University of Sarajevo

Faculty of Philosophy

Department of English Language and Literature

PROCESSING ASPECT FEATURE VIOLATIONS: AN EXPERIMENTAL STUDY

(Procesiranje negramatičnih oblika glagolskog vida: Eksperimentalna studija)

Master's Thesis

Student: Minela Majstorić, BA

Supervisor: Doc. dr. Nermina Čordalija

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DEDICATION

To the people who have inspired me every step of the way,

Mirsad, Nermina, Adela, Nedim.

You have supported me and helped me through the hardest times.

Without you, I would not be here.

To my friends who have been there through thick and thin.

Thank you all for making me see this adventure through to the end.

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ABSTRACT

Grammatical aspect expresses the internal temporal constituency of a situation. More specifically, grammatical aspect answers the question *Is the event or state described by the verb complete, or is it continuing?* Bosnian/Croatian/Serbian (BCS) distinguishes between the perfective and the imperfective aspect since this is a binary system characteristic of Slavic languages. English, on the other hand, grammaticalizes the perfect and the progressive, which do not entirely correspond to the perfective/imperfective aspectual opposition. Grammatical aspect is an obligatory category in BCS, and studies have shown that BCS aspectual violations are clearly understood as ungrammatical and detected immediately at the point of the violation. The existing study on processing English aspectual violations showed that native speakers of English do not detect aspectual violations during sentence processing at the point of the violation but only after the sentence has been processed. We conducted a self-paced reading study to explore whether advanced BCS learners of English detect aspectual violations during sentence processing. Our results are in line with the previous findings on L1 processing of English aspect – English aspectual violations are not detected online during sentence comprehension in L2 processing. However, there is an important difference. Unlike native speakers of English, BCS advanced learners of English do not detect aspectual violations even after the sentence has been processed. Such results provide evidence for the Shallow Structure Hypothesis in L2 processing. We, therefore, compare our findings with other studies on grammatical aspect, contrast L1 and L2 processing, and discuss English and BCS aspect.

Keywords: grammatical aspect, aspectual violations, Bosnian/Croatian/Serbian, English, self-paced reading, L1 processing, L2 processing

SAŽETAK

Glagolski vid (gramatički aspekt) izražava unutrašnju vremensku strukturu situacije. Konkretno, aspekt odgovara na pitanje *Da li su događaj ili stanje, opisani glagolom, završeni ili i dalje traju?* Za bosanski/hrvatski/srpski (BHS) karakteristična je podjela na svršeni i nesvršeni glagolski vid, budući da je ovo binarni sistem karakterističan za slavenske jezike. U engleskom sistemu glagolskog vida, gramatički je izražen kontrast između perfekta i progresiva koji ne odgovaraju u potpunosti razlici između svršenog i nesvršenog vida. Glagolski vid je obavezna kategorija u BHS jeziku i studije su pokazale da se negramatični oblici glagolskog vida lahko shvataju kao neispravni, te da ih izvorni govornici prepoznaju čim se negramatični oblik glagola integrira u rečenicu. S druge strane, jedina studija koje se bavi procesiranjem negramatičnih oblika glagolskog vida u engleskom jeziku je pokazala da izvorni govornici engleskog ne prepoznaju negramatične oblike glagolskog vida tokom procesiranja rečenice već tek nakon što je čitava rečenica procesirana. Mi smo proveli studiju koja koristi metodu čitanja slobodnim tempom da bi istražili da li napredni L2 govornici engleskog jezika prepoznaju negramatične oblike glagolskog vida tokom procesiranja rečenice. Naši rezultati su u skladu s otkrićima ranije studije o L1 procesiranju glagolskog vida u engleskom – negramatični oblici glagolskog vida u engleskom jeziku se ne prepoznaju kao negramatični tokom procesiranja rečenice ni u L2 procesiranju. Međutim, postoji bitna razlika. Za razliku od izvornih govornika engleskog jezika, L2 govornici nisu prepoznali negramatične oblike glagolskog vida ni nakon što je čitava rečenica procesirana. Ovakvi rezultati upućuju na tačnost Hipoteze o površnoj sintaksičkoj strukturi u L2 procesiranju. U ovom radu poredimo naše rezultate s rezultatima drugih studija na temu glagolskog vida, pravimo kontrast između L1 i L2 procesiranja te diskutujemo glagolski vid u engleskom i BHS jeziku.

Ključne riječi: glagolski vid/gramatički aspekt, negramatični oblici glagolskog vida, bosanski/hrvatski/srpski, engleski, metoda čitanja slobodnim tempom, L1 procesiranje, L2 procesiranje

1 Introduction

Studies report that native speakers of English do not show electrophysiological responses to violations of aspect (Flecken et al., 2015), while native speakers of Bosnian/Croatian/Serbian (BCS)[1] show a clear sensitivity to aspectual violations in their language (Čordalija, 2021; Čordalija et al., 2023). Even though they detect aspectual violations already at the point of the verb in their L1, in this study we investigate whether BCS advanced learners of English process aspectual violations in English, their L2.

More precisely, the thesis presents an experimental study that investigated whether BCS L2 learners of English process aspectual violations at the verb or in adjacent positions. Section 1 describes both tense and aspect systems in English and BCS due to the inextricable link between these two categories. We discuss existing studies on grammatical aspect and address several theories concerning L2 processing. We also describe the method used to design the experimental study. Section 2 gives a detailed account of the design of the experimental study and the experimental procedure. In section 3, the results of statistical analyses are given. In section 4, we discuss the results of our study in light of existing research on L2 processing and grammatical aspect processing. Section 5 provides an overview of this thesis and states the importance of the experimental study.

[1] Bosnian/Croatian/Serbian (BCS) is a label representing three official national standards in Bosnia and Herzegovina: Bosnian, Croatian, and Serbian.

1.1 Tense vs aspect: General observations

Time is a universal, non-linguistic concept with three divisions: past, present, and future (Quirk, 1973). In language, information about time is conveyed primarily by tense and/or aspect, depending on the resources of the language. However, adverb phrases, prepositional phrases, and noun phrases, as well as adverbial clauses, are also used to express time in a sentence. Although both aspect and tense are concerned with time, they are concerned with time in very different ways (Comrie, 1976).

Tense is typically a deictic category in that it relates the time of the situation to the moment of speech (Dahl, 1985). According to Comrie (1976), tense views the situation externally. This means that tense locates events and states on the time axis. This category gives us a clear understanding of the correspondence between the form of the verb and our concept of time (Quirk, 1973).

Aspect, on the other hand, is a non-deictic category (Dahl, 1985). Such a view entails that aspect is not concerned with relating the time of the situation to any other time-point, but rather with the internal temporal contours of the situation (Comrie, 1976). Simply speaking, aspect concerns the manner in which the verbal action is experienced or regarded, for example, if the event is completed or in progress (Quirk, 1973), or if the event is a single or repeated one (Dowty, 1979).

If a language does not realize the category of tense inflectionally, aspectual information may allow the inference of the temporal location. Consequently, tense and aspect are complementary domains. The next section discusses tense and aspect systems in English.

1.2 Tense in English

In English, verb phrases can be marked for only two tenses: present and past. Verb phrases that are marked for tense are called tensed or finite verb phrases. In English finite verb phrases, tense is expressed on the first auxiliary verb, if there are any (*have/has been singing*), including modal verbs (*could have been singing*). If there are no auxiliary verbs, tense is inflectionally expressed on the main verb (*plays/played*). When a verb phrase does not express tense, it is referred to as a non-finite verb phrase. There are four non-finite verb forms in English:

- to-infinitive (*John believes the prisoner to be innocent.*);
- bare infinitive (*Can you help him do his homework?);*
- *-ing* participle (*I found talking about politics with him very interesting, indeed.);*
  -ed participle (*He never found that old book printed in blue ink.*).

1.2.1 Present tense

Present tense, when referring to present time, has three major meanings:

a. It can describe a state that exists at the present time: *I want a packet of crisps.*
b. It can refer to a habitual action: *She's a vegetarian but she eats chicken.*
c. It can describe an action that is currently happening*: Here comes your mother.* (Biber et al., 2002).

What this means is that present tense primarily describes the situation in present time that is located temporally as simultaneous with the moment of speaking (Comrie, 1976). Since tense distinctions typically involve different inflectional endings, it is important to emphasize the fact that present tense in English is either *unmarked* (for 1st and 2nd person singular and 1st, 2nd, and 3rd person plural subjects), *e.g., I hate beef waffles,* or marked with an *-s suffix* (in the 3rd person singular), *e.g., He hates beef waffles* (Carnie, 2013).

1.2.2 Past tense

Past tense is primarily used to refer to past time *(He danced all night long).* In fictional narratives and descriptions, the use of the simple past tense is common for describing past states and events. English past tense is typically marked with an -ed suffix (e.g., the past tense of *dance* is *danced*) or a verb has an irregular past tense form (e.g., the past tense of *leave* is *left*). The form of the past tense verb, whether it ends in the *–ed* suffix or has an irregular form, is called the *preterite* (Carnie, 2013).

