PROCESSING OF CONDITIONAL CONSTRUCTIONS IN TURKISH L2 SPEAKERS OF ENGLISH

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ABSTRACT

PROCESSING OF CONDITIONAL CONSTRUCTIONS IN TURKISH L2 SPEAKERS OF ENGLISH

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This thesis aims to examine whether Turkish L2 learners of English process conditional constructions in an incremental and/or predictive manner. An offline grammaticality judgment (GJT) task was devised to test L2 learners' sensitivity to grammatical violations and an online self-paced reading (SPR) task was designed to find out whether processing patterns of L2 learners would match existing L2 processing accounts. We manipulated the Connector Type (unless, unless…not, if…not) and Context Type (congruent, incongruent) as within-subjects and proficiency level (advanced, intermediate) as between-subjects factors. Results from the offline task revealed that Turkish L2 speakers were able to detect ungrammaticalities due to double negations (as in unless…not), and thus have a correct representation of unless. On the other hand, results from the SPR task showed that regardless of their proficiency levels, Turkish

L2 speakers failed to detect syntactic anomalies during online processing, and in fact, they tended to expect an overt negation following unless. In a similar vein, L2 speakers were able to integrate the context in their interpretation only in unless…not and if…not conditions (i.e., conditions in which their structural expectations are met). As for unless (i.e., grammatical but not expected), the integration of the contextual information was either delayed or prevented. To account for the findings in terms of L2 processing mechanisms, overall, we propose that on condition that L2 speakers' structural expectations are fulfilled, the integration of higher-level sources such as discourse and pragmatics can be achieved. Crucially, the pattern was the same in native speakers. The observed pattern is discussed in terms of existing L2 processing accounts.

Keywords: L2 Sentence Processing, Conditional Constructions, Psycholinguistics, Incremental Processing

ÖZ

KOŞULLU YAPILARIN İKİNCİ DİLDE İŞLEMLENMESİ

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İnsanlar dilbilimsel bir girdiyi otomatik olarak analiz etme, anlama, işlemleme ve üretme yeteneğine sahiptir. Bu becerinin temelini sözdizimsel işlemleme sırasında sözcükleri biçimbilimsel, edimbilimsel, anlambilimsel ve diğer ilgili dilsel ve dilsel olmayan bilgilere göre çözümleyebilme (parsing) oluşturur. Bu çalışma temel olarak İngilizceyi ikinci yabancı dil olarak öğrenen Türk öğrencilerin koşullu yapıları işlemleme örüntülerini araştırmayı amaçlamaktadır. Çalışmanın diğer amacı ise Yüzeysel Çözümleme Hipotezi'nin ve Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi'nin sınanmasıdır. İkinci dil konuşucularının dilbilgisel olmayan yapıları edinimini ölçmek amacıyla Dilbilgisel Yargı Testi ve koşullu yapıları çözümleme süreçlerini araştırmak adına online Kendi-Hızıyla Okuma deneyi kullanılmıştır. Bu araştırmada Bağlaç Türü (unless, unless…not, if…not) ve Bağlam Türü (tutarlı, tutarsız) deney cümleleri arasında değişkenlik göstermiştir. Dilbilgisel Yargı Testi'nin

sonuçları katılımcıların ikinci dildeki koşullu yapıları doğru bir şekilde edindiğini göstermesine rağmen, online Kendi-Hızıyla Okuma deneyi sırasında katılımcılar aynı performansı gösterememiştir. Online deneyde katılımcılar unless koşulunda (dilbilgisi kurallarına uygun, beklenmedik), unless...not (dilbilgisi kurallarına uymayan, beklendik) ve if...not (dilbilgisi kurallarına uygun, beklendik) koşullarının zıttına, bağlamsal bilgiyi etkili bir şekilde entegre edememiştir. Bu sonuç anadil konuşucularının işlemleme örüntülerinde de yansıyarak gözlemlenmiştir. Her iki grupta gözlemlenen bu benzer örüntü ikinci dil konuşucularının sözdizimsel beklentileri karşılanmadığında bağlamsal bilgiyi kısıtlı bir şekilde entegre etmesinin veya edememesinin yalnızca ikincidil konuşucusu olmaya atfedilemeyeceğini göstermiştir. Araştırmanın bulguları ikinci dil çözümleme savları çerçevesinde tartışılacaktır.

Anahtar Kelimeler: İkinci Dilde İşlemleme, Koşullu Yapılar, Psikodilbilim, Artımlı Çözümleme

To My Beloved Mom

and

All Women Deprived of Their Right to Learn

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beginning till the end (and to many to come), several nervous breakdowns, countless coffee breaks, unquestionable trust, encouragement and patience, and listening attentively to each and every update in this bloody process (so bloody that now I have migraine with aura) On a separate angle, I would like to thank the members of METU Language and Cognition Development Laboratory and Tan Arda Gedik for their invaluable (literally) assistance in data collection process; my students at TOBB ETU for bearing me through the stressful times, the participants for making this thesis possible, my roomie Tuğba Acar for all the library weekends and coffee breaks, and the team Bearhood for their unconditional faith in me.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ERP	Event-related Potentials
GJT	Grammaticality Judgment Task
IH	Interface Hypothesis
L1	Native Language
L2	Second Language
Ms	Millisecond
OPT	Oxford Placement Test
Q	Quartile
RAGE	Reduced Ability to Generate Expectations
RT	Reaction Time
SD	Standard Deviation
SPR	Self-paced Reading
SSH	Shallow Structure Hypothesis

CHAPTER 1

INTRODUCTION

This introductory chapter consists of four sections. In the first section, the theoretical background of the study is presented with a focus on leading L2 processing theories. The second section discusses the significance and purpose of the study, and the third section introduces the structure under investigation in this thesis. Finally, in the fourth section the research questions guiding the present study and the predictions based on the research questions are stated.

1.1 Background to the Study

Humans have the ability to analyze, comprehend, produce and process the linguistic input in appropriate ways automatically. At the center of this capability lies parsing, which refers to real-time construction of structural representations for complex words, phrases, and sentences during language comprehension and production. During syntactic parsing, the task is both to assign grammatical structure to an input string and to segment the sentence into meaningful units while working out the semantic relationship between these units along with lexical, pragmatic and other relevant linguistic as well as nonlinguistic information. Although the ability to compute syntactic analysis and hierarchical phrase structure is universal, the way and the extent native and non-native speakers process language differ (Papadopoulou, 2005; Clahsen & Felser, 2006a; 2006b; 2018; Clahsen & Muysken, 1996; Papadopoulou & Clahsen, 2003; Marinis, Roberts, Felser and Clahsen, 2005; Hahne, Müller & Clahsen, 2006; Felser, Roberts, Gross & Marinis, 2003; Kaan, 2014).

The new line of research using experimental psycholinguistic techniques such as eye-tracking, response-time measurements and event-related brain potentials (ERPs) have led to a number of empirical findings in respect to how and why native and non-native processing differ. Some of the factors to account for the differences between native and non-native processing are incomplete acquisition of target language grammar (Hahne et al., 2006; Frenk-Mestre, 2002), L1 transfer effects (Hartsuiker et al., 2004; MacWhinney, 2005), individual differences with respect to their cognitive abilities (Juffs, 2004; 2005) shallow parsing (Clahsen & Felser, 2006a; 2006b), and reduced ability of L2 speakers to generate expectations (Grüter, Rohde and Schafer, 2014).

To begin with the limitations of the L2 grammar, the acquisition of grammar by late L2 learners has been reported to be less successful and less uniform, which in turn affects the way they process (Hahne et al., 2006; Hahne & Friederici, 2001). This has been attributed to their incomplete and protracted acquisition of grammar (Hahne et al., 2006). It is logical to assume that to reach native-like processing performance, L2 learners should exhibit sufficiently rich and implicit grammatical knowledge as a prerequisite (Clahsen & Felser, 2008). Otherwise, one would expect to observe processing differences between native and non-native speakers. However, even highly proficient L2 learners have been reported to process some grammatical structures in a different way from native speakers (Papadopoulou & Clahsen, 2003; Felser et al., 2003; Marinis et al., 2005). Therefore, the discrepancy between L2 learners' knowledge of the target structure and on-line processing performance may not always be attributed to incomplete acquisition of grammar.

Another factor that may be responsible for the differences between native and non-native processing is transfer from the native language. Although research using off-line tasks has revealed L1 influence (Hartsuiker et al., 2004; MacWhinney, 2005), those tasks provide limited information for automaticity in real-time language processing. In fact, L1 transfer effects are reported to be limited in online experiments. Studies by Felser et al. (2003) and Papadopoulou and Clahsen (2003) report that parsing

preferences of several learner groups from typologically different L1 backgrounds (Spanish, Greek, German or French) are quite similar, which as a result argues against predominant L1 transfer effect on L2 processing (see also Marinis et al., 2005). Although the extent to which L1 influence on real-time processing is still under question and there is a great amount of evidence for L1 transfer effects on phonological, lexical and lexical-semantic domains (Frenck-Mestre & Pynte, 1997; Weber & Cutler, 2003), L2 learners' processing of nonlocal dependencies or some other grammatical structures may not be susceptible to transfer effects (Clahsen & Felser, 2008).

