in a particular form (present perfect vs. past simple) affected processing, this would most likely affect processing of match items as well. However, there was no difference in the processing of atelic and telic sentences in match condition.

Another explanation could be found by looking into the extent of the temporal incongruency caused by mismatch with atelic and telic items. In the past simple items, the time span referred to by the adverbial includes the past time and that is why matching an adverbial of current relevance with a verb in the preterit may not be completely ungrammatical. No temporal inconsistency emerges with telic predicates, because they have endpoints in the past and an action is finished. As illustrated in Figure 24 (left), the temporal frames of congruent and incongruent forms are identical, which could explain absence of increased processing cost. There is, however, a temporal clash in the case of atelic predicates, because the expected form continues up to the time of utterance, which is contradicted by the mismatch past simple form. Black diagonal dashes in Figure 24 (right) show where misalignment between the congruent and incongruent forms occur, possibly leading to higher processing costs in the spill-over region.

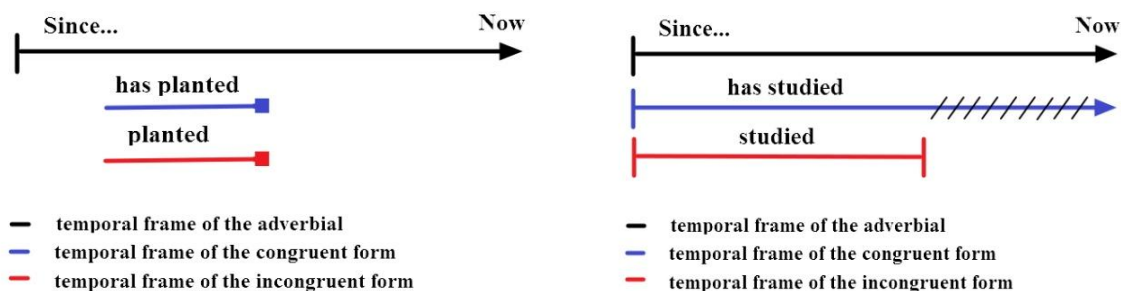


Figure 24. Temporal frames of mismatch in past simple telic (left) and atelic (right) sentences

In the case of the present perfect items, the present tense component means that the time that is being talked about includes the time of the utterance. Past simple adverbials single out a specific time in the past, which excludes the time of the utterance, as shown in Figure 25. The time span referred to by the adverbial does not include current relevance (diagonal dashes in Figure 25 (left)), and it does not include time of the utterance (diagonal dashes in Figure 25(right)). That could be the reason behind the observed processing cost in the present perfect mismatch items and higher processing cost in the atelic items in general.

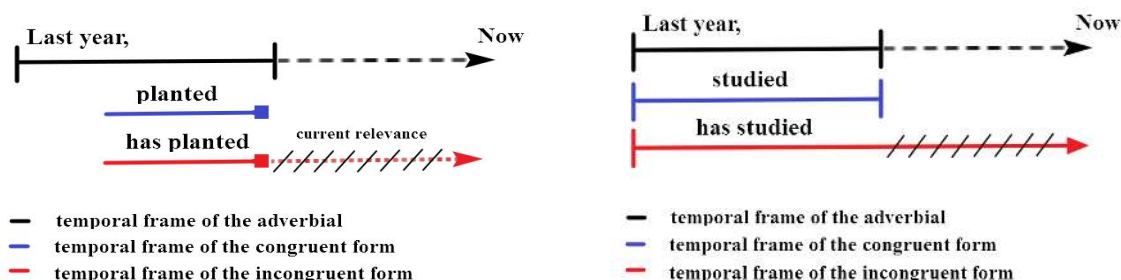


Figure 25. Temporal frames of mismatch in present perfect telic (left) and atelic (right) sentences

In sum, for native speakers, the results of the present study generally replicate the results obtained by Roberts & Lszka (2013) with some differences. Native speakers in both studies were found to be sensitive to temporal mismatches in the present perfect items. The divergence in the result in the past simple items could be explained by the main difference in the design – the stimuli in Roberts & Lszka (2013) were not balanced for telicity and sentences with atelic and telic predicates were not separated in the statistical analyses, which could lead to any effects being cancelled out in the data.

6.3 Self-paced reading task findings for L2 learners

The current study found that Russian L2 learners of English were not sensitive during on-line processing to the mismatch between the fronted temporal adverbial and the inflected verb.

Importantly, however, they behaved differently in telic and atelic conditions. This insensitivity to mismatches suggests an asymmetry between on-line and off-line results, since Russian L2 learners were generally able to distinguish between match and mismatch conditions in the acceptability judgment test. These findings will be discussed in the light of Roberts & Liszka's (2013) results, even if results cannot be directly compared due to differences in stimuli, learner group L1s (theirs German and French; ours Russian), statistical analyses, etc.

Roberts & Liszka (2013) found French but not German L2 learners to be sensitive to the mismatch between the fronted temporal adverbial and the inflected verb during on-line processing. It was suggested that the L1 transfer might be one of the factors influencing the extent to which these groups are sensitive to agreement violations in on-line comprehension. This is in line with other findings. For instance, Hopp (2010) has found that Russian but not Dutch and English learners of L2 German were sensitive to agreement violations of case and subject-verb agreement, reflecting the greater degree of inflection in Russian relative to Dutch and English. In Roberts & Liszka L1 influence would only explain sensitivity to mismatches between current relevance adverbial and imperfective predicate, since in French the imperfective form and current relevance are incompatible. If the learners were indeed interpreting the English sentences according to their L1 grammar, the French would be expected to be insensitive to the mismatch between the current relevance adverb and the perfective past simple or mismatch between past simple adverb and perfective present perfect. Since the majority of the sentences in the stimuli were imperfective, the design of the stimuli itself could be the reason for the higher sensitivity to violations in the French group.

Another possible reason mentioned by Roberts & Liszka (2013:429) is "the difference in whether or not their first language distinguishes aspectual differences grammatically (French: im/perfective) or not (German)..." This factor sounds similar to the previous argument of L1 transfer, and it is a broader instance of transfer, where structures do not have to work in the same way across the languages. The advanced Russian learners of English did not show any sensitivity to the mismatch between the fronted temporal adverbial and the inflected verb during on-line processing in the present study, which suggests that Russian speakers are not likely to be more susceptible to the salience of aspect in English in general because they pay attention to the aspect of an event constantly in their L1, as suggested. Instead, the presence of a distinction between perfect and non-perfect (not just im/perfective) in L1 may be the factor that contributes to whether a learner demonstrates native-like behavior or not, at least at the

non-near-native stage. Further research is needed to answer this question. For example, investigating another learner group from an L1 background that does instantiate perfect/non-perfect distinction could be a potential solution.