A usual misconception relating to tense is that present tense entails only present time reference and that past tense exclusively conveys past time reference. The two tenses are related to those distinctions in time, but they do not always correspond precisely to the difference between the present and the past in the real world. Present tense generally refers to a time that includes the time of speaking but usually extends backward and forward in time and can be used in narratives to give dynamism to past events (example [a] below; Nelson & Greenbaum, 2013; Biber et al., 2002). Conversely, the simple past tense is sometimes used for a situation at the present time. In this case, past tense often provides information about stance (example [b] below; Biber et al., 2002). Such secondary uses refer to a current state of mind and signal that the speaker is being polite. Furthermore, in some types of dependent clauses, the simple past tense is used to express the unreal past, in other words, to convey hypothetical or 'unreal' conditions (example [c] below; Biber et al., 2002).

Compare:

a) present tense expressing past time reference (the historic present): *I wanted just a small box. He wasn't satisfied with it - He goes and makes a big one as well.*
b) past tense expressing present time reference to convey politeness: *Did you want a cup of tea?*
c) past tense expressing present/future time reference in hypothetical situations: *Timothy, it's time you got married.*

1.2.3 'Future tense'

English does not possess the means to express future time inflectionally. Consequently, it is claimed that English does not express future tense. Instead, there are several strategies for expressing future time: the use of modal verbs (*e.g., Even more precise coordination will be necessary*), semi-auxiliaries (e.g., *I'm going to eat my beef waffles*), or the use of the present tense to indicate a future action *(e.g., I'm leaving here tomorrow).* In some cases, past tense can also be used to express hypothetical future events *(e.g., If Arsenal won, they'd be top of the league).*

This again emphasizes the fact that there is no simple correlation between the grammatical category of tense and the notion of time. As shown above, in the right circumstances, both present tense and past tense are compatible with the expression of future time (Burton-Roberts, 2013).

When discussing tense, the dichotomy between absolute and. relative tenses is inevitable. The term *absolute tense* is used to refer to tenses that take present moment as their deictic center (Comrie, 1985). There are three basic tenses that have been used to form the backbone of much work on time reference in grammar: present tense (*e.g., The Eiffel Tower stands in Paris*), past tense (*e.g., John lived in Manchester from 1962 to 1982)* and 'future tense' *(e.g., It will rain tomorrow[2])* (Comrie, 1985). Another possible form of time reference is relative time reference, where, instead of the time of a situation being located relative to the present moment, it is related to the time of some other situation (Comrie, 1976). What is specific to the relative tense are adverbials, which are used in sentences to locate a situation relative to some reference point that is given by a context, such as *on the same day, on the day before, on the next day,* etc. In the sentence *On the next day, Jack looked out of his bedroom window* natural reaction would be to look for a reference point in terms of which time adverbial can be interpreted – *the next day after what?* This question does not arise in absolute tense where the time reference is quite clear (*e.g., Tomorrow, Jack will look out of his bedroom window*) (Comrie, 1985).

This section discussed simple tense forms in English that do not express information about aspect. However, English grammaticalizes aspectual information too.

1.3 Aspect

As a general definition of aspect, we may take the formulation that ‘aspects are different ways of viewing the internal temporal constituency of a situation' (Comrie, 1976). In the sentence *Mary was running when the rain started,* the verb *was running* sets the background to the main event, while that event itself is introduced by the second verb *started.* The second verb presents the totality of the situation referred to without reference to its internal temporal constituency: the whole of the situation is presented as a single unanalyzable whole, with beginning, middle, and end rolled into one. By contrast, the progressive verb form (*was running*) does not convey a holistic view of the situation but conceives it as consisting of stages and expressing duration. Moreover, this means that there is no explicit reference to the beginning or the end of running. Mary’s running both preceded and followed the rain (Comrie, 1976). Essentially, grammatical aspect answers the question, 'Is the event and state described by the verb completed, or is it continuing?' (Biber et al., 2002).

Aspect traditionally refers to grammaticalized aspectual oppositions such as perfective and imperfective that occur in Slavic languages (Smith, 1997). The perfective/imperfective contrast is often viewed as the typologically most prominent aspectual distinction, but not all languages fit this binary approach. English does not, for instance, for it grammaticalizes the progressive, which only conveys a subpart of the meaning of imperfective and perfect, which does not correspond to the perfective aspectual distinction (de Swart, 2012). This is the reason why authors focus on the perfect (*e.g., He had seen him picking purses*) and the progressive, sometimes known as ‘continuous’ *(e.g., Jeff is seeing that new movie tonight*), as two subcategories of English aspect. There are also verb forms that do not express aspect morphologically, so they are described as simple, non-aspectually marked forms (*e.g., She sees her therapist twice a week*) (Biber et al., 2002).

However, a constant source of confusion in the study of aspect is the complex interrelation between grammar and lexicon (Dahl, 1985). According to Dahl (1985), aspectual meanings can indeed be expressed by morphological means in some languages, but it is also true for all languages that verbal lexemes differ in their aspectual potential, which does not exclusively entail morphological realization of that potential.

Brinton (1988) suggests that there need to be two disparate trends in aspectual studies: one that concentrates on the grammatical meaning of the verbal forms, while the other concentrates on the lexical meaning of verbs. In other words, grammatical aspect refers to aspectual meanings conveyed by verb morphology (e.g., *is running* – the progressive meaning signaled by *be* and the *-ing* suffix), whereas aspectual meanings that may be expressed by the verb and its arguments without any morphological endings constitute lexical aspect (e.g., *ran all day* – the progressive meaning conveyed by the constellation of the verb and the adverbial with no aspectual morphology whatsoever).

In the next two sections, we pay more attention to two types of aspect - lexical and grammatical, with the main focus being on grammatical aspect.

1.3.1 Lexical aspect

Lexical aspect entails that aspectual meaning can be conveyed lexically by the semantics of the verb and its arguments *(e.g., swim a mile)*. In addition to the term 'lexical aspect', some linguists also make use of the terms *aktionsart* or *inherent aspect* (Smith, 1997; Comrie, 1976; Binnick, 1991). Aktionsart is a German word meaning 'kinds of action'. Although there have been numerous attempts to coin an English equivalent, none of these have become generally accepted (Comrie, 1976).

There is a clear distinction between the lexical and grammatical aspect. Grammatical aspect is understood as grammaticalization of the relevant semantic distinctions, while aktionsart represents lexicalization of the distinctions, irrespective of how these distinctions are lexicalized (Comrie, 1976). This is why the lexical aspect is often known as aktionsart, but also as situation type or internal structure (Smith, 1997; Comrie, 1976).

There are four different classes of verbs that differ in their lexical aspect that are based on the time schemata proposed by Vendler (1967) and further developed by Dowty (1979). It is important to note that some linguists add a fifth category of semelfactive: single-stage events with no result or outcome (*e.g., hiccup, cough*), (Smith, 1997; Comrie, 1976), however, we will focus on the original four proposed by Vendler (1967).

According to Vendler (1967), there exist following situation types:

a) accomplishments: *draw a circle, run a mile*
b) activities: *run, sleep*
c) states: *know, be asleep, love*
d) achievements: *recognize, wake up, die*

It is important to notice that it can be easy to confuse achievements with accomplishments (Vendler, 1967). The difference between the two is that achievements (*win, convince*) are described as happening at a particular moment, while activities (*keep a secret, hunt*) may last for a long period of time (Dowty, 1979). More generally, the four classes of verbs also differ in the temporal properties of dynamism, durativity, and telicity (Smith, 1997). Aristotle distinguished between static and dynamic, or states and events; others have added the features of telicity and duration (Smith, 1997).

When we talk about telicity, there can be telic (*make a chair*) and atelic situation types (*sing*). Both refer to durative situations that can last for a shorter or longer period of time, depending on different factors that are related to the events. However, there is an important difference between these two types of situations with regard to their internal structure (Comrie, 1973). A telic situation, *make a chair*, represents a situation that eventually comes to the point of completion. This means that the event must come to an end. Moreover, until this point is reached, the situation described by the predicate *make a chair* cannot come to an end but can only be broken off part way through (Comrie, 1973). As Smith suggests (1997), telic events have natural final endpoints, which is not the case with atelic events. An atelic situation, *singing*, can be stopped at any time, and it will still be true that it happened, even if the song is not completed (Comrie, 1976). Thus, the situation described by the predicate *make a chair* has a terminal point built into it, and at the point the chair is complete, it automatically terminates. On the contrary, the situation described by *singing* has no such terminal point and can be protracted indefinitely or broken off at any point (Comrie, 1976).

The distinction between states and dynamic situations is one that seems reasonably clear intuitively (Comrie, 1976). According to Comrie (1976), states refer to something ongoing. In other words, a characteristic of a state is that, unless something happens to change it, it will continue.

On the other hand, in a dynamic situation, the situation will only continue if it is continually subject to a new input of energy (Comrie, 1976). Consider examples with *know* (state) and *run* (dynamic situation). Every phase of the verb *know* in the sentence *John knows where I live* is identical. This means that if we cut into the situation at any point in time, the phase will be the same - he will know. However, with the dynamic situation of the verb *run*, each phase is different at different points in time. When we say *John is running*, phases change depending on John's movement (Comrie, 1976).