Given that previous explanations only partially account for the differences between native and nonnative parsing, Clahsen and Felser (2006) proposed an alternative account: Shallow Structure Hypothesis (hereafter SSH). The SSH argues that L2 learners are shallow processors of syntax and they rely more on semantic, pragmatic and lexical cues during sentence processing. From a computational perspective, processing in native speakers is thought to have two routes: full parsing and shallow parsing. Whereas full parsing results in a fully detailed syntactic analysis for an utterance, shallow parsing provides a less detailed syntactic representation, where lexical-semantic and other surface elements contribute more to the interpretation (Sanford & Sturt, 2002). Based on these two assumptions of processing routes, the SSH claims that shallow parsing governs L2 processing such that L2 learners rely mainly on surface-level cues and other information rather than on complex hierarchical and abstract (such as movement traces or dependencies) structures. As a result, it is concluded that syntactic analysis and hierarchical phrase structure would be less detailed and shallower in adult L2 learners compared to native speakers. According to this hypothesis, L2 learners depend on lexical, semantic and pragmatic information in the same way as native speakers but not on the detailed syntactic information. In other words, L2 learners may underuse syntax when processing target language structures because their shallow parsing route is guided by lexical-semantic and pragmatic information as well as world knowledge, strong associative meaning or form patterns. For nonnative speakers, the access to the same parsing mechanisms that native speakers

have (such as minimal attachment) is also possible, but its application is limited because L2 grammar could be divergent, incomplete or unavailable for parsing. Evidence suggesting that adult L2 learners rely more on non-structural information in parsing sentences comes predominantly from empirical studies on the processing of ambiguity and syntactic dependencies, which are outlined in depth in Chapter 2. (Felser et al., 2003; Marinis et al., 2005; Papadopoulou & Clahsen, 2003; Hahne & Friederici, 2001; Hahne et al., 2006; Juffs & Harrington, 1995; 1996; Dussias, 2003).

Thus, according to the SSH, regardless of proficiency level, incomplete acquisition of the target language structure, and L1 interference, L2 learners are unable to compute fully detailed syntactic analysis and therefore their processing is 'shallow' or 'minimal'. During comprehension, each upcoming word or phrase is integrated into the existing representation largely guided by semantic, pragmatic and contextual information (Clahsen & Felser 2006a; 2006b; 2006c).

The understanding of processing as 'integration' has been followed by processing as 'prediction': In the past few years, the interest in the field of sentence processing has started to shift from how speakers compute syntactic analysis by integrating upcoming words into the preceding unit to the extent speakers form predictions about what comes next (Levy, 2008; Altmann & Mirkovic, 2009; Kaan, 2014; Kaan et al., 2010; Grüter, Rohde & Schafer, 2014) During listening or reading, speakers assign likelihood to the continuation of the utterances based on syntactic, semantic and phonological representation of the input. If there is a discrepancy between what is predicted and what is stated, then, processing difficulty ensues because of the mismatch. In that case, language users adjust their future predictions to minimize errors and this process of constant adjustment can account for language learning (Kaan, 2014). During sentence comprehension, native speakers are able to anticipate upcoming sentence structure at syntactic, semantic and lexical level (Altmann & Mirkovic, 2009; Kutas, DeLong & Smith, 2011; Pickering & Garrod, 2011; Kamide, Altmann & Haywood, 2003; van Berkum et al., 2005; Kaan; 2014; Özge, Küntay & Snedeker, 2019). However, whether

or not second language learners form predictions during processing or to what extent they do is still under debate (Dussias et al., 2013; Grüter et al., 2012; Williams, 2006; Hopp, 2013; Martin et al., 2013, Lew-Williams & Fernald, 2010; Grüter & Rohde, 2013). Based on these empirical research findings, native speakers typically anticipate information without any conscious effort, but nonnative speakers may show slower and less predictive processing, though successful comprehension may or may not be possible at the end. According to the RAGE hypothesis, slower processing of nonnative speakers or problems that they encounter during processing are directly related to their inability or 'reduced' ability to anticipate upcoming linguistic material (Grüter et al., 2014).

1.2 Purpose and Significance of the Study

Most of the research conducted to date has tried to understand the processing mechanisms of both native and nonnative speakers. Since more and more people possess knowledge of a second language, it is crucial to examine possible similarities and/or differences between native and nonnative language processing. The empirical findings so far have revealed some differences between native speakers and adult L2 learners in their sentence processing abilities. However, the existing picture is only composed of qualitative differences and the reasons responsible for apparent differences between native and nonnative speakers are far from being conclusive.

Therefore, the aim of the present thesis is two-fold. First, it aims to test whether Turkish L2 learners of English would present a pattern predicted by the Shallow Structure Hypothesis on a construction that does not involve syntactic dependencies or ambiguities despite being syntactically and semantically complex. Second, this thesis aims to see whether L2 learners process conditional constructions in an incremental and/or predictive manner.

Previously, the SSH has been proposed to account for these differences. However, the existing data is only restricted to a limited set of grammatical phenomena such as empty categories, local and non-local wh-dependencies, relative clause attachment, and ambiguity resolution (Felser et al., 2003; Marinis et al., 2005; Papadopoulou & Clahsen, 2003; Dussias, 2003 Hahne & Friederici, 2001; Hahne et al., 2006). Therefore, it remains to be seen whether the SSH holds true for other kinds of syntactic structures or for other L1/L2 combinations than that have been analyzed so far. This thesis aims to fill in this gap by investigating how Turkish L2 speakers of English process conditionals within congruent or incongruent pragmatic context. The reason we focus on conditionals is that the difference between the syntactic representation of the structure in Turkish and English provides a ground for testing the predictions by SSH, which is explained in detail in the next chapter.

In addition, as stated previously, the SSH hypothesizes that adult L2 speakers compute sentential representations which include less syntactic detail, but they predominantly use metalinguistic information and pragmatic inferencing for successful comprehension. In order to examine possible dominance of surface cues, a structure which possesses syntactic but more importantly semantic complexity must be tested. In other words, previous research looked at syntactically complex grammar structures and predicate-argument structure representations that capture thematic roles and other aspects of lexical-semantic structure (such as garden-path sentences). Thus, conditional constructions being syntactically complex and requiring inductive inference (beyond the predicate-argument structure representations) may still add some novel findings to existing empirical data.

Since sentence processing requires comprehending not only with the integration of new units to the existing structure but also forming predictions for the upcoming information, this thesis also aims to test whether Turkish L2 learners of English anticipate the continuation of a conditional marker in relation to the discourse-based context provided as either congruent or incongruent.

1.3 Structure under Investigation

In this thesis, processing of conditional counterfactual utterances constructed with unless and if in English are analyzed because of four reasons: (i) Grasping the meaning of conditionals has some cognitive prerequisites and thus conditionals are semantically complex; (ii) The form and the structure used in conditionals, specifically tense and mood of the verb as well as the conjunction in each conditional type contributes to syntactic complexity of conditionals; (iii) Unless has a syntactically different representation in Turkish and in English; and (iv) Counterfactuality allows to explore possible effects of pragmatic context in processing because it provides information about the truth status of the events. These reasons are explained in depth in Chapter 2. Different syntactic representations of unless utterances in Turkish and English provides a starting point for our study. Unless is an exceptive conditional and holds implicit negation. Some authors analyze unless in that it has been considered as the same as if not sentences. Given an utterance 'Prof Arid will pass you if you don't fail the exam', one could easily paraphrase it with 'Prof Arid will pass you unless you fail the exam' (Geis, 1973: 231). However, others propose that unless in fact specifies a unique condition (i.e., biconditional) under which the course will not be passed whereas if not specifies only one of the several conditions (i.e., uniconditional) and therefore unless cannot be paralleled with if not (Dancygier, 1985; Declerck & Reed, 2000; Geis, 1973). What is more, they also differ in the way the negative is signified (Wright & Hull, 1986). The negativity of unless in fact results from its 'exceptive' nature: The situation explained by unless constructions are said to be exceptional and as a result the consequence in the main clause will not hold true or happen (Dancygier, 2002). In short, the negative conditional unless is different at the lexical level in terms of implicitness of the negation (Wright & Hull, 1986).

On the other hand, in Turkish, conditional meaning is expressed by the use of suffixes which have more than one function and may simultaneously mark tense, aspect and

modality, which is explained in depth in Chapter 2 (Göksel & Kerslake, 2005). The equivalent of unless, -mEdIkçE has an explicit negative marker (-mE) unlike unless in English (Bakırlı, 2010).