A third factor in the discussion of on-line sensitivity is proficiency and learning environment, as in instruction versus immersion. According to the Full Transfer Full Access Model (Schwartz & Sprouse, 1996; White, 1989, 2003), some L1 transfer effects are expected, but learners are able to acquire a native-like mental representation of L2 abstract features in the course of development. It could be the case that intensive English instruction prompted Russian learners to develop metalinguistic knowledge of the structure under investigation, but a high amount of exposure is required in order to achieve native-like processing patterns. The current finding does not imply that the learners are not able to acquire the tense-aspect structure that works differently in their L1. The absence of sensitivity could mean that they were not advanced enough to show native-like behavior.

While the results show that Russian L2 learners process sentences in match and mismatch conditions similarly, their behavior differed somewhat between telic and atelic conditions. These RT differences were supported by adequate experimental control, including matching critical stimuli for token form frequencies and a regression analysis on RTs to correct for the linear word-length effect. So it is not very likely that the results can be accounted for by form-related differences in the stimuli.

The explanation for the differences found between processing of telic and atelic items could involve principles of prototype formation, whereby semantic representations in L2 learners' tense-aspect morphology is organized around a central prototypical meaning (Shirai & Andersen, 1995). It is argued that L2 learners tend to use tense-aspect morphology to make a perfective and imperfective distinction, which suggests that some tense-aspect forms may be more prototypically associated with perfective or imperfective situations (Bickerton, 1981; Uno, 2014). This discussion on prototype formation can be applied to the findings obtained in this study. In the discussion of the distinct features of Russian English in the domain of grammar, Davydova (2011) points out that the present perfect is avoided in "perfect of persistent situation" contexts, where the present perfect form is combined with atelic verbs resulting in a unitary continuous sense. This tendency to assign a perfective reading to English present perfect was reflected in the difficulty L2 learners encountered when assessing imperfective present perfect sentences in the Acceptability Judgment Task. The question was whether this would affect L2 learners' processing behavior or not.

In the present perfect sentences, no processing difficulty was encountered in the first three regions measured - the auxiliary, verb and the following word (V+1) were actually processed faster than their telic counterparts. However, there is a main effect of telicity in the V+2 region (e.g. *Since last year, Kate has studied French every day*) where processing cost is increased. Since the participants cannot go back in the text, all comprehension failures may result in the longer RTs in the later regions. In Russian the perfectivity of a sentence is morphologically marked on a verb and following the incremental nature of processing, non-near-native Russian learners may attempt to assign perfective or imperfective reading to a sentence when they encounter a verb. If the present perfect and past simple forms are indeed more prototypically related to perfective interpretation, the perfectivity may be assigned incorrectly and require reanalysis later in a sentence. In other words, the participants may encounter a word that indicates that their previous interpretation was an error. Similarly, the participants may delay assigning perfectivity in unclear cases and attempt to interpret the sentence in the later regions which could explain higher processing costs as well.

To sum up, Russian L2 learners of English did not distinguish between match and mismatch sentences irrespective of telicity, but there was a difference in the processing pattern of the telic and atelic sentences. It was argued that the present perfect and past simple may be associated with perfective interpretation by L2 learners, which could lead to a different processing pattern in atelic sentences. However, it is unclear whether this behavior can be described as a general learner effect, or it is a characteristic of Russian learners of English, who attempt to find a perfective/imperfective counterpart in their L2.

6.4 Limitations and outlook

The current study investigates the effects of two variables, TA match and Telicity, in two language groups separately, such that language group is not included as a variable. This is one of the main limitations of this experiment. It is a common practice to have Language as a variable in L2 studies, since the learners' behavior is compared to that of native speakers. Inclusion of the Telicity variable in addition to the TA match, led to a 2x2 design within each group. While it is theoretically possible to include language as a variable and compare the groups statistically with the current design, it requires more advanced statistical models, which are more difficult to analyze.

Next, the method chosen for this study indicated where the participants encountered the processing difficulty, but it is impossible to say how this difficulty was resolved. It could be

interesting to use alternative methods, for example eye-tracking, to investigate possible regressions from verb and spill-over regions as an indicator of processing difficulty. The inability to revisit text in self-paced reading could have induced L2 learners' insensitivity to violations, since linear word-by-word reading may place a heavier burden on learners' working memory capacity.

Another point that should be addressed is the method used to create telic and atelic distinctions in the stimuli. In this study a diagnostic test for lexical aspect developed by Andersen & Shirai (1995) was used to determine whether a predicate was inherently telic or atelic in a given context. The procedure was performed by the researcher when adopting/creating the stimuli and a number of challenges in classification were present. To improve the method in future research, a group of native speakers could undergo the procedure in order to verify the telicity of the predicates. For example, following Andersen and Shirai (1995), native speakers could be asked whether 'X is *Ving*' entails 'X has *Ved*' (as in *she is studying* entails *she has studied*) to separate activities from accomplishments and assign telicity to a predicate. This would objectively verify how native speakers of English perceive temporal qualities of predicates and would be more reliable than a subjective judgment.

7 Conclusion

The aim of this thesis was to investigate the behavior of native speakers of British English and advanced Russian learners of L2 English when processing tense-aspect mismatches and telicity manipulations.

Both native speakers and learners were sensitive to tense-aspect violations in the present perfect items as measured by the off-line Acceptability Judgment Task (AJT). The telicity of the predicates only slightly affected how native speakers of British English assessed grammatical and ungrammatical sentences. However, as predicted, the present perfect atelic match items cause some difficulties in the learners' group. Contrary to the predictions, English native speakers showed almost no sensitivity to the mismatch in the telic items in the past simple condition. Russian L2 learners are sensitive to the mismatch in the past simple items, irrespective of the telicity.

Consistent with previous research, this study has demonstrated that in the on-line task (SPR), native English speakers are sensitive to the temporal mismatch in the present perfect condition and show almost no sensitivity in the past simple condition. That is, reading times measured with the SPR task revealed that native speakers slowed down when encountering a present perfect mismatch irrespective of verb telicity, slowed down slightly when encountering atelic verbs in past simple mismatch, but were unaffected when encountering telic verbs in the past simple mismatch conditions. The telicity of the predicates had an effect on processing behavior in mismatch conditions only, but not in match conditions. Several possible explanations for this finding were discussed.