Durativity entails that situations can be durative (Smith, 1997) or punctual (Comrie, 1976). Durative situations simply refer to the fact that the given situation lasts for a certain period of time (Comrie, 1976). However, punctual situations do not have duration, not even the duration of a very short period. Hence, a punctual situation, by definition, has no internal structure (Comrie, 1976). A punctual situation is described in the sentence *John reached the summit of the mountain.* In this example, there is one moment when John had not yet reached the summit and another moment when he had, with no time intervening between the two. No matter how slowly one presented the film of John's exploits, the interval between these two moments would always be zero, and it would always be inappropriate to use imperfective forms such as *at this moment.* However, when we say *He was coughing,* the only possible interpretation of this sentence is that it is referring to a series of coughs. In this case, a series of coughs, even if there are only two, is a durative situation (Comrie, 1976).

Inevitably, lexical and grammatical aspect interact. Situation types differ in that some may be marked for progressive grammatical aspect while others do not allow progressive markers. First two categories, accomplishments (*draw a circle*) and activities (*run*), allow progressive aspect, whereas the next two categories, states (*know*) and achievements (*recognize*) do not (Dowty, 1979). Dowty (1979) pointed out that it is not true of all achievements that they fail to occur in the progressive. Examples such as *John is dying of cancer*, or *John is winning the marathon*, are perfectly acceptable in English, even though they contain verbs such as *win* and *die*, which are regarded as achievements (Hinrichs, 1985).

This section discussed lexical aspect in English. In the rest of the paper, we focus on grammatical aspect, as that is the category that we experimentally investigate.

1.3.2 Grammatical aspect

As previously discussed, grammatical aspect embodies different ways of viewing the internal temporal constituency of the situation. (Comrie, 1976) For that reason, grammatical aspect is also referred to as 'viewpoint aspect'. (Smith, 1997) This term corresponds to the Slavic word *vid* 'view' introduced into Slavic grammar in the early nineteenth century (in Brinton, 1988). Such terminology reflects the fact that viewpoint aspect conveys the speaker's view of the situation (Bardovi-Harlig & Comajoan-Colome, 2020).

> *Aspectual viewpoints function like the lens of a camera, making objects visible to the receiver. Situations are the objects on which viewpoint lenses are trained. And just as the camera lens is necessary to make the object available for a picture, so viewpoints are necessary to make visible the situation talked about in a sentence* (Smith, 1997).

More specifically, aspect signals how the action is laid out along the time axis – either stretched out or gathered up at a point (Riđanović, 2012). What this entails is that the choice of an aspectual opposition makes visible an unbounded, ongoing situation or a closed, bounded one. In the context of prototypical aspectual oppositions, imperfective aspect falls under the unbounded category, whereas perfective aspect falls under the bounded category (Maienborn et al., 2011). Similarly, Smith (1997) defines perfective viewpoint as presenting a situation 'as a whole' *(e.g., vidjeti 'to have seen')*, while 'imperfective viewpoints present part of a situation, with no information about its endpoints' (e.g., *viđati 'to be seeing'*).

This is a general characterization of the viewpoint distinction, which should be valid cross-linguistically. However, Slavic languages express the aspectual opposition between two verbal forms, perfective and imperfective, while English aspect is based on the difference between the perfect *(e.g., has/had run*) and the progressive *(e.g., was running)* (Comrie, 1976). To draw a cross-linguistic parallel, we first describe grammatical aspect in English and then contrast it with the aspectual system in BCS.

1.3.3 Grammatical aspect in English: The Perfect

The perfect aspect signals that the time of the event occurs before the reference time (Carnie, 2013). Consequently, the perfect aspect most often describes events or states taking place during a preceding period of time (Biber et al., 2002). According to Comrie (1976), there is a very frequent characterization of perfectivity in the sense that it indicates a completed action. He further suggests that the mere term 'completed' is problematic because there is an important semantic distinction between saying that the perfect represents a 'completed' action rather than a 'complete' action. He states that even though the perfect does denote a complete situation with a beginning, middle, and end, the use of 'completed' puts too much emphasis on the termination of the situation, while the mere perfect does not put more emphasis on the end than it does on the beginning and the middle. This entails that the perfect aspect conceptualizes all parts of the situation as a single whole.

The general formula for creating the perfect is to use the auxiliary *have* (present tense form *have/has* or past tense form *had*) and the *-ed* participle (Carnie, 2013). According to Carnie (2013), the participle is sometimes inaccurately called *the past participle*. He suggests that this term should be avoided simply because there is nothing particularly past about participles, as they are non-finite forms and can occur in verb phrases that refer to the present or future.

The perfect aspect is unique in that it expresses a relation between two time-points: the time of the state resulting from a prior situation and the time of that prior situation (Comrie, 1976). This relates to the fact that the perfect aspect can be combined with each of the tenses where the tense is indicated by the particular form of the verb *have* (Carnie, 259). When perfect aspect is combined with present tense, it typically refers to a situation set in some indefinite period that leads to the present. This situation can relate to a state of affairs that extends to the present *(e.g., I <u>have lived</u> here since last summer),* or it may be an event or set of events that is viewed as possibly recurring *(e.g., I <u>have phoned</u> him every day since he fell ill)* (Nelson & Greenbaum, 2013). On the other hand, when the perfect aspect is combined with past tense, a reference is made to a situation that happened earlier than another situation set in the past (*e.g., We <u>had heard</u> a lot about her before we ever met her)* (Nelson & Greenbaum, 2013). This entails that actions in the past are completed at or before a given time in the past, where the actual time is often specified (Biber et al., 2002).

Importantly, Slavists insist on the distinction between ‘the perfect’ and ‘the perfective’. The difference between the two could be understood from the fact that the term ‘perfective' contrasts with 'imperfective', and denotes a situation viewed in its entirety, without regard to internal stages of the situation, while the term 'perfect' refers to a past situation either to indicate its present relevance or anteriority when compared to another past situation. Another reason why Slavists insist on this distinction is that there exist languages such as Bulgarian and Old Church Slavonic where both of these oppositions are grammaticalized (Comrie, 1976).

1.3.4 Grammatical aspect in English: The Progressive

The progressive aspect indicates an event that is ongoing in relation to the reference time (Carnie, 2013). According to de Swart (2012), the progressive sentence requires part of the process to be realized in the actual world but leaves open the remaining part, including its culmination point, or situates this part of the process in some possible world with strict requirements on accessibility from the actual world. Simply speaking, whether combined with present or past tense, the progressive aspect describes an event or a state of affairs in progress or continuing, as (1) below shows (Biber et al., 2002).

(1) *I was sitting in my office smoking James’s cigarettes.*

As Comrie (1976) states, it is important to note that the term progressiveness is often confused with the term imperfectivity. In addition to duration, imperfectivity in Slavic languages also includes habituality. However, a situation can be viewed as habitual without being progressive. In this respect, progressiveness is similar to continuousness, which is definable as imperfectivity that is not occasioned by habituality. The progressive in English is not incompatible with habituality, though. Such habituality is conveyed by the progressive form and typically combined with a high-frequency adverbial to add the tone of disapproval and annoyance as in (2) (Quirk et al., 1973).

(2) *He's always writing with a special pen - just because he likes to be different.*

In English, the progressive aspect is always indicated by combining what is traditionally called the present participle form of the verb with the auxiliary *be*.

Present participles in English are always marked by an *-ing* suffix and are also referred to as *gerunds* or *gerund-participles* (Carnie, 2013; Huddleston & Pullum, 2002). According to Carnie (2013), the term *gerund* is not precise enough as it is typically used to describe nouns that are homophonous with present participles. However, he states that it is preferable to use the term 'gerund' than 'past/present participle' as participles are non-finite forms that do not express tense (present or past).

The progressive aspect can be combined with tense so that the tense marking is indicated on the auxiliary (Carnie, 2013). As *be* has little meaning other than that of duration or existence, and as the present participle also carries durative force, the most common aspectual meaning of the progressive is that of duration (Brinton, 1988). Although the *-ing* form is an essential ingredient of the English progressive, in non-finite constructions, the *-ing* form does not necessarily have the progressive meaning; in fact, in such constructions, it typically indicates only simultaneity (relative present time reference) with the situation of the main verb, e.g., *anyone knowing the whereabouts of John Smith is asked to communicate with his solicitor (i.e., anyone who knows, not *anyone who is knowing)* (Comrie, 1976).

Furthermore, it is often suggested that the progressive aspect is only compatible with dynamic situations (Biber et al., 2002). Similarly, according to Quirk et al. (1973), the progressive occurs only with dynamic verbs, or more accurately, with verbs in dynamic use *(e.g., chase, shop).* However, Biber et al. (2002) state that stative verbs also occur in the progressive form. Essentially, what is challenging to account for is the combination of the progressive grammatical aspect with the aktionsart of the verb (lexical aspect). Nevertheless, the combination of the progressive with stative verbs (typically an infelicitous combination) can result in a felicitous combination expressing the meaning of temporariness *(e.g., He is <u>just being</u> lazy)* (Brinton, 1988).

Biber et al. (2002) also argue that the progressive aspect is most common in conversation and fiction. In conversation, most progressive verb phrases are in the present tense, while past progressive verbs are preferred in fiction. There are two notable exceptions to this general trend: the past tense forms *was/were saying* and *was/were thinking* are more common in both registers.

Already at this point, we can observe that English progressive forms convey more than one aspectual meaning. The next section discusses whether this occurs in BCS as well.

1.4 Grammatical aspect in BCS

As a Slavic language, BCS grammaticalizes the aspectual opposition perfective - imperfective. In BCS the infinitival form of the verb is already inflected for aspect, and aspect is an indispensable verbal category marked on finite as well as non-finite verb forms, as in *bacati – baciti* 'to be throwing – to have thrown', *dolaziti – doći* 'to be coming – to have come'.