Counterfactual expressions, which are used in both Turkish and English, add another dimension to the test items in our experiment. Conditionals expressing past imaginative situations are called counterfactual conditionals (Comrie, 1986). Given a counterfactual statement such as 'If Jeremy had been a millionaire, he would have bought a Mercedes.', one would understand the sentence by keeping two possibilities in mind: the assumption that Jeremy was a millionaire and he bought a Mercedes and the presupposed facts, Jeremy was not a millionaire and he did not buy a Mercedes. In addition, counterfactual conditionals convey information about the truth-value of the antecedent and the consequence whereas factual or indicative conditionals only provide possibilities for the consequence dependent on the antecedent (Ferguson & Sanford, 2008).

In sum, given that the presence of an explicit negation marker (-mE) in Turkish unless, we investigate the processing pattern that nonnative speakers have in a structure with an implicit negation, which is unless. In addition, we choose past counterfactuals conditionals to explore any possible effect of discourse-based information on L2 speakers' processing patterns.

1.4 Research Questions and Predictions

The research questions addressed in the present study are the following:

1. Does the SSH make correct predictions in a structure that does not involve structural ambiguities or long-distance dependencies?
2. Do Turkish-speaking L2 learners of English parse conditional constructions in an incremental fashion?

3. Do Turkish-speaking L2 learners of English integrate discourse-based contextual information in an incremental fashion in the interpretation of conditionals?
4. Are there any differences in the L2 learners processing patterns across different proficiency levels (i.e., intermediate and advanced)?

For our first research questions, in the light of the previous proposal, the SSH (Clahsen & Felser, 2006a; 2006b; 2006c), it is expected that L2 learners would fail to recognize grammatical violations when the context is congruent. The SSH posits that L2 learners process syntactically challenging sentences in the light of surface-level information (pragmatics, semantics or discourse-based cues), disregarding the complexity of the structure or anomalies. However, given that the context is incongruent, L2 speakers are expected to experience processing difficulties in comprehending the syntactically anomalous sentences due to lack of their detailed syntactic representations and the surface-level cues. The processing difficulties are expected to be observed at the RTs for the critical regions (i.e., Segments with syntactic and discourse-based experimental manipulation). On the other hand, if the SSH is not able to make correct predictions in the processing of conditional constructions in L2 speakers, then, we expect our participants to process syntactically anomalous sentences with equal difficulty both in congruent and incongruent contexts. In other words, we would not expect any facilitator effect of context when it is congruent.

As for incremental processing, it is hypothesized that if L2 learners are able to parse sentences incrementally, then, we expect them to produce elevated RTs in Segment 3 (i.e., Segment with syntactic experimental manipulation) when they read sentences in unless…not condition as unless is already a negation-encoded marker. If L2 speakers are not able to process sentences incrementally, then, double negation will not be expected to arise processing difficulties. In line with syntactic parsing, if L2 speakers integrate contextual information incrementally, then, in Segment 7 (i.e., resolution point of discourse manipulation) they are expected to show longer RTs in incongruent

contexts compared to congruent ones. If L2 speakers are not incremental processors, then, efficient integration of discourse-based information will not be observed.

In line with the RAGE Hypothesis (Grüter et al., 2014; 2017) it is expected that L2 speakers are not able to generate or update expectations for the upcoming units although they have detailed syntactic representations. That is, they will not be integrating the hypotheticality aspect of conditional constructions in relation to discourse manipulation as efficiently as native speakers. Thus, we would expect nonnative speakers to produce longer RTs in the critical region with discourse manipulation in both congruent and incongruent contexts, which can be taken as an indication of their reduced ability to generate predictions based on the syntactic structure. On the other hand, if L2 speakers can predict upcoming structures as efficiently as native speakers, then we would expect them to integrate congruent contexts faster and accurately than incongruent one.

CHAPTER 2

THEORETICAL BACKGROUND

This chapter includes four major sections. The first section introduces and reviews the sentence processing. The second section outlines second language processing accounts, namely Shallow Structure Hypothesis (SSH) and Reduced Ability to Generate Expectations (RAGE) Hypothesis. In the third section, additional previous research studies on the SSH and the RAGE are reviewed, and in the fourth section, conditional constructions in Turkish and in English are briefly explained.

2.1. Sentence Processing

A great deal of work has been carried out to model the processes that determine human capacity to process language. The main questions that need to be answered deal with the way human language processor works, how linguistic knowledge is realized, represented and stored in the brain and the actual source of the human capacity for language. Although the proposals diverge on the exact structure of the architectures and mechanisms behind sentence processing, the idea that assigning interpretations to the units is incremental is convergent (e.g., Frazier & Rayner, 1982; Elman, 1990; 1993; Frazier & d'Arcais, 1989; Altmann & Steedman, 1988; Trueswell & Tanenhaus, 1994; Altmann & Kamide, 1999; Federmeier, 2007; Hale, 2001; Levy, 2008; Altmann & Mirkovic, 2009; Özge, Marinis & Zeyrek, 2015; Kuperberg & Jaeger, 2016).That is, humans parse linguistic input with no or very limited delay as soon as each unit becomes available.

There is ample evidence that people infer the syntactic structure of sentences (i.e., parse) in a predictive (i.e., incremental) fashion, as well. Roughly explained, predictive interpretation refers to the fact that interpretation of a sentence is built up word-by-word as the input unfolds and thus the system either lags or gets ahead of the input. In the case of falling behind, processing difficulties and delays in interpretation ensue whereas getting ahead yields prediction, and thus facilitation in comprehension. Lower-level sources and higher-level sources of information are consulted for successful processing. To flesh out the full meaning of the sentence, phonological, lexical and morphosyntactic constraints (as lower-level sources) are fundamental for generating the structural alternatives for the processing system and these are accompanied by discourse and pragmatic constraints (as higher-level sources) such as the discourse and the visual context.

Upon encountering an utterance fragment such as `The prime minister criticized the…`, whereas it is not possible for a reader to anticipate the precise words accurately due to the isolated context, it is possible to generate expectations, i.e., potential representations: syntactic (a noun is likely to follow) and semantic (something criticize-able). Even before the input is available for processing, generating possible syntactic and semantic representations is likely to contribute to real-time language interpretation. What is meant by `interpreting` sentences varies from interpretation referring to `building hierarchical syntactic structure of the sentence` (Frazier, 1987) to `immediate integration of relevant background knowledge and information provided by discourse context` (Pickering and Traxler, 2000, p. 239), which suggests that readers constantly update the representation they have in mind with each new word encountered. This assumption of interpretation (i.e., immediate attachment of each upcoming word to the evolving structure) is evidenced by 'garden-path' sentences. As soon as the readers have an incompatible analysis with the new integrated word, they must reanalyze and/or revise the initial representation. To exemplify,

(1) We like the book that the author wrote unceasingly and with great dedication about while waiting for a contract.

(2) We like the city that the author wrote unceasingly and with great dedication about while waiting for contract.

(Pickering and Traxler, 1996)

According to Active Filler Strategy (Frazier, 1987), as soon as a potential gap position available, the impatient parser will initially associate it with the filler (or `immediate association` principle by Pickering and Barry, 1991). If the upcoming word reveals that there was no gap, then reanalysis occurs, and as a result, the filler-gap revision accompanies processing difficulty. In both sentences, there is a gap after the verb `wrote`. When the readers face the verb, they must immediately associate the gap with the filler book in (1) or city in (2). Evidence from the eye-tracking study reveals that reading times for the region wrote unceasingly were longer in (2) than in (1). This shows that real-world knowledge about the things that can and cannot be written affects the plausibility of the computation. Thus, with the integration of the rest of the sentence, possible gap positions turn out to be after about in both sentences. However, this time, reading times for disambiguating region about while were longer in (1) than (2). Traxler and Pickering (1996) claim that reanalysis is hard and costly when an initially thought plausible analysis turns out to be implausible. In other words, when the filler is implausible, it yields slower reading times at the verb, but faster reading times in the disambiguating region. During sentence processing, this pattern of constant attachment and reanalysis, and word-by-word interpretation is diagnostic for incremental interpretation (Williams, 2006).