Differently from native speakers, the advanced Russian learners' reading times did not reveal any sensitivity to TA mismatches. This finding contradicts Roberts & Liszka's (2013) suggestion that the presence of grammaticized aspect in the L1 in general may underlie the differences in sensitivity to tense-aspect agreement violations. Russian encodes grammaticized aspect, but it does not have perfect/non-perfect distinction (*relative tense*). Thus, the fact that *relative tense* is not encoded in learners' L1 is likely to be one of the major factors behind the absence of main effects of temporal violations in the learners' data. While grammatical and ungrammatical sentences were processed similarly, there was a difference in processing pattern of telic and atelic sentences, which may be attributed to the presence of a perfective/imperfective distinction in the learners' L1. The results of both on-line and off-line

tasks suggest that learners attribute a perfective value to the present perfect, which converges with the predictions of the Aspect Hypothesis (Andersen & Shirai, 1996).

Including telicity as a variable in this study allowed for a more detailed investigation of tense-aspect processing in both groups. First, it demonstrated that native speakers are not completely insensitive to mismatches in past simple sentences, because the extent of temporal incongruity differs in atelic and telic mismatch conditions. The finding also suggested that not all verbs are equally affected by the tendency of the present perfect to be gradually replaced by past simple. This supports various corpus studies (e.g. Yao, 2014) discussing the gradual shift in the nature of the construction's "current relevance" from the salient present result of a past event to the constitution of the extended-now interval. Second, the study has revealed a potentially difficult area for advanced Russian learners (atelic present perfect), where processing and assessing problems were found in both on-line and off-line tasks.

To conclude, the current study suggests that there may be a substantial difference in the way English speakers and advanced Russian learners perceive the category of present perfect. The learner group commonly attribute the resultative perfective sense to this TA marker, whereas native speakers lean towards the imperfective extended-now sense instead. This finding suggests interesting practical considerations for the L2 acquisition of tense and aspect markers. For example, the finding emphasizes the importance of focusing on two uses of the present perfect, as in a finished past action versus the extended-now interval, during the course of instruction. It should be pointed out to the learners that present perfect does not correspond to the perfective aspect in Russian and that there is no clear-cut correspondence between the concepts. Another point to consider is whether the name of the tense could be confusing for the learners and influence their interpretation of the L2 form. The name *perfect* usually is described with the same word as *perfective aspect* in Russian, which means "complete". It is not surprising that learners are misled by the label itself. This difficulty may linger even in the advanced level of proficiency until learners receive enough exposure to the L2 in order to reanalyze this form. Further investigations of groups with different language backgrounds could clarify whether this behavior can be generalized and these arguments be applied to all learners of English, or whether this behavior is specific to the Russian learners.

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Appendix 1: Stimuli

Experimental sentences for the on-line reading experiment

The same lexical items were used to create the past simple (match/mismatch) and present perfect (match/mismatch) items.

Telic situations

1.1 Since the summer, Henry has achieved great results in maths. He practiced every evening with his older brother.

1.2 *Last summer, Henry has achieved great results in maths. He practiced every evening with his older brother.

1.3 Last summer, Henry achieved great results in maths. He practiced every evening with his older brother.

1.4 *Since the summer, Henry achieved great results in maths. He practiced every evening with his older brother.

2.1 Since spring, Bert has planted many different flowers. He wants to enter into a gardening competition.

2.2 *Last spring, Bert has planted many different flowers. He wanted to enter into a gardening competition.

2.3 Last spring, Bert planted many different flowers. He wanted to enter into a gardening competition.

2.4 *Since spring, Bert planted many different flowers. He wants to enter into a gardening competition.

3.1 Since last Christmas, Jane has written three children's books. She hopes to become a famous author someday.

3.2 *Last year, Jane has written three children's books. She hopes to become a famous author someday.

3.3 Last year, Jane wrote three children's books. She hopes to become a famous author someday.

3.4 *Since last Christmas, Jane wrote three children's books. She hopes to become a famous author someday.

4.1 Since last month, Alice has lost her keys several times. Her parents are very unhappy with her.

4.2 *Last month, Alice has lost her keys several times. Her parents are very unhappy with her

4.3 Last month, Alice lost her keys several times. Her parents are very unhappy with her.

4.4 *Since last month, Alice lost her keys several times. Her parents are very unhappy with her.

5.1 Since New Year, Mary has organized many amazing parties. She loves meeting new people and she knows everyone in the campus.

5.2 *Last semester, Mary has organized many amazing parties. She loves meeting new people and she knows everyone in the campus.

5.3 Last semester, Mary organized many amazing parties. She loves meeting new people and she knows everyone in the campus.

5.4 *Since New Year, Mary organized many amazing parties. She loves meeting new people and she knows everyone in the campus.

6.1 Since 2012, Adam has bought three expensive cars. He really wants to impress his friends.

6.2 *Last year, Adam has bought three expensive cars. He really wanted to impress his friends.

6.3 Last year, Adam bought three expensive cars. He really wanted to impress his friends.

6.4 *Since 2012, Adam bought three expensive cars. He really wants to impress his friends.

7.1 Since the beginning of the year, the school hockey team has won every single game. They improved significantly over a short period of time.

7.2 *Last year, the school hockey team has won every single game. They improved significantly over a short period of time.

7.3 Last year, the school hockey team won every single game. They improved significantly over a short period of time.

7.4 *Since the beginning of the year, the school hockey team won every single game. They improved significantly over a short period of time.

8.1 Since February, Ben has crashed his car four times. He now pays a lot for his insurance.

8.2 *In February, Ben has crashed his car four times. He now pays a lot for his insurance.

8.3 In February, Ben crashed his car four times. He now pays a lot for his insurance.

8.4 *Since February, Ben crashed his car four times. He now pays a lot for his insurance.

9.1 Since his birthday, Paul has met two lovely women. He wants to go out with both of them.

9.2 *On his birthday, Paul has met two lovely women. He wants to go out with both of them.

9.3 On his birthday, Paul met two lovely women. He wants to go out with both of them.

9.4 *Since his birthday, Paul met two lovely women. He wants to go out with both of them.

10.1 Since Christmas, Barbara has spent too much money. Her credit card bill was enormous.

10.2 *At Christmas, Barbara has spent too much money. Her credit card bill was enormous.

10.3 At Christmas, Barbara spent too much money. Her credit card bill was enormous.

10.4 *Since Christmas, Barbara spent too much money. Her credit card bill was enormous.