In BCS, a large number of imperfective verbs are root verbs, i.e., verbs without derivational affixes (Riđanović, 2012). The perfective form can be derived from the imperfective (perfectization), and vice versa (imperfectization) (Jahić et al., 2000). Nevertheless, most typically, verbs are inherently imperfective and derive their perfective counterparts by prefixation (n*apisati – pisati* 'to have written – to be writing'). Less frequently, the perfective aspectual partner is derived by suffixation (*dočekivati – dočekati* 'to be welcoming – to have welcomed'), vowel change (*bacati – baciti* 'to be throwing – to have thrown'), or stress change (*pogledati – pogledati* 'to have looked – to be looking'). Consequently, we can say that in BCS, most verbs act in an aspectual pair (perfective-imperfective) (Jahić et al., 2000).

However, some perfectivizing prefixes can add a new meaning to the verb, different from that of the imperfective variant. For example, the imperfective ići ('to be going') can derive perfectives *doći* ('to arrive), *ući* ('to come in'), *otići* ('to go away'), *preći* ('to cross'), *poći* ('to set out') (Riđanović, 2012). In the literature, these are referred to as lexical prefixes.

It is also important to mention that a few verbs can be used as both perfective and imperfective verbs – verbs of dual aspect (e.g., *sanjati*: 'to be dreaming' - 'to have dreamt') (Riđanović, 2012). Means of aspectual grammaticalization aside, aspectual partners express three meanings: punctual, durative and iterative (Riđanović, 2012).

When a verb describes only a point in time, such a meaning is understood as punctual (Riđanović, 2012). Perfective aspect is used to express punctual meaning - the action, state, or occurrence in its totality without a possibility of being divided, regardless of the tense feature on the verb.

This means that the tense feature of the verb marked for perfective aspect can be past as in (3), future as in (4), or present as in (5).

(3) *Sjeo sam na granu i pogledao…* 'I sat on a branch and looked at…'
(4) *Kuću ću sagraditi brzo, ali ostalo...* 'I will build the house fast, but the rest…'
(5) *On se izmakne i čeka...* 'He moves away and waits...'

In other words, perfective verbs in BCS report an action, state, or occurrence that is completely limited by time, which means that the action, state, or occurrence happened in an instant and is completely finished (e.g., *sjesti* 'to have sat down'), or partly limited by time, which means that the action, state, or occurrence show that the beginning is completed, that the ending was different (e.g., *pročitati* 'to have read'), or that the action, state, or occurrence lasted for a shorter or longer period (e.g. *posvirati* 'to have played') (Jahić et al., 2000).

Durative and habitual meanings are expressed by imperfective verb forms as (6) and (7) show. This entails that the difference between durative and iterative meaning is understood from the context (Jahić et al., 2000).

(6) Učenici sada pišu esej.
Students now write$_{IPFV}$ essay
'Students are now writing an essay.'
(7) Učenici često pišu eseje.
Students often write$_{IPFV}$ essays
'Students often write essays.'

On rare occasions, the imperfective verb only has iterative meaning. For example, the perfective and punctual verb *vidjeti* ('see') has only imperfective iterative meaning *viđati* ('to be seeing') (Riđanović, 2012).

Lastly, in Slavic aspectology, one often talks of the so-called 'general factual' or 'simple denotative' use of the imperfective aspect, where 'there is no specific reference to the completeness of the event' and 'the speaker is simply interested in expressing the bare fact that such and such an event did take place, without any further implications' (Comrie, 1976) (In Dahl, 1985).

(8) Jesi li čitao tu knjigu?
AUX$_{2SG.PRS}$ PRT read$_{PTCP.IPFV}$ that book?
'Have you read that book?'

In summary, the imperfective form seems to be underspecified in BCS, expressing more than one meaning; the intended meaning is disambiguated by the sentential context. The perfective form, on the other hand, is specific, conveying the meaning of punctuality, which logically entails that perfective aspect cannot be used in the present tense to refer to an ongoing action as such action cannot be punctual (Riđanović, 2012).

1.5 Grammatical aspect in English vs. grammatical aspect in BCS

English and BCS both express grammatical aspect, but they vary considerably regarding both the formal expression and the semantic features of aspectual subcategories. BCS grammaticalizes perfective and imperfective while English grammaticalizes perfect and progressive. While aspect in Slavic languages is generally more synthetic (stems or aspectual affixes carry the perfective or imperfective meaning), English aspect is expressed analytically (the combination of the auxiliary and inflection on the main verb). Unlike English, BCS employs an intricate system of morphology that can hardly be described as purely inflectional or purely derivational. In English, aspect is not obligatorily expressed on the verb. On the contrary, in BCS, the infinitival form of the verb is already inflected for aspect.

Imperfective form is underspecified in BCS, while perfective form is specific. In English, on the other hand, neither aspectual opposition shows one-to-one correspondence between the form and the function. Progressive forms, for example, do not exclusively express durative meaning (*He is always losing his keys* – progressive form, habitual meaning), nor is durative meaning solely expressed by progressive forms (*He waited for a long time in the rain* – grammatical aspect not expressed, durative meaning). What this means is that English shows considerable flexibility in its aspectual system – one aspectual form may express more than one meaning, and one and the same meaning may be expressed by different aspectual forms and even non-aspectually marked forms.

In BCS, the imperfective aspectual partner to a certain extent shows such flexibility, but the perfective aspect does not due to its straightforward distribution and one-to-one correspondence between the form and the function (Zeller & Clasmeier, 2020 for Russian; Čordalija et al., 2023 for BCS).

1.6 Psycholinguistic and neurolinguistic studies on aspect in L1 processing

Grammatical aspect has been studied experimentally to observe how it is processed in the human brain. Below, we present behavioral and neuroimaging studies on L1 processing that investigated how the choice of grammatical aspect models the situation being described. In studies that investigate English aspect, the simple past rather than perfect aspect is sometimes used to express completion. The simple past form is inflectionally unmarked aspect-wise. Therefore, in those studies, we focus on findings concerning the progressive aspect.

In several experiments, Madden and Zwaan (2003) investigated how sensitive readers are to the non-progressive/progressive distinction in English. They used a picture presentation method, which allowed them to focus on both ongoing and completed events. In one of the experiments, participants were asked if the sentences matched the previously shown picture. Participants responded faster to matching pictures (the progressive sentence was used to describe an ongoing event and the simple past sentence was used to describe a completed event) than to mismatching ones (the progressive sentence was used to describe a completed event).

Another experiment focused on determining whether the aspectual information in the picture of events could make it easier to understand the situation. They did so by switching the order, which means that the participants were first presented with a picture, and only then did they receive the associated sentence. Participants showed a faster reaction when sentences in the simple past were preceded by a completed event rather than an in-process event, but progressive sentences were responded to equally fast, no matter which picture preceded them.

A set of experiments was conducted by Carreiras, Carriedo, Alonso, and Fernandez (1997), where they focused on the role of tense and aspect in the mental construction of subjects' while reading. In their study, Carreiras et al. presented participants with paragraphs where they assigned current and past attributes to a main character.

Participants were asked to read and answer subsequent questions. They found that characters are more easily activated in memory when actions are presented in the past progressive rather than the past perfect. By doing so, they showed that aspectual dimension of a situation model is very important. The choice of the progressive allows access to the internal structure of the event and the details about the participants, for example, whereas the choice of the perfect aspect implies observing the situation from the outside with no access to the internal structure of the event.

A similar method was used in an experiment conducted by Anderson et al. (2013). In order to explore how grammatical information influences our understanding of events, they conducted a mouse-tracking experiment to track motor output (placing characters in the scene) when a variation within aspect happened. Anderson and colleagues showed that participants placed characters further from the final destination and closer to the location of the ongoing action when they were presented with descriptions of events in the past progressive. They, moreover, showed that sentences describing events in the simple past drew participants' attention to locations associated with completed events. This method has already been used by Anderson et al. (2008), who showed that mouse movements, that were relevant to events described in the past progressive, had a longer duration than those relevant to events reported by verbs in the simple past form.

In a self-paced reading study, Madden and Therriault (2009) presented participants with past perfect and progressive sentences where the target object (e.g., *an umbrella*) following the main verb (e.g., *had used/was using*) was presented as a picture of the object that was in use (e.g., *open umbrella*) or was not in use (e.g., *closed umbrella*). The results showed that after the verb, either in the past perfect or the past progressive, the picture of the object in use was more easily integrated into the structure than the picture of the object that was not in use (as shown by faster reaction times for pictures of the object in use – the button press). However, this effect of faster reaction times dissipated and was not significant for the next two words in sentences with past perfect verbs. On the contrary, in sentences with verbs in the past progressive, the facilitation in reading times also occurred for the two words following the verb.

Madden and Therriault explain that the initial simulation of objects in use (as evidenced by faster reaction times for pictures of objects in use than for objects not in use) is expected as it is not constrained by grammatical cues on the verb.