In the native language processing literature, although the underlying mechanisms and reasons may vary, the assumptions reviewed here are convergent on the idea that native speakers predict upcoming elements depending on their knowledge on morphosyntax, semantics and lexical items (for a review, see Clifton & Frazier, 1989; Gibson, 2000; Levy, 2008; Altmann & Mirkovic, 2009 and Kuperberg & Jaeger, 2016). The fundamental evidence for prediction comes from Altmann and Kamide (1999). When

listeners are provided with a visual scene including a cake and some inedible objects such as a ball, a train, and car, upon hearing the fragment "the boy will eat…", they move their eyes to the depiction of the cake before they hear the word. Together with several follow-up studies (e.g., Kamide, Altmann & Haywood, 2003; Altmann & Kamide, 2004; 2007; 2009, for a study in Turkish see Özge et al., 2019), it is plausible to propose that listeners make use of both linguistic and extra-linguistic context to generate predictions. In studies using Event-related brain Potentials (ERPs), signs of incongruency at determiners (as in The day was breezy so the boy went outside to fly a/an kite/airplane) before participants read or hear the actual unexpected item reveal that speakers do come up with predictions about the following entities (DeLong, Urbach & Kutas, 2005). In short, growing number of on-line and electrophysiological studies show that native speakers use the information through various levels to anticipate. Given all these, the availability or efficiency of such mechanisms in L2 appears to be a must for successful sentence comprehension. However, studies on L2 learners have shown that advanced L2 speakers do not predict at all or as efficient as native speakers on-line though they are fully informed about the syntactic rules or words (Grüter et al., 2012; Grüter & Rohde, 2014; 2017, Williams, 2006; Martin et al., 2013; Kaan et al., 2007; Lew-William & Fernald, 2012)

2.2. Second Language Processing Accounts

Processing can be regarded as a fundamental aspect of language acquisition and competent linguistic use (Trueswell & Gleitman, 2007). The ability to process the input in order to construct a grammatical string and to comprehend is indispensable for both first and second language acquirers. Simultaneously, comprehension requires fitting/mapping the constructed grammatical string to a larger hierarchical structure and to meaning in real-time. Therefore, language processing is a combination of how learners deal with input to construct a system. To do this, they must possess great deal of knowledge about how language unfolds in oral and written discourse, how the world is organized and the probability of the occurrence of an event in several communicative

contexts. To answer the questions of how successful language acquisition is for children or nonnative speakers, growing number of research studies focused not only on the acquisition of grammatical knowledge but also on the mechanisms that language learners employ to process information. The popular assumption is that second language processing is somehow qualitatively different from first language processing.

Asymmetries between nonnative and native processing are listed by Clahsen & Felser (2006a). First, L2 speakers find it difficult to integrate different sources of information such as lexical, prosodic, structural and discourse-level online as opposed to adult native speakers (Felser et al., 2003; Papadopoulou & Clahsen, 2003). Second, L2 processing is less efficient and automatic than native processing, which results in delays in nonnative processing as evidenced by event-related brain potentials (ERPs) studies (Hahne, 2001; Hahne & Friederici, 2001). Third, L2 processing is prone to the interference of native language processing strategies. Trying to apply inappropriate L1 processing strategies for L2 processing posits a barrier for reaching a native-like competence in the L2. However, the experimental results on the effect of L1 transfer to L2 processing are far from conclusive (see Frenck-Mestre & Pynte, 1997; Harthsuiker et al., 2004 for L1 influence, and see Felser, Roberts, Gross & Marinis, 2003; Papadopoulou & Clahsen, 2003; Roberts, Marinis, Felser & Clahsen, 2004 for lack of L1 influence). Fourth, L2 processing partially makes use of native processing mechanisms. Ullman's Declarative/Procedural (DP) model (2001) argues that language processing in L1 has a declarative memory system, where lexical units and explicit knowledge in relation to sound and meaning are stored, and procedural memory system, which involves implicit combinatorial rules and hierarchical structures. The 'cooperative' and 'competitive' interaction of both systems are available and required in language processing (Ullman, 2004). As a result of this automaticity, L1 parsing is fast and unconscious. However, for L2 acquisition, probably due to learning the language after the critical period, changes in the procedural system lead to explicit and conscious processing while leaving the declarative system unaffected (Ullman, 2004).

Thus, L2 speakers have a 'reduced ability' to process language in a nativelike fashion and they exhibit asymmetries compared to native speakers.

As these four previous accounts outlined above provide controversial or partial explanations for the differences between native and nonnative processing and the underlying reasons behind the differences, several alternative hypotheses were proposed. Of those, Shallow Structure Hypothesis (the SSH) by Clahsen and Felser (2006a; 2006b; 2006c; 2018) and Reduced Ability to Generate Expectations Hypothesis (the RAGE) by Grüter et al. (2014; 2017) constitute the theoretical framework of this study.

Briefly, the SSH proposes that even near natives tend to have problems constructing hierarchical syntactic representations real-time and are guided by lexical-semantic and surface-level information for their interpretation. Within the scope of the SSH, "shallow" processing mechanisms in the second language are responsible for building and manipulating less detailed grammatical structures. On the other hand, the RAGE proposes that L2 speakers have reduced ability to generate expectations about the upcoming linguistic structure and this reduction results in asymmetries in first and second language processing. These two hypotheses are outlined in depth in the following section.

2.2.1. Shallow Structure Hypothesis

The Shallow Structure Hypothesis proposed by Clahsen and Felser (2006a, 2006b, 2006c, 2018) is based on asymmetries between native and nonnative processing in syntactic domains as opposed to symmetries in lexical-thematic and semantic-pragmatic domains. The SSH has two major proposals. The first is that 'the syntactic representations adult L2 learners compute for comprehension are shallower and less detailed than those of native speakers (Clahsen & Felser, 2006a, p. 32). The second claim is that L1 transfer effects in second language processing surface at little or no

amount in L2 processing; in other words, disregarding the distinctive grammatical representations in their L1, nonnative speakers perform more similarly to each other than native speakers of the target language under examination. Each claim is outlined below.

The evidence for the nature of structural representations that nonnative speakers compute for the target language is centered around L2 speakers (a) who fail to flesh out detailed syntax-based attachment preferences for ambiguous relative clauses and (b) who fail to reactivate a filler in the processing of filler-gap dependencies such as the example in (3) below:

(3) [$_{DP}$ The manager$_i$ [$_{CP}$ [who$_i$] the consultant claimed [$_{CP\,[t2]}$ that the new proposal had pleased $_{[t1]}$]]]… ill here five new employees.

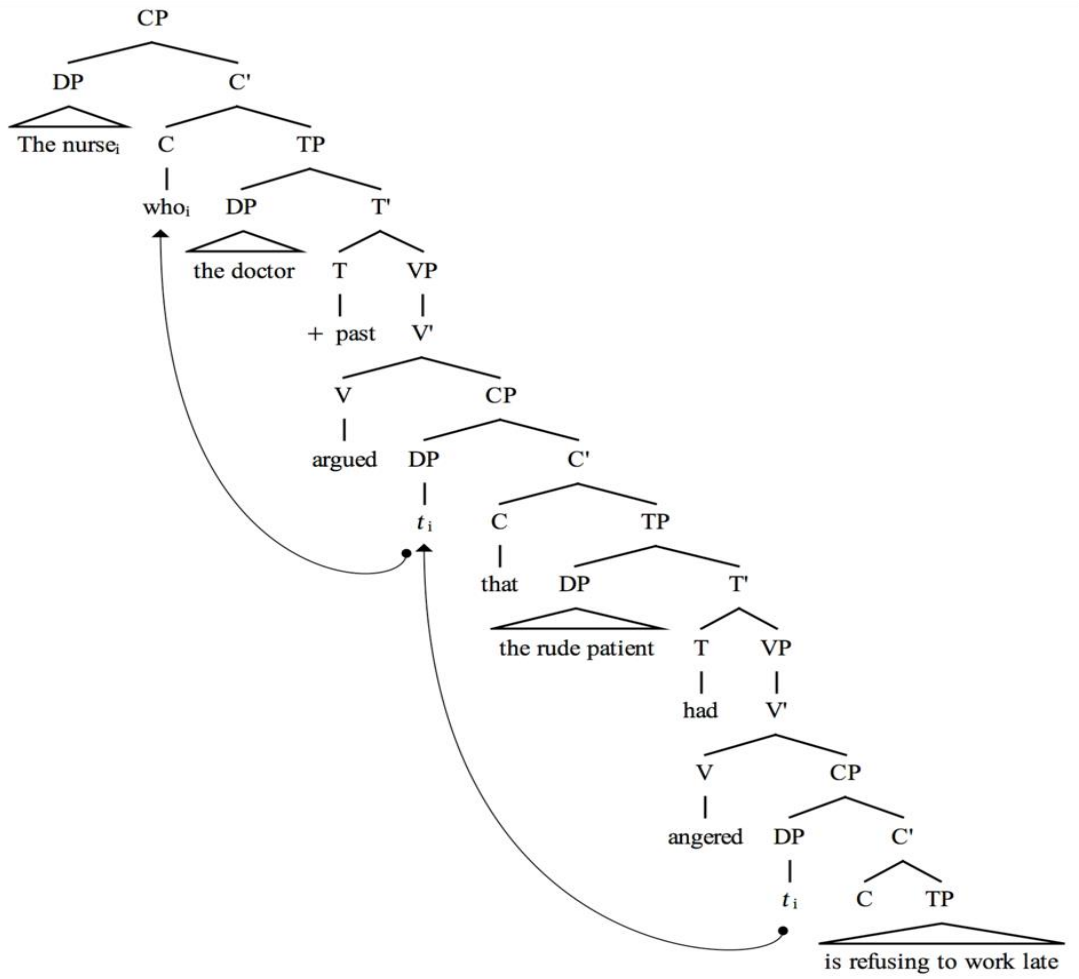
In (1), the wh-filler who is base generated in the specifier position of lowest TP (i.e., who is interpreted as the object of the verb pleased). Through successive cyclic movement, it moves up to the specifier position of the embedded CP and then to the specifier position of the matrix clause. The movement of wh-filler who from its initial position to the final landing position cannot take place in one derivational step because crossing two bounding nodes (specifier position of the embedded CP and the specifier position of the matrix clause) is restricted in order not to violate subjacency principle (Chomsky, 1981; see also Gibson & Warren, 2004). SpecCP position of the embedded clause provides an intermediate landing site for the long-distance movement. It was hypothesized that successive cyclic movement promotes the processing of long-distance dependencies because it helps speakers to consult to an intermediate mental representation of the filler who referring to the manager when they encounter the beginning of the embedded clause (i.e., the complementizer that). The hypothesis that intermediate gap sites facilitate processing as opposed to the sentences that lack intermediate gaps (e.g. nominalization). Supportive experimental evidence comes from the study of Gibson and Warren (2004): Native speakers show slower reading times at