11. 1 Since last Friday, Mark has seen the same movie twice. He really loved it.

11.2 *Last Friday, Mark has seen the same movie twice. He really loved it.

11.3 Last Friday, Mark saw the same movie twice. He really loved it.

11.4 *Since last Friday, Mark saw the same movie twice. He really loved it.

12.1 Since he quit his job, Jack has met many wonderful friends. He often invites them over for a beer.

12.2 *Last summer, Jack has met many wonderful friends. He often invites them over for a beer.

12.3 Last summer, Jack met many wonderful friends. He often invites them over for a beer.

12.4 *Since he quit his job, Jack met many wonderful friends. He often invites them over for a beer.

13.1 Since she started volunteering at the animal shelter, Anna has helped many animals to recover. She dreams of becoming a vet one day.

13.2 *When she volunteered at the animal shelter, Anna has helped many animals to recover. She dreams of becoming a vet one day.

13.3 When she volunteered at the animal shelter, Anna helped many animals to recover. She dreams of becoming a vet one day.

13.4 *Since she started volunteering at the animal shelter, Anna helped many animals to recover. She dreams of becoming a vet one day.

14.1 Since last spring, our company has hired a few additional workers. All of them are satisfied with their new jobs.

14.2 *Last spring, our company has hired a few additional workers. All of them are satisfied with their new jobs.

14.3 Last spring, our company hired a few additional workers. All of them are satisfied with their new jobs.

14.4 *Since last spring, our company hired a few additional workers. All of them are satisfied with their new jobs.

15.1 Since last competition, Andreas has improved his swimming technique. His coach is very proud of him.

15.2 *Before the competition, Andreas has improved his swimming technique. His coach was very proud of him.

15.3 Before the competition, Andreas improved his swimming technique. His coach was very proud of him.

15.4 *Since last competition, Andreas improved his swimming technique. His coach is very proud of him.

16.1 Since the summer, Sarah and Mike have adopted two little kittens. Now they want to adopt a dog too.

16.2 *Last summer, Sarah and Mike have adopted two little kittens. Now they want to adopt a dog too.

16.3 Last summer, Sarah and Mike adopted two little kittens. Now they want to adopt a dog too.

16.4 *Since the summer, Sarah and Mike adopted two little kittens. Now they want to adopt a dog too.

Atelic situations

17.1 Since the summer, Michael has played soccer every day. He now wants to become a professional.

17.2 *Last year, Michael has played soccer every day. He now wants to become a professional.

17.3 Last year, Michael played soccer every day. He now wants to become a professional.

17.4 *Since the summer, Michael played soccer every day. He now wants to become a professional.

18.1 Since he met them, Joe has liked Mary's old friends. He doesn't think they are boring.

18.2 *At first, Joe has liked Mary's old friends. He doesn't think they are boring.

18.3 At first, Joe liked Mary's old friends. He doesn't think they are boring.

18.4 *Since he met them, Joe liked Mary's old friends. He doesn't think they are boring.

19.1 Since he first saw her, Sam has thought Jenny was beautiful. However, he is far too nervous to speak to her.

19.2 *When he saw her, Sam has thought Jenny was beautiful. However, he is far too nervous to speak to her.

19.3 When he saw her, Sam thought Jenny was beautiful. However, he is far too nervous to speak to her.

19.4 *Since he first saw her, Sam thought Jenny was beautiful. However, he is far too nervous to speak to her.

20.1 Since the summer, James has gone swimming every day. Now he is getting bored of it.

20.2 *Last week, James has gone swimming every day. Now he is getting bored of it.

20.3 Last week, James went swimming every day. Now he is getting bored of it.

20.4 *Since the summer, James went swimming every day. Now he is getting bored of it.

21.1 For the last three days, Tom has felt pain in his knee. He could not even go to work.

21.2 *Three days ago, Tom has felt pain in his knee. He could not even go to work.

21.3 Three days ago, Tom felt pain in his knee. He could not even go to work.

21.4 *For the last three days, Tom felt pain in his knee. He could not even go to work.

22.1 Since last year, Kate has studied French every evening. She now wants to learn German.

22.2 *Last year, Kate has studied French every evening. She now wants to learn German.

22.3 Last year, Kate studied French every evening. She now wants to learn German.

22.4 *Since last year, Kate studied French every evening. She now wants to learn German.

23.1 Since he was twenty, Matt has been a very famous singer. He now feels unsatisfied with his life.

23.2 *Once many years ago, Matt has been a very famous singer. He now feels unsatisfied with his life.

23.3 Once many years ago, Matt was a very famous singer. He now feels unsatisfied with his life.

23.4 Since he was twenty, Matt was a very famous singer. He now feels unsatisfied with his life.

24.1 Since she was ten years old, Brenda has wanted to be a police officer. She now works in a hospital.

24.2 *When she was ten years old, Brenda has wanted to be a police officer. She now works in a hospital.

24.3 When she was ten years old, Brenda wanted to be a police officer. She now works in a hospital.

24.4 *Since she was ten years old, Brenda wanted to be a police officer. She now works in a hospital.

25.1 Since last week, the cat has eaten only cooked fish. She now also eats meat.

25.2 *Initially, the cat has eaten only cooked fish. She now also eats meat.

25.3 Initially, the cat ate only cooked fish. She now also eats meat.

25.4 *Since last week, the cat ate only cooked fish. She now also eats meat.

26.1 For months now, Christine has wanted to be Gary's girlfriend. Now she finds him unpleasant.

26.2 *At first, Christine has wanted to be Gary's girlfriend. Now she finds him unpleasant.

26.3 At first, Christine wanted to be Gary' girlfriend. Now she finds him unpleasant.

26.4 *For months now, Christine wanted to be Gary's girlfriend. Now she finds him unpleasant.

27.1 Since he first started cooking, Alan has enjoyed making pasta the most. He now likes making desserts.

27.2 *When he first started cooking, Alan has enjoyed making pasta the most. He now likes making desserts.

27.3 When he first started cooking, Alan enjoyed making pasta the most. He now likes making desserts.

27.4 *Since he first started cooking, Alan enjoyed making pasta the most. He now likes making desserts.

28.1 Since he finished university, Jerry has thought about starting a business. He wants to be a millionaire.

28.2 *When he finished university, Jerry has thought about starting a business. He wanted to be a millionaire.

28.3 When he finished university, Jerry thought about starting a business. He wanted to be a millionaire.

28.4 *Since he finished university, Jerry thought about starting a business. He wants to be a millionaire.