In other words, it is natural that participants construe images of objects in use after hearing the verb, regardless of grammatical information on the verb. However, grammatical cues significantly affect event representations in later segments of the sentence that were their regions of interest. They showed that when a participant hears a verb in the past perfect, they begin construing a simulation of a completed event that is not compatible with the picture of the object in use. Consequently, the simulation of the object in use is deactivated, and the effect of faster reaction times dissipates and is not significant in the next two words. The fact that in the progressive sentence, button press was faster on two words following the verb suggests that in the presence of progressive markers, participants simulate events in progress. More precisely, the picture of the object in use is compatible with the simulation of the event in progress, meaning that the initial effect of faster reading times for objects in use spills over onto the next two words in the sentence.

The studies that we discussed above show that the choice of aspect significantly influences how we cognitively model the situation, whether we construe it as a complete event with no access to its internal structure (English perfect aspect or non-aspectually marked forms to express perfective meaning) or an event in progress with multiple stages, and with access to these stages (English progressive aspect).

One of the first studies that dealt with brain processing of temporal aspect agreement was conducted by Flecken et al. (2015). The study focused on the comparison of aspect processing in terms of aspect agreement mismatch in (9), semantic processing in (10), and number agreement processing in terms of morphosyntactic violations in (11).

(9) *Right now, Sophie *swims in the pool.*

(10) *Right now, Sophie *is cooking in the pool.*

(11) *Right now, Sophie *are swimming in the pool.*

The experiment consisted of a sentence-reading task where participants were presented with questions followed by an answer (*e.g., What is Sophie doing in the pool right now? – Right now, Sophie is swimming in the pool*.). The answer was formulated in such a way that the sentence was introduced by the adverb phrase *right now* followed by a verb that was manipulated in order to fill one of the four conditions: correct form-aspect match (*is swimming*), aspect violation (*swims*), semantic violation (i*s cooking in the pool*), or morphosyntactic violation (*are swimming*).

Sentences were followed by a grammaticality judgment question to assess how participants judge match and mismatch sentences when their attention is drawn to the topic of (un)grammaticality.

The results showed, as expected, morphosyntactic violations triggered a P600 modulation and that semantic violations elicited an N400 effect.[3] Aspectual violations, however, were not followed by either a N400 or a P600 but instead showed a short early negativity (250-350 ms) that cannot be clearly attributed to time reference processing. In other words, English native speakers did not process aspectual violations at the point where they were integrated in the sentence, as there was no clear effect of the violation that would be reflected in an ERP component. Flecken et al., however, report that in the grammaticality judgment task that was performed after the sentence had been processed, English native speakers detected aspectual violations and rated them as significantly less acceptable than grammatical sentences.

Čordalija, Bastiaanse, and Popov (2023) performed an ERP study on aspectual violations in BCS. In this study, an incompatible perfective verb form was introduced into the real-present time frame in ungrammatical sentences, as in (12).

(12)	Asistenti	*trenutno pročitaju	članak	o	umjetnoj	inteligenciji.
	Assistants	currently read$_{PRS.PFV}$	article	about	artificial	intelligence

'Assistants currently read an article about artificial intelligence.'

Čordalija et al. (2023) found that aspectual violations in BCS triggered an immediate and robust P600 effect normally associated with (morpho)syntactic processing. In another study that used the self-paced reading method, Čordalija (2021) showed that aspectual violations in BCS trigger longer reading times already at the verb compared to grammatical sentences. Subsequent grammaticality judgment questions also showed that aspectual violations are clearly marked as ungrammatical in BCS. Similarly, Zeller and Clasmeier (2020) showed that aspectual violations in Russian trigger an immediate effect – a P600 component in their ERP study.

Čordalija et al. (2023) compare L1 processing in BCS and English. Aspectual violations in BCS triggered an immediate effect in the form of the P600 in Čordalija et al. (2023) and prolonged reading times in Čordalija (2021). English aspectual violations were only detected at the end of the sentence and not online, during sentence comprehension, in Flecken et al. (2015).

Čordalija et al. (2023) explain that in BCS, the distribution of aspectual oppositions is simple and clear. Perfective and imperfective verb forms cannot be used in the same context. Next to this, perfective forms cannot be used in present time at all. Consequently, BCS aspectual violations are detected as soon as the violation becomes clear. On the contrary, English has a flexible aspectual system where different verb forms can express similar aspectual meanings and one aspectual form can express primary and secondary meaning (e.g., *They were dancing* – progressive aspect, durative meaning; *They are always losing their keys* – progressive aspect, habitual meaning). Čordalija et al. (2023) propose that in the case of English, instead of processing aspectual violations at the verb, the parser may activate the less frequent but still plausible secondary aspectual meaning of the verb that is initially compatible with the time frame of the sentence. By the end of the sentence, the contextually inappropriate secondary meaning is discarded, and the violation becomes clear, which is why aspectual violations were labeled as ungrammatical after the sentence has been processed in a grammaticality judgment task, but not before. In other words, English aspectual violations are not detected online, at the spot, during automatic sentence processing, but only when the intended meaning becomes clear, after the sentence, in a subsequent grammaticality judgment task when they are asked to make a conscious and controlled decision about the grammaticality of the sentence. By contrast, BCS aspectual violations are processed at the verb during sentence comprehension, and they are detected again as ungrammatical in a grammaticality judgment task after the sentence has been processed.

1.7 L2 processing in general

There have been several decades of psycholinguistic research that has deepened our understanding of how both children and adults process and understand native languages. Experimental studies on L2 processing have started to emerge, but the topic of second language processing has been addressed by many linguists in non-experimental ways too. This critical period hypothesis, for example, was set by Lenneberg (1976) and argued that there is a critical period for language acquisition, from early infancy to puberty. He stated that language acquisition must occur before puberty in order for language to fully develop. Similarly, Johnson and Newport (1989) conducted a study in order to look into critical period effects in second language acquisition.

The findings have shown that there is a linear decline in performance throughout puberty, a lack of linearity, and some variability after puberty. This would mean that there is a gradual decline in language learning skills over the ongoing period of maturational growth. Next to this, this study suggests that there are cognitive changes with maturation. What this means is that an increase in cognitive abilities may make language learning more difficult.

The difference between L1 and L2 language processing was also investigated by Ahn (2021). Ahn (2021) argues that existing studies on L2 processing show a limitation in that they do not question what motivates L2 speakers to prioritize one piece of information over another. Real-world knowledge is an important factor in language processing since it allows speakers to predict upcoming linguistic material even before the phrase or sentence is finished. Naturally, L1 speakers are much more prone to make predictions, and it is much easier for them to do so than L2 speakers.

Discrepancies here may arise because the cognitive development of adult L2 learners has progressed to a certain degree, and their understanding of the world is in place when they acquire a new set of rules in L2. With this in mind, Ahn (2021) conducted a study where she proposed three research questions: whether L2 speakers have knowledge of definiteness comparable to that of L1 speaker (RQ1), whether both L1 and L2 speaker have the same real-world knowledge (RQ2), and only if both conditions, RQ1 and RQ2, are met, she proposed the third question on how linguistic and nonlinguistic knowledge interact in L1 and L2 sentence processing (RQ3). Regarding the first question, she tested whether the linguistic cues of definite and indefinite articles could lead to the prediction of linguistic material. The experiment showed that both L1 and advanced L2 participants could use definiteness to predict upcoming material. The second question showed that L1 and advanced L2 speaker share the same real-world knowledge by conducting an experiment where participants were asked to make associations between objects and people of certain occupations, gender, age, etc. However, despite them sharing real-world knowledge and knowledge of definiteness, the study has shown that L1 and advanced L2 speaker behave differently when they are presented with these two types of information simultaneously. L1 speakers showed a faster reaction to grammatical sentences, while advanced L2 speakers showed a faster reaction to ungrammatical sentences or no difference in reaction between grammatical and ungrammatical sentences.

Similarly, Kaan (2014) performed a study on predictive sentence processing in L2 and L1 and the differences between the two. He states that most native speakers appear to use information rapidly to anticipate upcoming information, while L2 speakers do not anticipate to the same extent, even though they know the specific rules and words used. For example, Spanish non-native speakers lagged behind in the use of gender information to predict the upcoming noun compared to native speakers.

Lew-Williams and Fernald (2010) also concluded that non-native Spanish speakers were not successful in using prenominal gender marking to predict upcoming sentence material. According to Lew-Williams and Fernald (2010), the reason behind this is the fact that native speakers are exposed to article-noun sentences through their first years of life onwards. In contrast, L2 speakers learn about gender agreement only when a teacher/instructor gives them a lecture on it, talking about rules of the grammar, creating an approach to language that is much less efficient than acquiring it over the years. What these studies show is that L1 and L2 speakers employ different strategies in sentence processing.

Juffs (1998) found that L2 learners of English from various language backgrounds processed main verb/reduced relative clause ambiguities as in The bad boys criticized almost every day were playing in the park in a similar way as native speakers. The learners showed evidence of being "garden-pathed" only if the initial participle looked like a transitive main verb. This suggested that the learners were sensitive to verb argument structure information. Learners from typologically different language backgrounds like Chinese, Japanese, or Korean speakers had more difficulty processing ambiguous sentences of this kind than did learners whose L1 was typologically similar to English, i.e., Romance speakers (in Clahsen & Felser, 2006). This showed that the typological distance between L1 and L2 plays a role in language acquisition.

Slabakova (1999) conducted a study on how Bulgarian learners of English process aspectual information. More specifically, she focused on telic and atelic sentences with three groups of participants in regard to their proficiency in English: low intermediate, high intermediate, and advanced. In an aspectual interpretation task, which was based on the combination of two clauses, where one established the context and the other contained telic or atelic prpredicate,s in (13) and (14), participants were asked to judge how naturally the two clauses combine together.