both gap positions, which suggests that the parser is trying to integrate the wh-filler to construct a hierarchical syntactic representation.

Following the fact that native speakers show evidence for the psychological realization of intermediate gaps with the elevated reading times at gap positions, whether L2 learners process long-distance dependencies similarly to native speakers is further tested (Marinis et al., 2005). A detailed syntactic representation of Marinis et al.'s experimental sentence is shown in (4). As discussed above, in line with the subjacency principle (Chomsky, 1981), NP nurse moves to its final landing position (i.e., specifier position of the matrix CP) passing through the intermediate gap position (i.e., specifier position of the embedded CP), which is also represented in (4).

(4) The nurse who the doctor argued that the rude patient had angered is refusing to work late.

In contrast to the evidence available for native processing of wh-dependencies, L2 speakers from different L1 backgrounds (Chinese, Japanese, German, Greek) do not postulate intermediate syntactic gaps regardless of whether successive cyclic wh-movement is operative in their L1 or not (Martinis et al., 2005). Crucially, however, L2 speakers were able to comprehend and interpret sentences accurately. This finding supports that L2 learners can indeed build up less detailed syntactic representations of the sentence, but they rely on semantic or conceptual representation based on their lexical, pragmatic and world knowledge (Clahsen & Felser, 2006a). When L2 speakers encounter utterances as in (3) and (4), the parser constructs a representation relying on the predicate-argument structure of the verbs and other available lexical-semantic structure. For instance, in (3), as soon as the parser gets to argue, it assigns its theta roles as the agent to the doctor and the theme to the embedded clause. Likewise, when it gets to anger, the parser knows that anger takes an experiencer and a theme, the nurse and the rude patient, respectively. Therefore, with a complete assignment of theta roles, the parser constructs complete semantic analysis and is able to reach accurate interpretation for the sentence.



The second proposal that SSH claims regards the extent to which nonnative speakers transfer their L1 processing mechanisms into their L2 processing. Although the authors admit that this claim is less validated, it proposes that either L2 acquirers do not transfer their native language processing preferences at all or L1 mechanisms 'only indirectly' influence nonnative processing (Clahsen & Felser, 2006b, p.118). What is expected is that L2 speakers' parsing preferences and/or mechanisms are independent of their L1, and thus the possible interfering L1 effects are more limited than it was reported in offline L2 acquisition studies (Clahsen & Felser, 2018). Evidence for the claim comes from ambiguous sentences with relative clauses (Papadopoulou & Clahsen, 2003).

Considering sentences as in (5), attachment of relative clause is possible both to the servant [NP1] and to the actress [NP2]:

(5) Someone shot [the servant]$_{NP1}$ of [the actress]$_{NP2}$ who was on the balcony.

Results from several offline and online studies examining languages other than English have revealed that attachment preferences do not hold universally. Native English speakers tend to show low-attachment (NP2) preferences in line with general parsing strategies, according to which new phrases are attached to the most recent phrase (i.e., late closure (Frazier, 1978) or recency principle (Gibson et al., 1996)). However, languages such as Spanish, German, Dutch, French and Russian attachment preferences result in high-attachment (NP1) and thus suggest language-specific parsing strategies (as cited in Papadopoulou & Clahsen, 2003). Spanish, German and Russian learners of Greek completed both off-line and online experiments on their RC attachment preferences. Both the native language and target language of the participants exhibit the same attachment preferences for RC ambiguities, i.e., high-attachment (NP1), which in turn allowed researchers to hypothesize that language-specific preferences of participants' native language would surface in their target language. Instead, it turned out that RC-attachment preferences of L2 learners are different from native Greek speakers and also from their native languages. In other words, L2 acquirers were not influenced by their L1-based ambiguity resolution strategies as opposed to what is expected. This was evident in their lack of a dominant preference for genitive antecedents such as in (3) the servant of the actress. On the other hand, for the experimental materials containing a prepositional phrase (PP) headed by a thematic preposition with as in the man with the girl, there was a clear preference for NP2. It is because the thematic preposition assigns a theta role to NP2 and the RC is supposed to be processed within this domain and thus attached low. The fact that a highly proficient group of learners failed to show target-like attachment preferences in spite of their native language showing the same preference as their target language has driven Clahsen & Felser (2006a; 2006b) to conclude that L2 learners' parsing

mechanisms are heavily guided by lexical cues and hardly by structural ones. For genitive antecedents, the local processing domain tends to be the entire NP (i.e., the servant of the actress) and thus resulting in either NP1 or NP2 attachment in contrast to the clear preference provided by a theta-role assigning lexical preposition. Therefore, it is argued that L2 speakers are sensitive to attachment biases provided by a thematic preposition, but they are unable to show a clear preference for relative clauses when lexical cues are absent or not available, irrespective of their L1 parsing preferences. In summary, the findings of Papadopoulou and Clahsen (2003) reveals that it is the semantically based associations that integrate the contribution of available lexical cues to the interpretation. Across L2 speakers who have typologically different language backgrounds, the lack of a systematic preference for ambiguity resolution points out that L1 interference may surface at little or no amount, suggesting once again that the differences in processing mechanisms cannot be attributed to L1 transfer effects (Clahsen & Felser, 2006a; 2006b).

Taken together, the SSH is a psycholinguistic hypothesis that remains agnostic to the role of neurological localization in shallow versus deep processing. Rather, it is grounded on 'dual-pathways models' of processing that constitutes 'a heuristic (or shallow processing) and a grammatical (or full parsing) route' (Clahsen & Felser, 2018). Successful processing and interpretation are possible both for native and nonnative speakers, but the route that they implement may differ (as shown in Figure 1, Clahsen & Felser, 2006b, p.118). It is hypothesized that the availability of full parsing route is likely to be restricted even at later stages of L2 learning (Clahsen & Felser, 2006b). Figure 1 visualizes the pattern that nonnative speakers might be following during processing in their L2.

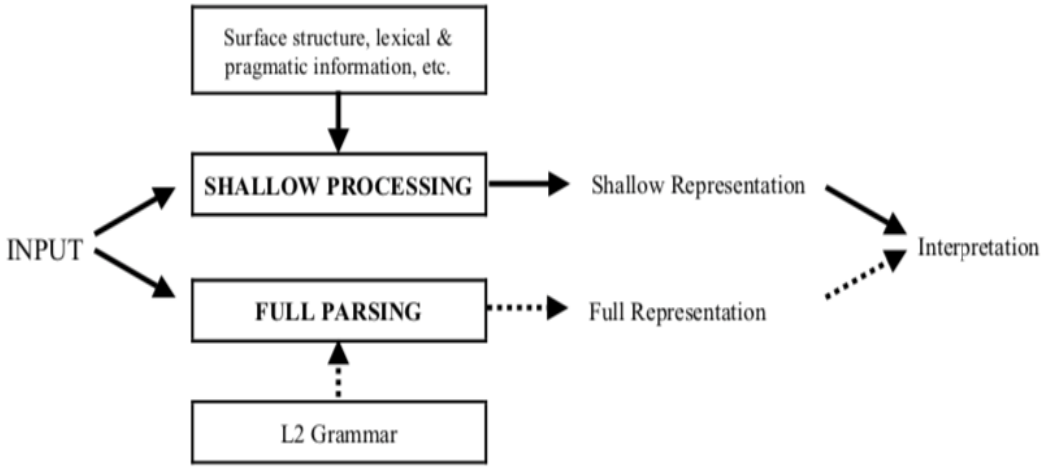


Figure 1. *Shallow Structure Hypothesis Model* (Clahsen & Felser, 2006b).