29.1 For the last month, Sandra has felt very unhappy at work. She has even thought about leaving.

29.2 *Last month, Sandra has felt very unhappy at work. She even thought about leaving.

29.3 Last month, Sandra felt very unhappy at work. She even thought about leaving.

29.4 *For the last month, Sandra felt very unhappy at work. She has even thought about leaving.

30.1 Since she first started her job, Emma has loved the work very much. It's not very exciting now.

30.2 *When she first started her job, Emma has loved the work very much. It's not very exciting now.

30.3 When she first started her job, Emma loved the work very much. It's not very exciting now.

30.4 *Since she first started her job, Emma loved the work very much. It's not very exciting now.

31.1 Since the beginning, the band has been popular among women. They sold a million records.

31.2 *Initially, the band has been popular among women. They sold a million records.

31.3 Initially, the band was popular among women. They sold a million records.

31.4 *Since the beginning, the band was popular among women. They sold a million records.

32.1 For many years now, Judith has thought about joining the army. It is a dangerous profession.

32.2 *Many years ago, Judith has thought about joining the army. It is a dangerous profession.

32.3 Many years ago, Judith thought about joining the army. It is a dangerous profession.

32.4 *For many years now, Judith thought about joining the army. It is a dangerous profession.

Comprehension questions for the experimental sentences

1. Is it true that Henry had to study maths alone? (NO)
2. Is it true that Bert planted only roses for the gardening competition? (NO)

3. Does Jane write detective stories? (NO)
4. Is it true that Alice is a bit disorganized? (YES)
5. Is Mary an out-going person? (YES)
6. Is it true that Adam stole an expensive car? (NO)
7. Is it true that the hockey team lost one game this year? (NO)
8. Is Ben a careful driver? (NO)
9. Is it true that Paul can't decide which woman he likes more? (YES)
10. Is Barbara quite careless with money? (YES)
11. Is it true that Mark liked the movie so much, that he watched it three times? (NO)
12. Is it true that Jack doesn't have any friends? (NO)
13. Does Anna like animals? (YES)
14. Is it true that new workers are happy with their jobs? (YES)
15. Did Andreas get better at swimming? (YES)
16. Is it true that Sarah and Mike want to have three pets? (YES)
17. Is Michael tired of playing soccer? (NO)
18. Is it true that Joe finds Mary's old friends interesting? (YES)
19. Does Sam find Jenny attractive? (YES)
20. Is James still excited about swimming? (NO)
21. Is it true that Tom's knee hurt too much and he had to stay at home? (YES)
22. Can Kate speak German well? (NO)
23. Is Matt a famous actor? (NO)
24. Does Brenda work as a police officer? (NO)
25. Does the cat like fish? (YES)
26. Is it true that Christine doesn't want to be Gary's girlfriend anymore? (YES)
27. Does Alan hate cooking? (NO)
28. Is Jerry an ambitious person? (YES)
29. Is it true that Sandra is satisfied with her job? (NO)
30. Does Emma find her job boring now? (YES)
31. Is it true that mostly women buy the band's records? (YES)
32. Is it true that Judith doesn't want to join the army because it's too dangerous? (NO)

Filler sentences for the on-line reading experiment

33. Simon seldom scored below average on tests and projects. He was quite surprised to see a failing test grade.

34. At first my parents did not allow me to play video games after school, but now they permit it sometimes.
35. My brother rarely gets angry, but his wrath was uncontrollable when I wrecked his car.
36. Marcel performed poorly at his audition because the judges were very intimidating. He could not overcome how nervous they made him.
37. If I had not gone into Celia's store to buy a coat, I would not be married to her now.
38. It is difficult to trust Melinda because she is so fickle. She claims to be your best friend one day and she ignores you the next.
39. Chris was drowsy after his all-night study session. If he had been able to stay alert during the test, he would have performed better.
40. Because of falling revenues and increasing costs, executives were concerned that the company might not survive the financial crisis.
41. Chocolate has always been one of my favourite foods. So, it was difficult for me to resist another brownie.
42. To Via's dismay, her chances in the chess tournament ended suddenly with one move. Her mistake was moving the queen instead of the rook.
43. The students were grateful for an opportunity to take classes overseas. So, they readily accepted the offer.
44. Since what constitutes a proper diet remains a controversial subject on which few experts agree, additional research is required.
45. In late summer, the squirrel will gather a large collection of nuts and berries to eat throughout the winter months.
46. Marie had never seen anything as striking as the Grand Canyon before. She wanted to marvel at its beauty forever.
47. When speeding fines were increased, many motorists decided to alter their driving habits.
48. Mia was ready to go to summer camp. Her bags were packed, and she was excited.
49. Alexis was excited to begin her new job. We were impressed by how eager she was.
50. Before, Joanie's diet had consisted primarily of imported foods. However, lately she has begun to enjoy more local cuisine.
51. There were many cars in the theater parking lot. When Darren found an available parking spot, he felt fortunate.

52. Despite his effort to combat his fear of heights, the alarming speed at which the roller coaster dipped and turned frightened John.
53. Mr. Smith's philosophy course gets full quickly, even though the school has increased the maximum attendance level twice already.
54. The book's conclusion was shocking, since I never thought the book would end with a major death.
55. The truck, which had been overloaded, did not break in time and hit the wall. The driver was badly injured.
56. I arrived over an hour late to the office and everyone was working. Actually, they had been working for over two hours on the new project and I felt really guilty.
57. Unlike the misleading television documentary, the biography written about Audrey Hepburn was accurate.
58. The car was in pristine condition. Although it was produced in 1964, it looked like it had just rolled off of the assembly line.
59. Damon is a frugal shopper. He clips coupons, compares prices, and targets sale and clearance items.
60. After his victory in the election, the new mayor had adopted an aura of arrogance that displeased many of the voters. He was too proud to shake hands with the average citizen.
61. My dog gave me a guilty look. I think he was the one who ate my sandwich!
62. Manuel had heard that a single word sometimes may have multiple different meanings. Although, at the moment, he could not think of any examples.
63. I told Graham I did not want to go to the cinema because I had already seen Titanic twice.
64. I did not recognize Tim at all this morning because he had shaved off his beard.
65. If I had more money, I would not have asked the bank for a loan.
66. Although they have always done everything together in the past, the twins felt it was crucial for their independent development to experience college separately.
67. Despite his growing wealth and power, Teddy remains a humble man.
68. Cindy's date proved to be the perfect gentleman. He opened all the doors for her, paid the check, and even brought her flowers.
69. Despite his wide range of interests, the idea of becoming a bottle cap manufacturer seemed rather strange to him.