(13) *Mike drew a circle on a piece of paper but the circle is only half-finished.*
(telic + unfinished, ungrammatical)

(14) *Mr Smith sold cars and now he sells motorcycles.*
(atelic + habitual, good match)

The results showed that participants have acquired the telic-atelic distinction. The only difference was that low-intermediate groups performed significantly worse than high-intermediate and advanced participants regarding telic sentences, but when it comes to atelic, they performed the same as high-intermediate and advanced groups.

In yet another test, participants were asked to translate the verbal form of the test clause into their native language, Bulgarian. For example, in a sentence, *Sharon worked in a bakery and made a cake,* the participants were asked to choose between telic and atelic form of *make* in Bulgarian: *praveše* (atelic) and *na-pravi* (telic). The results show that the low-intermediate group was as accurate on atelic verbs as the high-intermediate and advanced groups but less accurate on telic verbs. The results from this test complement and support the results from aspectual interpretation task. A general conclusion is that L1 transfer is more evident in telic than in atelic sentences. According to Slabakova (1999), this is due to the fact that in Bulgarian and in Slavic languages in general, telicity markers are overt and typically realized as prefixes, while in English, telicity is encoded by the object (Telic: *Peter ate a pear*; Atelic: *Peter ate pears*). A verbal form without a proverb would signal atelicity for a speaker of a Slavic language, resulting in lower accuracy in tasks involving telic sentences in English.

Slabakova (2008) formulated the Bottleneck Hypothesis, which identifies parts of grammar that are easier or more difficult to acquire in a second language. This hypothesis argues that morphology is the bottleneck in L2 acquisition because it combines a variety of semantic, syntactic, and phonological features that affect the meaning of the whole sentence. She claims that learning L2 syntax or semantics, for example, is not an acquisitional challenge. To support this claim, she gives evidence by referring to previous studies. Slabakova et al. (2012) tested if adult learners of Spanish recognized the meaning and context of Clitic Left Dislocation (CLLD) and Focus Fronting (FF). The results showed that the learners were no different from monolingual native speakers in their comprehension of these constructions. Another study conducted in order to support the mentioned claim was conducted by Montrul & Slabakova (2003).

Here they looked at two similar types of sentences with impersonal subjects, where the only difference was the use of preterit or imperfect. The advanced learners were over 85% accurate in judging interpretations, and the correct knowledge emerged even with intermediate learners. These studies show that regular syntactic and semantic operations do not constitute a challenge for learners. Slabakova concludes that functional morphology is responsible for most of the acquisition challenges.

Tsimpli and Sorace (2006) aimed to distinguish between syntax-semantics and syntax-discourse interfaces in advanced Russian learners of Greek who did not speak Greek before their arrival in the country. They formulate the Interface Hypothesis, which states that all phenomena that are processed in internal components of grammar (e.g., phonology, syntax, semantics) or at the interface between internal components (e.g., syntax-semantics) can be fully acquired in L2 acquisition. They predict more troublesome and incomplete acquisition of properties that are processed at the syntax-discourse level, which includes an external component of language (e.g., pragmatics, discourse), even among advanced speakers.

Clahsen and Felser (2006) conducted a study investigating the domains of morphology and syntax where they compared different populations (mature native speakers, children L1 learners, and adult L2 learners). They found that children who are L1 learners do not differ from adult native speakers in processing morphological information. This means that two mechanisms that are usually used by mature speakers during morphological processing, lexical storage and morphological decomposition, were also used by children. They, however, found important differences between adult L1 and L2 processing. They showed adult L2 learners rely on lexical and semantic information during sentence processing more than native speakers do, and unlike native speakers, L2 speakers show reduced reliance on syntactic information during sentence processing. Consequently, they formulated the Shallow Structure Hypothesis, which argues that the syntactic representations of L2 speakers during sentence processing are less detailed and more shallow than those of L1 speakers.

Native speakers of a language have developed an archive of frequent words, word categories, syntactic frames, and rules based on a lifetime of exposure to their native language. These frequencies change over time when interacting with other users of the language. It should come as no surprise that non-native speakers differ from native speakers in the nature of the language they are exposed to and the amount of exposure they receive. Additionally, non-immersed L2 speakers frequently only hear the language as it is spoken by other L2 speakers. To summarize, the studies presented above show significant differences between L1 and L2 processing. L2 linguistic performance seems to be dependent on multiple factors: proficiency, exposure to L2, typological distance between L1 and L2, and the components of grammar that are activated during processing. The question that emerges at this point is *What happens in L2 processing of aspect?*

1.8 Psycholinguistic and neurolinguistic studies on aspect in L2 processing

When talking about aspect in L2 processing, it is important to mention the Aspect Hypothesis. According to Andersen & Shirai (1994), the central claim of the Aspect Hypothesis is the following: *first and second language learners will initially be influenced by the inherent semantic aspect of verbs or predicates in the acquisition of tense and aspect markers associated with or affixed to these verbs* (in Huang, 2008).

Bardovi-Harlig & Comajoan-Colome (2020) gave an overview of the Aspect Hypothesis studies that tackled aspect in L2 processing. They state that the Aspect Hypothesis builds on three main constructs: tense, grammatical aspect, and lexical aspect. They suggest that in the context of second language acquisition, the Aspect Hypothesis predicts that in the initial stages of adult acquisition of tense-aspect morphology, the acquisition of past morphology will be influenced by lexical aspectual categories. This means that verbal morphology will act with predicates with similar semantics; perfective past will occur with telic predicates, imperfective past will occur with unbounded predicates, and progressive will occur with ongoing activities.

Huang (2008) conducted three studies to test the Aspect Hypothesis. The first study focused on tense-aspect markers in the English language, and it showed that there was a strong correlation between lexical aspect and L2 learners' use of tense and grammatical aspect.

More precisely, telic verbs (accomplishments and achievements) were predominately inflicted for past tense, unlike states and activities, which received a smaller percentage of past markers. In addition, activity verbs were more likely to occur in the progressive aspect. The second study focused on the L2 learners' awareness of lexical aspect. The purpose of this study was to test whether L2 learners are sensitive to lexical markers in their target language or not. He conducted this research using two types of elicitation tests: a multiple-choice test, examining learners' awareness of stativity and punctuality, and a true/false test, examining telicity in certain English verbs and predicates. An example of a question used in the study to test the interpretations of verbal punctuality, stativity, and telicity is given below.

(15) *I guess he died* _____ *(a) for one week (b) one week ago*

The study showed that L2 learners are often unaware of the lexical aspect in their second language. Around half of the participants in the study were not sensitive to lexical aspect of the predicate. This shows that L2 learners were not consistently sensitive to the L2 lexical aspect. These studies showed a paradox in the Aspect Hypothesis. Even though the hypothesis predicts that both L1 and L2 learners are affected by lexical aspect when they use temporal markings with verbs, L2 learners might not always be attentive to the semantic properties of L2 verbs.

Due to the scarcity of experimental studies on L2 aspect processing, we set out to explore how advanced BCS learners of English process violations of a habitual time frame by a progressive verb form in English. The next section describes the methods used to design the experimental study.

1.9 Self-paced reading (SPR) and grammaticality judgment tasks

Developments in the methods for psycholinguistic research arose out of the desire to measure language comprehension processed in real time using tasks as similar to normal reading as possible. Self-paced reading (SPR) is a fundamental measure for linguistic processing at or above the level of the sentence even today. Self-paced reading was the first real-time method to be used in non-native sentence processing research (Jegerski, 2014; Marinis, 2010).

SPR is a computerized method of recording the reading time of a certain segment of a sentence that is presented as an experimental stimulus. In such tasks, participants are asked to read sentences in word-by-word/phrase-by-phrase fashion by pressing a button. Consequently, participants have control over the rate of presentation of each segment of the sentence, which means that the task is self-paced (Marinis, 2010). It is also called subject-paced since the research participants determine how long they will spend reading each segment (Jegerski, 2014). By pressing a button, the first segment of a sentence appears together with a series of dashes that mask the remainder of the stimulus. Only when a participant is ready to continue, a second button press reveals the next part, then the next, and so on until the entire sentence has been revealed (Jegerski, 2014).

There are two presentation modes: a cumulative one that entails that a segment is revealed and remains visible to the participant as the next segment is revealed, and a non-cumulative presentation mode, which means that only one segment is visible at a time, and with every new segment revealed, the previous is re-masked. The cumulative display could present a potential confounding variable since most participants develop a reading strategy where they reveal all segments at a time before reading them all at once (Jegerski, 2014). The non-cumulative approach gives a more accurate picture of how participants process sentence online since they cannot go back and read parts of the sentence again (Marinis, 2010).

In a self-paced reading task, each button press is recorded and provides an insight into how fast participants process each word or phrase. A longer reaction time at a particular position in a sentence is thought to reflect processing difficulties, which could relate to the ungrammaticality of the sentence or a violation of an expectation (Marinis, 2010).

Just & Carpenter (1980) proposed that since the amount of time it takes a person to read a word is the same amount of time it takes a person to process the same word, the basic premise behind self-paced reading is that the eyes can be a window on cognition (Jegerski, 2014).