2.2.2. Reduced Ability to Generate Expectations Hypothesis

As opposed to the processing as "integration" approach proposed by Clahsen & Felser (2006a), which is outlined in the previous section, Reduced Ability to Generate Expectations (RAGE) hypothesis links processing to the ability to anticipate the upcoming input on the basis of previously encountered structure. It is proposed that L2 learners differ from native speakers not on their ability to build detailed morphosyntactic representations (as opposed to the SSH), but their ability to generate expectations for morphosyntactic elements during on-line processing (Grüter, Rohde & Schafer, 2014; 2017). That is, the RAGE presents that nonnative speakers' limited ability to predict upcoming units causes delays in their processing.

Preliminary evidence in support of the RAGE comes from the comparative tasks requiring integration or anticipation. Previous work reveals that L2 learners perform like native speakers on the comprehension tasks which involve gender-mismatch between nouns and adjectives (e.g., Dowens, Vergera, Barber & Carreiras, 2010). In contrast, for the tasks requiring L2 learners to generate expectations based on the available gender cues in Spanish and French, participants showed reduced or no use of

gender-predictive determiners (Lew-Williams & Fernald, 2010; Grüter, Lew-Williams & Fernald, 2012). In addition, Martin et al., (2003) investigated the extent late Spanish-English L2 comprehenders predict sentence-final words in their second language for the sentences ending either expected or unexpected noun phrases. Results show that L2 learners fail to predict the upcoming word actively based on phonologically predictive articles. As opposed to native speakers, L2 learners did not show an N400 effect for unexpected articles. It is also reported by Kaan et al., (2010) nonnative speakers did not make use of extracted wh-phrase to anticipate a gap, unlike native speakers.

The existing work suggests that RAGE is extensive on lexical and syntactic expectation generation among L2 comprehenders. However, a discourse-level task provides fundamental evidence for the RAGE, which is more informative because readers simultaneously integrate both linguistics and non-linguistics (i.e., world knowledge) cues, and there are no rules governing how this information should interact. Reference resolution is a universal phenomenon in the sense that it determines the referents essential for comprehension (i.e., who did what to whom) and nonnative speakers have ample experience in their native language.

There are several factors affecting the anaphora resolution outlined in previous studies (see Kehler et al., 2008; Stevenson et al., 1994). Grüter et al. (2014) conducted a coreference study focusing on two discourse-level factors as event structure and referential form. In a story continuation task, they manipulated event structure (i.e., aspect) in transfer-of-possession verbs with either a perfective or imperfective verb and referential form with either a pronoun or free as in (6):

(6) Patrick$_{[SOURCE]}$ gave/was giving a towel to Ron$_{[GOAL]}$. (He)_____.

Here, perfective aspect is tied to a finished event and so the continuations describe what happened next or as a result whereas imperfective aspect is tied to an ongoing event and so the continuations favor the elaboration or explanation of the transfer event.

Perfective aspect yields more Goal continuations, presumably because Goal is associated with the end state or a result while imperfective aspect favors more Source continuations since explanations and elaborations refer to the start state of the event. Hence, the reader's ability to build a mental model of the verb type guides his/her reference biases. On the other hand, in the case of a referential form, the presence of a pronoun favors more subject continuations than a free (non-pronoun) prompt. In other words, pronouns are preferred for re-mentioning the topic of a previous discourse (Rohde & Kehler, 2014).

Given that native speakers of Korean and Japanese were tested in the study, it is important to highlight that the effect of the verb aspect mentioned above is persistent in both Japanese and Korean. It is reported that Japanese and Korean speakers preferred some Source continuations for imperfective sentences compared to perfective context, in spite of the differences due to the effect of anaphoric type (as null pronoun condition is available in both of these languages) (see Ueno & Kehler, 2010 for Japanese; Kim et al., 2013 for Korean). If Japanese and Korean speakers show less expectation-driven effects in their second language, though it is available in their L1, it cannot be attributed to L1 transfer and it is likely to be related to non-native language processing, i.e., their reduced ability to generate expectations in their second language (Grüter et al., 2014).

The results indicated that nonnative speakers are aware of the aspect distinction between perfective and imperfective as shown by truth-value judgment task and they understand the mapping between verb aspect and coherence as demonstrated by previous studies on Korean and Japanese. However, they did not show any significant preference for Goal continuations over Source continuous, or vice versa, unlike native speakers.

These findings are regarded as the first evidence for the RAGE concluding that the ability of L2 speakers to generate expectations is reduced at the discourse level. This assumption is also supported by the recent studies focusing anticipatory processing at

the lexical and syntactic level (e.g., Lew-Williams & Fernald, 2010; Grüter, Lew-Williams & Fernald, 2012; Martin et al., 2003; Kaan et al., 2010). The underlying intuition for the RAGE is that limited resources of L2 processor are exhausted by structural integration and lexical access of the information incrementally. In return, there is little or no resources left for anticipation. In other words, processor is occupied by reactive processing, with a limitation on the scope of expectations.

In sum, although both the SSH and the RAGE support the idea that nonnative speakers' processing abilities are reduced, they differ in the way that they view processing. The SSH views processing as a bottom-up reactive mechanism that integrates incoming information with the previous information, and thus attributes processing differences in L1 and L2 to lack of detailed hierarchical structures. In contrast, the RAGE views processing as a top-down proactive mechanism and attributes processing differences to limited ability to predict incoming elements due to the fact that structural and lexical access to the information is already costly.

2.3. Further Studies on Sentence Processing in L2

Experimental data for second language processing research primarily focuses on the question of how native-like L2 processing is. Researchers in this field are interested in sentence comprehension/processing by "advanced late-learners". The preference for this specific learner group instead of balanced bilinguals can be attributed to the distinction between L2 acquisition and processing studies. In other words, in the process of language acquisition, the exact effect of parsing may not be exploitable due to incomplete acquisition. Several L2 sentence processing studies can be grouped under two headings: those focusing on parsing routines (e.g., Clahsen & Felser, 2006a; 2006b; Grüter et al., 2014) and those assessing learner's sensitivity to ungrammaticalities in their L2 online (Hopp, 2010; Juffs & Harrington, 1995; 1996). The experimental data in the former group deals with the usage of morphosyntactic information during parsing such as ambiguous or complex sentences including

dependencies and frames L2 processing models to explain the L1/L2 differences even at advanced proficiency levels. One of such models proposed is Shallow Structure Hypothesis (Clahsen & Felser, 2006a; 2006b) is outlined in the previous section in detail with the supportive evidence from wh-dependencies (Marinis et al., 2005) and ambiguous sentences (Papadopoulou & Clahsen, 2003). The other model is Reduced Ability to Generate Expectations Hypothesis (Grüter et al., 2014; 2017) which is also outlined in the previous section with supportive evidence. In this section, additional experimental work in support of the SSH and the RAGE hypothesis will be outlined.

To begin with, Felser & Robert (2007) investigated the processing of wh-dependencies by proficient Greek-speaking learners of English with cross-modal priming study, in which participants make lexical decisions on the basis of visual cues while listening to sentences with indirect-object relative clauses as in (i). Their aim was to investigate the existence of integrating syntactic gaps and to examine any potential effect of individual WM differences on processing of wh-dependencies. The usage of cross-modal picture priming (CMPP) enabled participants to see stimulus materials without interruption and provided them with the pictures instead of words. It was also noted that Greek is a head-initial language enabling wh-movement similar to English. Given that two languages pattern the same regarding wh-dependencies, it was initially expected that L2 learners would behave the same as native speakers. Under the predictions of SSH, it was hypothesized that mental representations of L2 learners during sentences processing lack of syntactic gaps or traces, and thus there would be no effects of localized priming despite the similar derivation patterns in both native language and the target language.

(7) John saw the peacock to which the small penguin gave the nice birthday present [__] in the garden last week.

The syntactic base position for the wh-phrase to which is after birthday present, as shown by the blank line. Both native and nonnative speakers in this study were shown a picture either at the base position or 500ms earlier, at a control position while hearing

the sentences. The pictures either illustrated the antecedent of the wh-phrase (the peacock) or something not related (e.g. "toothbrush"). The task of the participants was to decide whether the picture was something alive or not. Native speakers responded faster, which suggests that they postulate a gap in the base position. However, nonnative speakers showed faster response times both at the gap position and earlier at the control position.

Results showed that advanced level Greek-speaking learners of English did not postulate intermediate syntactic gaps during long-distance wh-dependency processing, which is in line with Marinis et al.'s (2005) findings. Regarding WM resources, there was not any interaction between L2 reading span and antecedent activation, which shows that failure to generate detailed syntactic descriptions cannot be attributed to the shortage of WM resources.