70. Although the president's advisers often disagreed with him, they rarely criticized his decisions.
71. Although we made payments each week, the loan took a very long time to repay due to a high rate of interest.
72. The company seemed to be a perfect fit for my career goals. So, after weighing my other options once more, I decided to accept the job offer.

Comprehension questions for the filler sentences

33. Is it true that Simon usually has good test scores? (YES)
34. Is the speaker allowed to play video games now? (YES)
35. Does the speaker's brother get angry often? (NO)
36. Is it true that the judges were very nice to Marcel? (NO)
37. Is the speaker married to Celia? (YES)
38. Is Melinda's behaviour unpredictable? (YES)
39. Was Chris sleepy during the test? (YES)
40. Were the executives positive about the company's chances to survive the crisis? (NO)
41. Is it true that the speaker likes chocolate a lot? (YES)
42. Did Via win the tournament? (NO)
43. Is it true that the students were very hesitant about going overseas? (NO)
44. Is it true that experts agree on what is a proper diet? (NO)
45. Is it true that the squirrel will gather many nuts and berries in late spring? (NO)
46. Did Marie enjoy the view of the Grand Canyon? (YES)
47. Did the increasing of speeding fines changed motorists' habits in any way? (YES)
48. Did Mia want to go to summer camp? (YES)
49. Is it true that Alexis didn't care about her new job? (NO)
50. Is it true that Joanie never buys local food? (NO)
51. Is it true that there were absolutely no available parking spots? (NO)
52. Did John feel anxious on the roller coaster? (YES)
53. Is Mr. Smith's course popular? (YES)
54. Is it true that no major characters died in the book? (NO)

55. Is it true that the truck was overloaded? (YES)
56. Did the speaker feel bad about being late? (YES)
57. Is it true that Audrey Hepburn's biography was misleading? (NO)
58. Was the car in a good condition? (YES)
59. Does Damon spend his money carefully? (YES)
60. Was the new mayor friendly with the citizens? (NO)
61. Does the speaker suspect his dog of stealing his sandwich? (YES)
62. Did Manuel give many examples of words that have many different meanings? (NO)
63. Is it true that the speaker wants to see Titanic again? (NO)
64. Is it true that Tim was hard to recognize without his beard? (YES)
65. Is it true that the speaker asked the bank for a loan? (YES)
66. Is it true that the twins will go to a college together? (NO)
67. Is Teddy a greedy person? (NO)
68. Is it true that Cindy's date was a very nice person? (YES)
69. Was he excited about working as a bottle cap manufacturer? (NO)
70. Is it true that advisers often criticized president's decisions? (NO)
71. Did the speaker make loan payments every month? (NO)
72. Is it true that the speaker rejected the job offer? (NO)

Items for the Acceptability Judgment Task

Conditions are coded as follows:

PP – present perfect	M – match	A - atelic
PS – past simple	MM – mismatch	T – telic

PPM-T

1. Since February, Ben has crashed his car four times.
2. Since last spring, our company has hired a few additional workers.
3. Emily has earned a lot of money this year.
4. I have spent three years in London. I love it here.

PPM-A

5. Since he first saw her, Sam has thought Jenny was beautiful.
6. For the past month, Sandra has felt very unhappy at work.
7. I have walked to work every day for the last six weeks!
8. Michael has played soccer every day since the summer.

PPMM-T

9. *Last summer, Henry has achieved great results in math.
10. *On his birthday, Paul has met two lovely women.
11. *They haven't recognized me at yesterday's meeting.
12. *Paul and Lucy have bought a new house last spring.

PPMM-A

13. *At first, Joe has liked Mary's old friends.
14. *Last week, James has gone swimming every day.
15. *I have eaten a lot of sweets when I was a child.
16. *George has dreamt of going to California before he died, but he didn't make it.

PSM-T

17. I lost my keys yesterday, so I couldn't get into the house.
18. Last year, the school hockey team won every single game.
19. At Christmas, Barbara spent too much money.
20. Chika graduated from university last July.

PSM-A

21. When he first started cooking, Alan enjoyed making pasta the most.
22. When she was ten years old, Brenda wanted to be a police officer.
23. They enjoyed themselves at the party last summer.
24. We knew someone was going to get fired when the boss walked into the room.

PSMM-T

25. *Since spring, Bert planted many different flowers.
26. *Since last month, Alice lost her keys several times.
27. *Jonny, I can't believe how much you changed since the last time I saw you.
28. *Gerry fell off his bike three times this month.

PSMM-A

29. *For months now, Christine wanted to be Gary's girlfriend.
30. *Since last week, the cat ate only cooked fish.
31. *Sara didn't smoke since she became pregnant.
32. *Our neighbor was in hospital since Friday.

Appendix 2: Language History Questionnaire²

Language History Questionnaire

1. Age (in years): _____
2. Sex (Circle one): Male / Female
3. Indicate your native language(s): _____
4. Rate your current ability in terms of listening, speaking, reading, and writing in each of the languages you have studied or learned. Please rate according to the following scale:

Very poor	Poor	Average	Above average	Good	Very Good	Native-like
1	2	3	4	5	6	7

Language	Listening	Speaking	Reading	Writing

5. Indicate the age at which you were first exposed to these languages in terms of listening, speaking, reading, and writing, and the total number of years you have spent studying them.

Language	Listening	Speaking	Reading	Writing	Years of use

6. Estimate how many hours per day you spend engaged in the following activities in the languages you have studied or learned:

Language: _____ Language: _____

Watching television: _____ (hrs) _____ (hrs)

² Adapted from LHQ 2.0, designed by Li, Zang, Sai and Puls (2013)

Reading for fun: _____ (hrs) _____ (hrs)

Reading for school/work: _____ (hrs) _____ (hrs)

Writing emails to friends: _____ (hrs) _____ (hrs)

Writing for school/work: _____ (hrs) _____ (hrs)

Speaking with someone³: _____ (hrs) _____ (hrs)

7. If you have lived or travelled in countries other than your country of residence or country of origin for three or more months, then indicate the name of the country, your length of stay and the language you used:

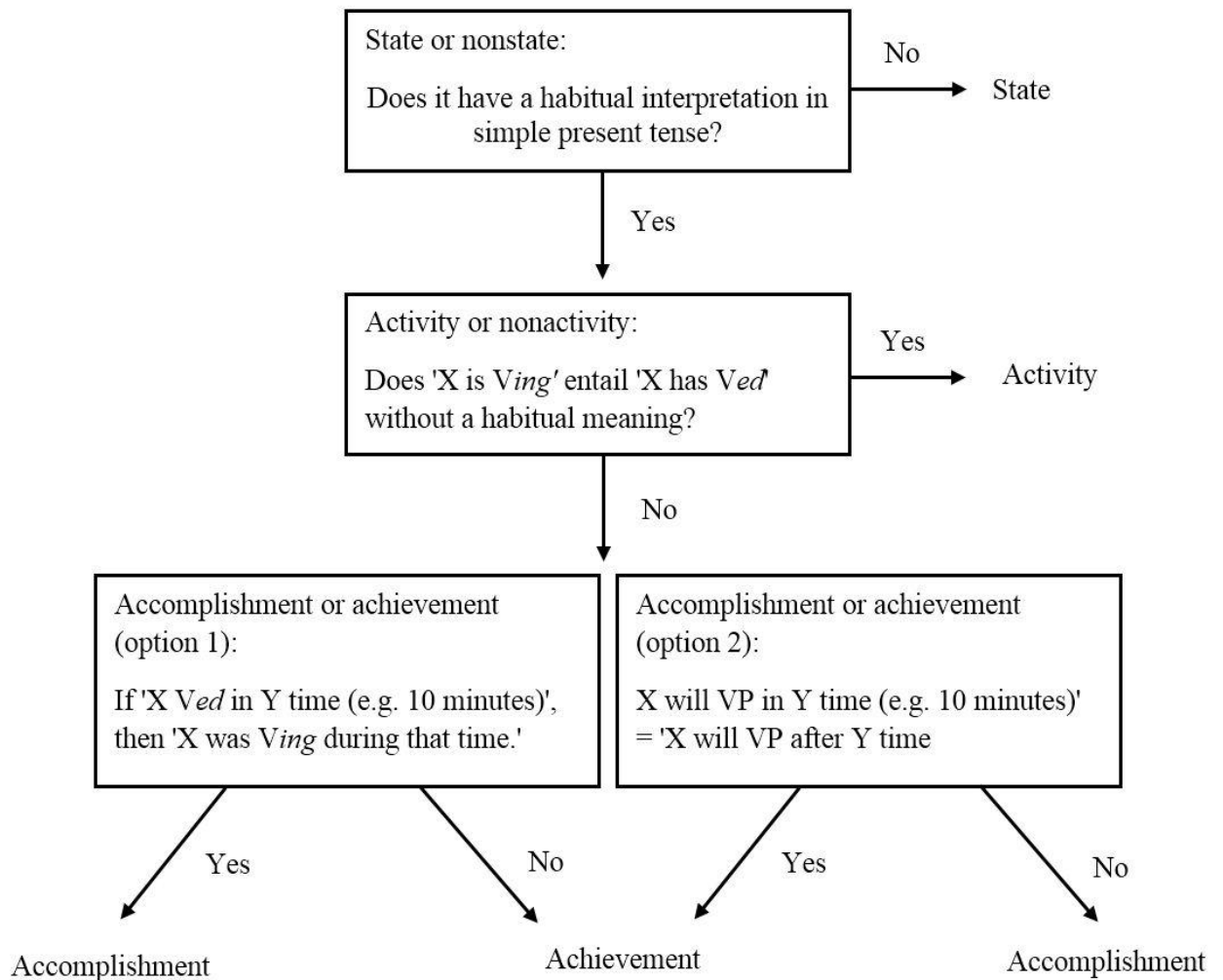
Country	Length of stay	Language

8. If you have any comments about your language learning experience and language usage, please leave them below.

³ For example, friends, family members, teachers, other students etc.

Appendix 3: Diagnostic tests for lexical aspect

Operational steps to classify lexical aspect of verb adapted from Shirai & Andersen, 1995.



Appendix 4: Residual reading times

Table 6. Mean Residual RTs. Present perfect condition

			Atelic				Telic			
			match		mismatch		match		mismatch	
			M	SD	M	SD	M	SD	M	SD
Perfect	aux	English	-24.22	54.10	4.38	77.09	8.69	82.48	38.86	94.96
		Russian	-42.78	101.08	-37.21	99.41	-5.60	83.30	3.03	129.19
	Verb	English	-55.79	42.35	71.07	164.26	-38.90	70.25	23.13	84.80
		Russian	-98.89	107.33	-61.60	152.00	-7.80	195.23	-21.09	121.50
	Verb+1	English	-43.73	65.29	5.65	47.08	-17.24	43.95	1.91	61.58
		Russian	-109.20	162.61	-96.89	148.05	-78.78	140.50	-48.47	139.11
	Verb+2	English	-52.06	44.56	3.47	55.91	-65.61	63.08	-56.76	64.30
		Russian	-20.86	127.91	-90.22	130.80	-115.06	155.89	-144.90	162.11

Table 7. Mean Residual RTs. Past simple condition

			Atelic				Telic			
			match		mismatch		match		mismatch	
			M	SD	M	SD	M	SD	M	SD
Past Simple	Verb	English	-29.76	37.34	-29.14	51.98	-16.71	90.30	-31.93	38.76
		Russian	-4.27	205.22	-22.26	135.10	38.95	163.53	-56.03	148.69
	Verb+1	English	-39.40	44.71	-11.24	62.48	-10.20	43.51	-8.94	71.66
		Russian	-126.38	118.17	-130.08	101.82	-50.64	105.53	-46.00	111.83
	Verb+2	English	-22.19	53.06	16.79	40.23	-28.28	76.63	-40.87	38.95
		Russian	-71.23	127.02	-68.95	111.84	-158.87	138.69	-150.40	143.64
	SF	English	36.93	94.12	87.85	109.70	3.87	118.61	-10.67	68.71
		Russian	-19.26	184.18	-51.73	146.97	-57.13	222.52	-38.50	192.60

Appendix 5: Statistical analyses⁴

Acceptability Judgment Task

Summary of the two-way within-subject ANOVA for present perfect items in the native speaker group

Type	Sources of variation	SS	df	Partial η^2	F	p
by part.	telicity	1.783	1	.1	4.624	.037 *
	temporal match	99.908	1	.85	259.14	< .001 ***
	telicity x temporal match	0.001	1	< .01	0.003	.954
	Error		44			
by item	telicity	0.593	1	.17	2.616	.132
	temporal match	33.351	1	.92	147.143	< .001 ***
	telicity x temporal match	0.000	1	< .01	0.002	.967
	Error		12			