In summary, a self-paced reading task is an online task as it investigates language processing while unfolding it word by word, phrase by phrase. The reading time for each word or phrase thus reflects automatic and subconscious processes that take place during sentence comprehension.

By contrast, a grammaticality judgment task is an offline task where participants are asked to reflect on the grammaticality of the sentence after it has been processed and to rate the sentence either as grammatical or ungrammatical or to rate it on a scale of grammaticality. Such tasks may impose a burden on the working memory as participants are asked to keep the sentence in the working memory before they get the chance to rate it. Moreover, as participants are explicitly made aware that the grammaticality of the sentence is being investigated, their previous linguistic knowledge is activated. Consequently, linguistic performance in offline tasks does not necessarily reflect automatic and subconscious processes that underlie language processing but a conscious and controlled decision about the grammatical status of a linguistic stimulus.

1.10 The present study

We performed a self-paced reading experiment to investigate aspect processing in L2 speakers. We formulated the following research question: **Do advanced BCS learners of English process aspectual violations in English?**

Violations were created by introducing a progressive verb form into a habitual temporal frame. The temporal frame was set by a topicalized time adverbial (e.g., *every day*). The context implying a habitual situation is incongruous with the semantics of the progressive verb, signaling a non-habitual event unfolding at the moment of speaking. The regions of interest were the position of the auxiliary and the main verb in the progressive construction, as well as the following two words. The violation was disambiguated on the main verb. However, we observed the immediately preceding position, as it represents the first part of the progressive construction announcing the progressive verb. We also observed positions following the main verb in the case of a spill-over effect – the effect of ungrammaticality affecting the processing of surrounding words.

BCS speakers process aspectual violations in their L1 as soon as the violation is introduced - on the verb (Čordalija, 2021; Čordalija et al., 2023). As shown by Flecken and colleagues (2015) in an ERP study, English native speakers did not show a clear effect of aspectual violations in English during real-time sentence processing. However, offline grammaticality questions showed that English native speakers rejected sentences with aspectual violations.

Studies on L2 processing suggest that even advanced L2 learners' linguistic performance is not completely parallel to that of L1 speakers (e.g., Ahn, 2021; Clahsen & Felser, 2006; Kaan, 2014; Lew-Williams & Fernald, 2010). In the context of our study, several factors must be considered.

The present study comprised aspectual violations that were essentially violations of semantics. Morphologically, the progressive verb was well-formed. It is its progressive semantics that was not compatible with the habitual semantics of the sentence. Semantic information is claimed to be acquired and processed with relative ease. Nevertheless, studies have shown that grammatical aspect violations are processed as (morpho)syntactic and not as semantic violations (Čordalija et al., 2023; Zeller & Clameier, 2020; Zhang and Zhang, 2008). As aspect is processed by the syntactic component of grammar, in line with the Interface Hypothesis (Tsimpli & Sorace, 2006) and the Bottleneck Hypothesis (Slabakova, 2008), we expect similar linguistic performance by advanced BCS L2 speakers of English and L1 speakers of English. We, hence, formulate the following hypothesis: ***Advanced BCS learners of English will not detect aspectual violations online during sentence comprehension in the self-paced reading task, but only after the sentence has been processed in the grammaticality judgment task***.

2 Methods

2.1 Participants

Participants in our study were 17 undergraduate students at the Department of English language and literature, University of Sarajevo. Participants were L1 speakers of Bosnian/Croatian/Serbian with English as their L2. The exclusion criteria entailed that participants must be matched on previous knowledge of English. We achieved this by testing a group that was exposed to the same courses in English linguistics from the beginning of their studies - second-year students. Furthermore, to eliminate the threat of potential confounding variables even within such a homogenous group, we administered a test on previous knowledge of English grammar. Only participants with an accuracy of 80% and above were included in the study. Four participants were excluded based on this criterion. Participation in the study was on a voluntary basis. In the beginning of the experiment, participants were informed of the duration of the experiment and the procedure. They were told that they could withdraw from the experiment at any time. All the data obtained from participants were anonymized by being assigned a code.

2.2 Materials and design

Experimental sentences were designed as a violation paradigm. Grammatical and ungrammatical sentences formed minimal pairs in the regions of interest: the auxiliary, the main verb, and the prepositional phrase functioning as a place adverbial. Twelve intransitive predicates were used to create two different sentences, yielding a set of 24 different sentences that each occurred with and without an aspectual violation. Consider the predicate *eat in the restaurant* in the following sentences:

(16) **Every day/right now, lawyers are eating in the restaurant while reading about a new case.*

(17) *At the moment/*every week, doctors are eating in the restaurant after a night shift.*

Predicates (the verb + adverbial) were taken from the study by Flecken et al. (2015). All predicates were atelic, as the Aspect Hypothesis predicts that the progressive aspect is more compatible with ongoing atelic situations. All the predicates were also atelic in BCS, our participants' L1, as Slabakova (1999) showed that telicity in L1 may affect aspect processing in L2.

Frequencies for verbs were taken from the British National Corpus, and all verbs had a frequency less than two standard deviations from the mean. Prepositions and the NP complements in adverbial PPs were also matched on frequency, so that prepositions and nouns with a frequency of two standard deviations above or below the mean were discarded and replaced.

This required that two nouns from the study by Flecken et al. be replaced. Sentences have the following structure: topicalized time adverbial + subject noun (occupation noun in plural) + auxiliary be + main verb + adverbial 1 + adverbial 2.

(18) *Right now/*every week, lifeguards are swimming in the pool*
[TOPICALIZED ADVERBIAL] [SUBJECT] [BE] [VERB] [ADVERBIAL 1]
to stay in shape.
[ADVERBIAL 2]

The verb was always kept constant. The ungrammaticality was introduced/eliminated by manipulating the adverbial. In grammatical sentences, adverbials *right now* and *at the moment* were used as they are congruent with the progressive aspect. In ungrammatical sentences, we used *every day* and *every week* because they are incongruent with the progressive aspect. The first postverbal adverbial was also kept constant in sentences that use the same verb. We observed reading times on the auxiliary, on the main verb and on the adverbial to check for a delayed effect of ungrammaticality. Therefore, it was important to keep the first adverbial constant too. The second adverbial was introduced so to postpone the end of the sentence and possible wrap-up effects affecting reading times on the first adverbial.

Experimental sentences comprised 24 items in a violation paradigm. To avoid priming effects resulting from one and the same participant being exposed to both the grammatical and ungrammatical forms of a sentence, experimental sentences were distributed across two presentation lists by using Latin Square design. We also created 48 fillers that were added to each list. Fillers involved violations of tense and person/number concord. Tense violations were also designed as a violation paradigm, as the following examples show.

(19) *Last week/*tomorrow pilots waited at the desk since all rooms were booked when they arrived.*

(20)**Next week/yesterday reporters waited at the desk only to be taken to the conference room a few minutes later.*

Sentences with tense violations had a very similar structure to experimental sentences. The time adverbial was topicalized and followed by the subject noun (occupation noun in plural). The verb was always inflected for the simple past tense.

Two adverbials followed the verb as in the experimental sentences. The ungrammaticality was introduced/eliminated by manipulating the adverbial. In grammatical sentences, adverbials *yesterday* and *last week* were used as they are congruent with the simple past tense. In ungrammatical sentences, we used *tomorrow* and *next week* as they are incongruent with past time reference of the verb. The verb and the first postverbal adverbial were kept constant to create sentences similar to experimental ones that would serve as distractors.

The other set of filler sentences involved violations of the person-number agreement. These sentences were introduced to alter the sentence structure, thereby preventing the participants from developing expectations that all sentences have a fixed structure: adverbial, subject, verb, adverbial 1, and adverbial 2, which was the structure of experimental sentences and type I filler sentences. Type II filler sentences started with a proper name as the subject of the sentence, the grammatical or ungrammatical form of the verb, object, and adverbial or two adverbials in the case of intransitive verbs.

(21)**Benjamin look a lot like his mother.*

(22)*Paul cuts old branches once a month.*

The test on pre-knowledge of English comprised multiple choice tasks, fill-in tasks, and grammaticality judgment tasks concerning verbal categories (tense, aspect, mood, voice, and finiteness), the difference between stative and dynamic verbs, and subject-verb agreement. The test included 85 sentences.

2.3 Procedure

The experiment consisted of one experimental session and was performed online via Pen Controller for Internet Based Experiments (PC Ibex; Zehr & Schwarz, 2018) on participants' laptops or computers in their own setting. The experiment started with the consent form, instructions, and five practice examples. Experimental sentences and fillers were segmented into words and shown in a linear, non-cumulative presentation. A series of dashes was first presented on the screen, corresponding to individual words in the sentence that the participant revealed by pressing the space button on the keyboard. In each trial, the sentence was followed by a grammaticality question. Experimental sentences and fillers were pseudo-randomized so that experimental sentences never immediately followed one another. Reading times for each word were automatically recorded and stored on the PC Ibex platform.

2.4 Data analysis

To analyze whether aspect violations are processed at the verb or in adjacent positions, participants' reading times in the regions of interest were used as a dependent variable. More specifically, we compared reading times in the regions of interest in grammatical and ungrammatical sentences.