In a similar vein, Felser et al. (2003) conducted an ambiguity resolution study of relative clause attachments that native German and Greek-speaking adult learners of English. There are cross-linguistic differences between the parsing strategies regarding structural ambiguities. Consider the sentence (8) below, relative clause who was reading a letter can equally be attached either to the professor (NP1 attachment) or the secretary (NP2 attachment).

(8) The dean liked the secretary of/with the professor who was reading a letter.

(Felser et al., 2003)

A typical English speaker prefers NP2 interpretation in accordance with the locality principle of Recency, which favors the attachment of incoming materials to the recently processed entity as long as it is grammatically plausible. On the other hand, speakers of languages with NP1 disambiguation preference interpret the sentences in line with locality principle of Predicate Proximity, which suggests the attachment of incoming material to entities close to the predicate as possible (i.e., the head of the predicate

phrase). The languages favoring NP1 attachment include German and Greek, the two nonnative speaker groups in this study. These locality-based structural principles and preferences of L2 speakers were already tested by Papadoupolou and Clahsen (2003) and the results were outlined in the previous section. Different from their experimental design, Felser et al. (2003) manipulated the preposition (of vs. with) to gather any possible effect of lexical-semantic properties of the preposition on participants' preference. It is observed universally that for the complex NPs linked by a thematic preposition, with, NP2 disambiguation is preferred in both online and offline studies with a stronger lexical bias over the structural one (Frenck-Mestre & Pynte, 2000; Papadopoulou & Clahsen, 2001). In contrast, the preposition of is only a case-assigner is unable to create a local thematic domain (Felser et al., 2003).

The results revealed that nonnative speakers have a different pattern: an NP2 resolution preference for the with condition, but no consistent resolution preference for the genitive condition irrespective of their L1, consistent with Papadopoulou and Clahsen (2001). Although it is not clear whether participants transferred the Predicate proximity strategy from their L1 or acquired the Recency principle for the inconsistent disambiguation in the genitive case, the consistency can be interpreted as the sign of lexical-semantic information integration in L2 processing. To sum up, L2 learners are inclined to directly map surface level cues to interpretation (Felser et al., 2003).

Of the two major proposals of the SSH, one focusing on syntactic representations being shallower in L2, the second one deals with the idea that L2 speakers disregard the grammatical representations in their native language, and thus little or no L1 transfer effects surface. The evidence for lack of L1 transfer effects in L2 processing comes from temporarily ambiguous relative clause attachments. Dussias (2003) investigated whether proficient L2 speakers parse sentences in line with universal, fixed parsing strategies, or else L1 transfer effects are exploitable. To test this, English-Spanish speaking and Spanish-English speaking participants took part in an offline questionnaire and a self-paced reading study. For ambiguous relative clause utterances

structured as NP1 of NP2, it is suggested that native English speakers tend to attach relative clauses locally while native Spanish speakers prefer non-local dependents. The results from the offline task revealed that both groups favored local attachment over the non-local one regardless of their L1 parsing strategies. As for the on-line data, there was a lack of preference for one strategy over the other. The lack of consistency and ruling of one syntactic analysis over the other could be attributed to the cognitive demands the parser engages in. In other words, cognitive load limits the parser to low attachment, i.e., late closure, to minimize the memory load by attaching the incoming material to the most local prior structure. The experiment of Frenck-Mestre and Pynte (1997) provided additional support for this assumption. They investigated the resolution strategies of English-speaking French L2 learners and French native speaker in an eye-tracking study involving prepositional phrases as noun-phrase attachment (low attachment) as in (9) or verb-phrase attachment (high attachment) as in (10):

(9) He rejected the manuscript on purpose because he hated its author.
(10) He rejected the manuscript on horses because he hated its author.

(Frenck-Mestre & Pynte, 1997)

The analysis of eye movements showed that verb-phrase attachment (high attachment; early closure) was more difficult for L2 speakers than native speakers. It is proposed by the authors that nonnative speakers favor low attachment strategy because it is less costly. Although these studies (Dussias, 2003; Frenck-Mestra & Pynte, 1997) observe some effects of lexical information on parsing, the results do not provide conclusive evidence for lexical-semantic information overriding syntactic principles.

Additional evidence supporting the SSH can be taken from electrophysiological (ERP) studies. Hahne and Friederici (2001) conducted an ERP study with Japanese-speaking German L2 learners and recoded their brain responses to either correct, semantically incorrect, syntactically incorrect or both semantically and syntactically incorrect sentences during listening as exemplified below (11):

(11)

a. The bread was eaten. (correct)
b. The volcano was eaten. (semantically incorrect)
c. The ice cream was in-the eaten. (syntactically incorrect)
d. The door lock was in-the eaten. (both semantically and syntactically incorrect)

(Hahne & Friederici, 2001)

N400 and P600 components (i.e., voltage fluctuations reflecting neural activity) are of specific interest for language processing (see Kutas et al., 2006 for a review). The target word in a pre-arranged time window leads to modulation differences of these components in comparison to a control word and elicits an ERP waveform (approximately 400ms after the critical sentence-final word for the N400 component and 600-900ms for the P600 component). The presence or absence of these effects in language studies attributes some functional roles to these components: N400 effect for semantic processes and P600 effect for syntactic aspects (Hahne & Friederici, 2001). The amplitude of the N400 effect is negatively correlated with the expectancy of the word; therefore, it is assumed to reflect lexical-semantic interaction processes. For syntactic integration, the effects of phrase structure or word-category violations are observed over the left anterior scalp, and thus called LAN (left anterior negativity). In this study, L2 learners and native speakers showed similar N400 effects for semantically incorrect sentences. However, significant P600 effects or early anterior negativities were not observed for sentences with phrase structure violation with L2 learners, which is usually observable in native speakers. Overall findings of the study suggest that L2 learners may have reduced ability to use syntactic information during processing, though the evidence is not conclusive. Still, such activation or limited activation patterns provide evidence for the SSH indirectly.

The supportive evidence for the SSH or the findings that the SSH based on extensively comes from either the studies of ambiguity resolution or wh-dependencies, which is a limited set of phenomena. Therefore, Clahsen and Felser (2006a) themselves stated that whether these findings in support of the SSH are generalizable across other

morphosyntactic domains is not clear. As part of further investigation, Felser, Sato, and Bertenshaw (2009) and Felser and Cunnings (2012) set out to explore the processing of reflexive pronouns by nonnative speakers (German-speaking learners of English). In generative syntax, structural constraints on the reference of reflexives are determined by binding principle A (Chomsky, 1981). English is a strict language regarding the binding properties of reflexives than other languages and binding principle A states that the reflexive must be bound by its binding domain, which is the closest c-commanding antecedent (Chomsky, 1981). For example, given Mary said that Julia had killed herself, Julia is the accessible, i.e., binding-theoretically appropriate, entity whereas Mary is referred to as the inaccessible referent, i.e., violating the Principle A. Previous work provides evidence for native English speakers' adherence to principle A in both online and offline tasks (as cited in Felser & Cunnings, 2012). As for L2 learners, the evidence suggests that nonnative speakers may more strongly be guided by pragmatic or discourse-related constraints while disregarding syntactic requirements in their offline interpretations as opposed to native speakers (Demirci, 2000; 2001). However, the role of nonstructural factors during online anaphora resolution has still been under investigation. In an online eye-tracking experiment, Felser and Cunnings (2012) investigated to what extent L2 learners consider inaccessible antecedent (i.e., non-local antecedent violating the binding principle) as a referent with a language similar to English in respect to binding constraints. To evaluate participants' knowledge of binding Principle A, an offline multiple-choice task was given, and nonnative participants performed at ceiling in the task, ensuring that they are aware of the structural binding requirements. The materials used in the online task consisted of a context sentence followed by a critical sentence with a reflexive and a wrap-up sentence. Gender congruence between the inaccessible antecedent and the reflexive as well as between the accessible antecedent and the reflexive were manipulated so that there were some match and mismatch cases both for accessible and inaccessible referents. A sample set of example sentences can be seen below:

(12) (James/Helen) has worked at the army hospital for years.

(He/She) noticed that the soldier had wounded (himself/herself) while on duty in the Far East.
Life must be difficult when you are in the army.

(Felser & Cunnings, 2012)

The findings demonstrated that despite having performed native-like in reflexive binding in an offline comprehension task, L2 learners prioritized and tried to link discourse-prominent but structurally inappropriate entities when first encountered a reflexive, unlike native speakers. From the perspective of the SSH, the results can be interpreted as structure-based principles (e.g., Principle A) may not be integrated initially because the syntactic configurations may lack enough details or cannot be retrieved rapidly enough. Rather, nonstructural information such as semantics and discourse-based routes may be applied faster and structural constraints become of secondary importance (Felser et al., 2009; Felser & Cunnings, 2012).