Summary of the two-way within-subject ANOVA for present perfect items in the learners' group

Type	Sources of variation	SS	df	Partial η^2	F	p
by part.	telicity	6.143	1	.06	4.915	.03 *
	temporal match	52.160	1	.33	41.731	< .001 ***
	telicity x temporal match	7.830	1	.07	6.265	.014 *
	Error		84			
by item	telicity	1.108	1	.43	9.209	.01 *
	temporal match	9.44	1	.87	78.479	< .001 ***
	telicity x temporal match	1.41	1	.49	11.723	.005 **
	Error		12			

Summary of the T-tests for present perfect items in the learners' group

		by participant			by item		
		t	df	p	t	df	p
atelic	match-mismatch	2.7	42	.01 *	3.14	6	.02 *
telic	match-mismatch	6.587	42	< .001 ***	12.25	6	< .001 ***
match	telic-atelic	-4.17	42	< .001 ***	-3.691	6	0.01 *
mismatch	telic atelic	0.174	42	.86	0.4	6	.7

⁴ Significant p-values highlighted in bold, $\alpha = 0.05$

Summary of the two-way within-subject ANOVA for past simple items in the native speaker group

Type	Sources of variation	SS	df	Partial η^2	F	p
by part.	telicity	2.189	1	.16	8.296	.006 **
	temporal match	6.564	1	.36	24.877	< .001 ***
	telicity x temporal match	1.783	1	.13	6.756	.013 *
	Error		44			
by item	telicity	0.727	1	.39	7.779	.016 *
	temporal match	2.198	1	.66	23.524	< .001 ***
	telicity x temporal match	0.59	1	.34	6.305	.027 *
	Error		12			

Summary of the T-tests for past simple items in the native speaker group

		by participant			by item		
		t	df	p	t	df	p
atelic	match-mismatch	4.196	22	< .001 ***	4.373	6	.005 **
telic	match-mismatch	2.794	22	.01 *	2.166	6	.07 .
match	telic-atelic	-0.462	22	.65	-0.424	6	.68
mismatch	telic atelic	-2.876	22	.008 **	-2.805	6	.03 *

Summary of the two-way within-subject ANOVA for past simple items in the learners' group

Type	Sources of variation	SS	df	Partial η^2	F	p
by part.	telicity	2.148	1	.03	2.253	.13
	temporal match	87.501	1	.52	91.749	< .001 ***
	telicity x temporal match	0.035	1	.04	0.037	.84
	Error		84			
by item	telicity	0.388	1	.18	2.559	.13
	temporal match	15.98	1	.89	105.561	< .001 ***
	telicity x temporal match	0.009	1	.00	0.056	.816
	Error		12			

Self-paced reading task

Summary of the two-way within-subject ANOVA for present perfect items in the native speaker group

Regions	Sources of variation	SS	df	Partial η^2	F	p
aux	telicity	13623	1	.05	2.207	.145
	temporal match	10360	1	.04	1.678	.202
	telicity x temporal match	8	1	< .01	0.001	.972
	Error		44			
Verb	telicity	2893	1	< 0.01	0.283	.597
	temporal match	107044	1	.19	10.469	.002 **
	telicity x temporal match	12612	1	.02	1.233	.273
	Error		44			
Verb+1	telicity	1551	1	.01	0.509	.479
	temporal match	14090	1	.1	4.619	.037 *
	telicity x temporal match	2743	1	.02	0.899	.348
	Error		44			
Verb+2	telicity	16330	1	.1	4.939	.031 *
	temporal match	12432	1	.08	3.76	.058 .
	telicity x temporal match	6538	1	.04	1.977	.167
	Error		44			

Summary of the two-way within-subject ANOVA for present perfect items in the learners' group

Regions	Sources of variation	SS	df	Partial η^2	F	p
aux	telicity	32963	1	.03	3.015	.086 .
	temporal match	1109	1	< .01	0.101	.75
	telicity x temporal match	52	1	< .01	0.004	.945
	Error		84			
Verb	telicity	95252	1	.05	4.354	.039 *
	temporal match	3169	1	< .01	0.145	.704
	telicity x temporal match	14080	1	< .01	0.644	.425
	Error		84			
Verb+1	telicity	34189	1	.02	1.564	.215
	temporal match	9997	1	< .01	0.457	.51
	telicity x temporal match	1783	1	< .01	0.082	.776
	Error		84			
Verb+2	telicity	121922	1	.06	5.803	.018 *
	temporal match	54121	1	.03	2.576	.112
	telicity x temporal match	8591	1	< .01	0.409	.524
	Error		84			

Summary of the two-way within-subject ANOVA for past simple items in the native speaker group

Regions	Sources of variation	SS	df	Partial η^2	F	p
Verb	telicity	316	1	< .01	0.092	.763
	temporal match	640	1	< .01	0.186	.668
	telicity x temporal match	752	1	< .01	0.219	.642
	Error		44			
Verb+1	telicity	2974	1	.02	0.92	.343
	temporal match	2596	1	.02	0.803	.375
	telicity x temporal match	2171	1	.02	0.672	.417
	Error		44			
Verb+2	telicity	12189	1	.09	4.124	.048 *
	temporal match	2089	1	.02	0.707	.405
	telicity x temporal match	7979	1	.06	2.7	.107
	Error		44			
SF	telicity	51946	1	.1	5.236	.027 *
	temporal match	3971	1	< .01	0.4	.53
	telicity x temporal match	12856	1	.03	1.296	.261
	Error		44			

Summary of the two-way within-subject ANOVA for past simple items in the learners' group

Regions	Sources of variation	SS	df	Partial η^2	F	p
Verb	telicity	491	1	< .01	0.018	.894
	temporal match	70203	1	.03	2.571	.113
	telicity x temporal match	32600	1	.01	1.194	.278
	Error		84			
Verb+1	telicity	131729	1	.12	10.779	.002 **
	temporal match	197	1	< .01	0.016	.9
	telicity x temporal match	60	1	< .01	0.005	.945
	Error		84			
Verb+2	telicity	157247	1	.1	9.181	.003 **
	temporal match	635	1	< .01	0.037	.848
	telicity x temporal match	211	1	< .01	0.012	.912
	Error					
SF	telicity	3374	1	< .01	0.094	.759
	temporal match	1073	1	< .01	0.03	.863
	telicity x temporal match	14440	1	< .01	0.406	.526
	Error		84			