Regions of interest were the following: the auxiliary of the progressive construction, the main verb of the progressive construction, the preposition of the adverbial PP, the article of the NP complement in the adverbial PP, and the noun complement of the adverbial PP. The critical region was the position of the main verb of the progressive construction, as that is the position where the violation becomes clear. However, we also observed the preceding position, as it is also part of the progressive construction, and the three following positions to check for a delayed effect of ungrammaticality. For the offline grammaticality judgment task at the end of the sentence, the accuracy rate was calculated as the percentage of correct responses. For statistical analysis, we used R (R Core Team, 2021) and the lme4 package (Bates et al., 2015) to perform a linear mixed effects analysis of the relationship between grammaticality and participants' reading times in the regions of interest. The sole fixed effect was grammaticality, that is, the presence or absence of the aspectual violation. Random effects were intercepts for subjects and items. *P*-values were obtained by likelihood ratio tests of the full model with the fixed effect against the reduced model without the fixed effect in question.

3 Results

We present the results of the online self-paced reading task first and then the results of the offline grammaticality judgment task.

3.1 Online data

The output of the linear mixed effects model for aspectual violations in the regions of interest is given in Table 1.

Table 1

Relationship between the fixed effect and reading time in ms at the position of the auxiliary, the main verb, the preposition, the article, and the noun.

Fixed effect	**Sentence position**				
	auxiliary	**main verb**	**preposition**	**article**	**noun**
Intercept (no violation)	473	541.8	426.7	390.8	437.8
Violation	-9.2	-52.8	+20.09	+25.9	-8.6

The linear mixed effects analysis of the reading times revealed that the presence of the aspectual violation in experimental sentences was not a significant factor in sentence processing, and it did not affect reading times in any of the regions of interest in comparison with grammatical experimental sentences without aspectual violations (p=0.7; p=0.2; p=0.35; p=0.4; p=0.79).

3.2 Offline data

The accuracy analysis of grammaticality judgments that were part of the SPR experiment showed the following results. In the violation paradigm, grammatical sentences were judged correctly in 99% of trials whereas ungrammatical sentences were judged correctly in 20% of trials. The offline results are summarized in Table 2. Such results imply that, at the end of the sentence, aspectual violations were largely judged incorrectly as being grammatical.

Table 2

The accuracy rate in the grammaticality judgment task

Grammaticality	**Accuracy [%]**
	Aspect
Grammatical sentences	99
Ungrammatical sentences	20

4 Discussion

This experimental study investigated L2 processing of grammatical aspect. Our research question concerned whether advanced BCS learners process aspectual violations in English. The self-paced reading data show that this is not the case, neither at the main verb, where the violation becomes clear, nor in other positions of interest that we checked for early or late effects of ungrammaticality (the position of the auxiliary verb, preposition, article, and noun). In other words, during sentence processing, there is no difference in L2 linguistic performance between sentences with aspectual violations and sentences without aspectual violations in English. BCS speakers do, however, detect aspectual violations in their L1 immediately at the point of the violation (Čordalija, 2021; Čordalija et al., 2023). Nevertheless, these results are in line with the study conducted by Flecken et al. (2015), which reports no effect of English aspect violations in L1 processing. Initially, this confirms our prediction that L1 and L2 processing of grammatical aspect are comparable as aspect is processed by the internal syntactic component of grammar.

However, the grammaticality judgment data shows that grammatical sentences without aspectual violations were evaluated as correct in 99% of the cases, whereas ungrammatical sentences with aspectual violations were recognized and evaluated as incorrect in only 22% of cases. This suggests the high tolerance of advanced BCS learners of English for ungrammatical sentences such as *Every day, students are dancing in the club to unwind after exhausting lectures*. At this point, L1 and L2 processing of aspect prove to take different paths.

L1 speakers of English rejected ungrammatical aspectual sentences, whereas advanced BCS learners of English predominantly rated them as acceptable. This disproves the hypothesis that advanced BCS learners of English will not process aspectual violations online during sentence comprehension but that they will detect aspectual violations after the sentence has been processed. In our study, advanced BCS learners of English did not detect aspectual violations in either the self-paced reading task or the grammaticality judgment task. To speculate why that is the case, we must address the L1 processing of English aspect again.

Čordalija et al. (2023) argued that BCS aspectual violations are detected immediately due to a clear form-function correspondence in BCS aspectual system and no overlap in aspectual forms and meanings that they express. On the contrary, in English aspectual system, one aspectual meaning can be conveyed by different forms, and one form can convey different aspectual meanings. For example, the punctual meaning can be conveyed by the present perfect, past perfect, or simple past form. Similarly, the habitual meaning is normally conveyed by simple forms, but sometimes progressive forms can be used in habitual contexts too (e.g*., He is always bringing his brother*). Flecken et al. (2015) and Čordalija et al. (2023) suggest that in L1 processing of English aspectual violations, participants did not detect aspectual violations during sentence processing due to the fact that the forms used to create violations have a secondary aspectual meaning that is compatible with the time frame of the sentence. Instead, the parser activated this secondary habitual meaning of the progressive as well as the primary one and deactivated the habitual interpretation at some point before the end of the sentence as it was not contextually appropriate. Consequently, in the subsequent grammaticality judgment task, the primary meaning of the duration of the progressive form was not compatible with the habitual time frame, which is why L1 speakers rated sentences with aspectual violations as ungrammatical.

Our study showed that L2 processing of aspect does not involve the same mechanisms as L1 processing. Even though it is tempting to claim that BCS L2 speakers activated the primary and secondary meanings of the progressive as L1 speakers, there is no evidence that the secondary, contextually inappropriate meaning is ever discarded, as reading times on words following the incongruous aspectual form are not significantly longer than in grammatical sentences. Furthermore, in the grammaticality judgment question, participants did not reject sentences with aspectual violations as ungrammatical but predominantly accepted them as grammatical.

Such a processing pattern is strikingly different from L1 processing and does not provide evidence for predictions of the Interface Hypothesis (Tsimpli & Sorace, 2006) and the Bottleneck Hypothesis (Slabakova, 2008). Although aspect is processed by the syntactic component of grammar and should be fully acquired and parallel to L1 processing, we showed that L2 processing of grammatical aspect is qualitatively different from L1 processing.

On the other hand, the Shallow Structure Hypothesis by Clahsen and Felser (2006) argues that L2 learners generally do not build deep syntactic representations of sentences with structural details as native speakers do. We may claim then that it is because it is processed by the syntactic component of grammar that L2 processing of English aspect is not comparable to L1 processing, as syntactic representations of L2 are shallow and do not contain fine structural details.

Moreover, Juffs (1998) and Slabakova (1999) claim that the L1-L2 typological distance also plays a significant role in L2 acquisition. English and BCS have different aspectual systems, as described above. For example, L1 speakers of BCS create an expectation of a perfective prefix in sentences with punctual meaning. In our study, we created violations by a progressive verb form, which corresponds to the BCS imperfective verb form that, unlike a perfective partner, does not carry a prefix. Hence, no expectation of a prefix as in L1 was created that would affect L2 processing. Nevertheless, the habitual time frame is perfectly compatible with an imperfective verb form in BCS. If the imperfective verb form is treated as parallel to the English progressive verb form (which is not compatible with the habitual time frame), L1 transfer might have been a significant factor in L2 processing. Lastly, our study is in line with studies on other topics in L2 processing that showed that different processing patterns are at the core of L1 and L2 processing (e.g., Ahn, 2021; Kaan, 2014; Lew-Williams & Fernald, 2010).

5 Summary

This thesis is organized as follows. In the Introduction we provided a detailed description of verbal categories that refer to time: tense and aspect (lexical and grammatical). We discussed the aspectual systems of both English and BCS, asserting that the aspectual systems of these two languages differ significantly due to the fact that unlike English aspect, BCS aspect is straightforward and clear, and any violation of aspect is immediately understood as ungrammatical. We outlined several studies on L1 processing of aspect that corroborate the previous observation on the difference between English and BCS aspect – English aspectual violations are not detected until after the end of the sentence. More broadly, we discussed how the choice of aspect influences our mental image of a situation. We also addressed findings and theories about L2 processing. We showed that some studies predict the same mechanisms behind L1 and L2 processing, at least with regard to certain linguistic properties (e.g., Tsimpli & Sorace, 2006; Slabakova, 2008), while some studies predict rather different patterns in L1 and L2 processing (Clahsen & Felser, 2006). Lastly, we formulated our research question and the hypothesis that advanced BCS learners of English would process English aspectual violations as native speakers do – only after the entire sentence has been processed.

Section Methods provides a detailed description of the linguistic stimuli and fillers that we used, the participants that we tested, and the procedure behind the self-paced reading task. Section Results gives an output of the linear mixed effects analysis of reading times in the regions of interest in grammatical and ungrammatical sentences in our study. The results of the grammaticality judgment task are also expressed as a percentage of correct answers.

In Discussion we state the findings of our study in the context of existing research and theories on aspect and L2 processing. We argue that because aspect violations are processed as violations of syntax and not as violations of semantics (see Čordalija, 2023; Zeller & Clasmeier, 2020), the fact that advanced BCS learners of English did not detect aspectual violations online or offline confirms the idea behind the Shallow Structure Hypothesis.

For L2 learners, it is easier to process semantic phenomena, whereas building syntactic representations implies a shallow structure without the structural details characteristic of L1 processing. For that reason, even at an advanced level, L2 processing pattern of sentences with aspectual violations and L2 processing pattern of sentences without aspectual violations are the same during real-time sentence comprehension and even after the sentence is processed.

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