On the other hand, there are some misunderstandings in second language processing literature regarding the SSH. The SSH is interpreted as L2 speakers fail to utilize syntactic information at all in sentence processing (Dekydtspotter, Miller, Schaefer, Chang & Kim, 2010). According to Clahsen and Felser (2018), this is an "overstatement" of the hypothesis. Without syntax, it would not be logical for L2 speakers to comprehend simple sentences such as The walls are painted by the students. Complete lack of syntax or unavailability of syntactic information is clearly not what the SSH proposes even for the lower level speakers: The SSH claims that L2 speakers underuse syntactic information in on-line processing (Clahsen & Felser, 2006a). Although the main argument of the SSH is the emphasis on the efficient use of nongrammatical information by L2 learners, it does not claim that discourse-related information and the context is the only parsing strategy that nonnative speakers employ, nor lack of syntax (see Slabakova, 2009).

Another criticism is related to the fact that the SSH appears to have too broad explanations for the distinction between the parser and the grammar. To clarify the

issue, the SSH differentiates linguistic knowledge and parsing mechanisms of nonnative speakers (Clahsen & Felser, 2006b). It is either the fact that syntactic knowledge and parser are simply different operations or syntactic knowledge feeds the parser during comprehension and production. The empirical evidence for these assumptions can be found in which offline/online comprehension differences are evident. For example, Tokowicz and MacWhinney (2005) reported that English-speaking Spanish L2 learners showed sensitivity to grammatical violations in ERP measures, which is not observed in offline grammatical judgments. In contrast, in Felser and Cunnings (2012), offline interpretations of English reflexives by L2 speakers was nativelike whereas their parsing decisions were not constrained by their grammatical knowledge. Finally, the SSH speculates that L2 speakers and their reduced ability to apply nativelike parsing strategies might hinder automatization but does not propose that L2 learners "can never achieve native-like syntactic parsing" as stated by Dallas, DeDe and Nicol (2013, p. 770).

In summary, the SSH has inspired several research studies on sentence processing in nonnative speakers. Although the grammatical phenomena under investigation were limited (i.e., most research investigated wh-dependencies or ambiguity resolution), the research concluded that L2 speakers tend to have difficulties in building or manipulating grammatical representations on-line, and thus are strongly guided by semantic, pragmatic, or surface-level cues (Clahsen & Felser, 2018).

The second group of research investigating the assumption that comprehension in the second language is overall slower and less accurate emphasizes the reduced ability of nonnative speakers to predict upcoming words as opposed to native speakers. Martin, Thierry, Kuipers, Boutonn, Foucart and Costa (2013) carried out an ERP study with late Spanish-speaking English bilinguals to investigate whether lexical prediction is available in L2 based on incrementally build up message-level representations. They used a similar paradigm to Delong et al. (2005); thus, ERPs were recorded while participants read sentences ending in an expected or unexpected noun. Experimental

sentences included an expected/an unexpected noun starting with a vowel/a consonant as shown in (13) and (14). All the sentences were semantically and syntactically correct, but final noun-phrase was more expected in one case. The final noun-phrases were determined based on an offline cloze probability test conducted with 21 native speakers and 20 L2 speakers. Cloze probability ratings were not significantly different between native and nonnative speakers.

(13) As it is rainy, it is better to go out with an umbrella/a raincoat. (expected/unexpected)
(14) She has a nice voice and always wanted to be a singer/an artist. (expected/unexpected)

(De Long et al., 2005)

Assuming that lexical prediction is indexed with the N400 effect and greater negative N400 results in less prediction (i.e., more surprisal), both native and nonnative speakers showed greater N400 amplitudes for unexpected final nouns than expected ones. However, expectedly, this expectation effect was significantly smaller in nonnative speakers. The presence of the N400 effect reveals that L2 speakers do experience processing difficulties for the unexpected case, so they are capable of activating semantic relatedness. The difference between L1 and L2 speakers can be attributed to the fact that native speakers make efficient use of message-level context as well as lexical prediction whereas comprehension is facilitated only by message-level contexts in L2 speakers. Overall, these findings illustrated that L2 speakers do not actively generate predictions for the upcoming input to the same extent as L1 speakers. Smaller N400 effects in L2 group suggests that lexical prediction is reduced or less efficient in nonnative processing, which in return concludes overall slower and less accurate processing mechanisms in L2 than in L1.

Gender-concord languages such as Spanish and German provide further evidence for the reduced ability of nonnative speakers to predict. Among many others, Lew-Williams and Fernald (2010), Grüter et al. (2012) and Dussias et al. (2013) conducted a combination of online/offline and production/comprehension studies with L2 Spanish

learners. Spanish has two grammatical genders as masculine and feminine, which are overtly marked at the preceding article. Lew-Williams and Fernald (2010) explored to what extent L2 speakers of Spanish incrementally process gender-marked articles ($la_{[fem]}$/$el_{[masc]}$) in comparison to native speakers. In Experiment 1, participants saw a visual display with two pictures, having either the same syntactic or different gender. Participants were expected to direct their eye movements to the gender-marked object after hearing the instructions as Find the$_{MASC}$/ the$_{FEM}$… (Encuentra el/la…), but without the noun. The stimuli consist of eight article-noun pairs half feminine and half masculine (such as la pelota "ball" and el caballo "horse"). Before the experiment, it was ensured that L2 speakers were familiar with the picture-noun matches. Results from Exp-1 revealed that although native speakers directed their eyes more rapidly on a different-gender case (i.e., when the determiner is informative), nonnative speakers did not use the disambiguating gender-marked determiner as the predictive cue. One factor accounting for the processing differences is that L1 and L2 speakers differ extensively in their previous exposure to the article-noun pairs in the study. Because L2 speakers learned the language in a classroom setting, the frequency and exposure to the specific noun may account for the differences. In order to minimize age and experience related factors, in Exp-2 and Exp-3, Lew-Williams and Fernald (2010) were first trained and tested on novel nouns with informative gender-marked determiners to see whether L2 adults would exhibit any processing advantage. However, L2 learners did not take advantage of predictive gender cues in Exp-3, as well. Overall, the findings confirmed the reduced ability of nonnative speakers to actively use lexical information and it is attributed to the lack of automatization in L2 as L2 speakers learn about gender concord in a classroom environment, which is less likely to orient nonnative speakers to predictive processing.

Grüter et al. (2012) extended the previous work on grammatical gender processing and investigated whether the previously observed effects are production-specific problems or related to the retrieval of the gender-marked information in online language use. They also wanted to ensure the reduced ability of L2 learners is due to assignment

errors rather than agreement errors. In a sentence-picture matching task, highly advanced L2 participants performed like native speakers, which suggests that learners successfully acquired the gender feature in the target language. Following the first experiment, a production task was designed to evaluate whether nonnative speakers have difficulty in gender assignment or agreement in spoken production. Participants were provided with two images of an object (such as mariposa "butterfly") in two different colors or shape and then asked to choose one by naming it (¿Cuál mariposa prefieres? 'Which butterfly do you like better?"). The findings in the production experiment suggested that the persistent difficulty with grammatical gender in nonnative speakers can be attributed to lexical properties of the gender, not the syntactic one. Although participants performed at ceiling in the offline task, they committed production errors, mostly assignment errors of a lexical nature, and showed weaker use of predictive gender cues in online processing. The reduced ability of nonnative speakers to generate hypothesis was attributed to the differences in word learning environment because the differences between L1 and L2 were linked to associations between the words and what is available as gender nodes in both lexicons.

Previous gender agreement studies outline here included participants from a non-gender-concord first language (such as English). To check whether speaking a language which has gender-marked articles facilities L2 processing or not, Dussias et al. (2013) designed an eye-tracking study with Italian-speaking Spanish learners. In addition to the different participant profiles, they embedded critical determine-noun combinations in a richer and more varied context unlike previous studies which used spoken instructions in an invariant context (e.g., "find the ball"). The facilitative effect of invariant context for prediction and recognition of the upcoming nouns is emphasized in expectancy-based processing accounts (e.g., Levy, 2008) and presumably sentences in invariant context result in fewer cognitive demands in comparison to elaborated pragmatically rich contexts. Therefore, this study aimed to investigate the effect of overlapping gender system in L1 with the L2 on predictive processing and the effect of contexts manipulated as variant (unlike previous studies)

and richer. The experiments with native speakers replicated the findings of previous research, and so will not be repeated (Lew-Williams & Fernald, 2010; Grüter et al., 2012). The first noteworthy finding here was the fact that participants were able to anticipate the upcoming information and gender-marked articles facilities processing even when critical nouns are embedded in rich contexts. In other words, when participants were to attend other properties of the sentence (i.e., semantic processing for plausibility), they could still exploit gender-marked cues rapidly to anticipate and comprehend the message. These findings indirectly prove that previous findings were not merely a product of experimental design. Regarding the learner data, both English-Spanish and Italian-Spanish bilinguals demonstrated sensitivity to gender concord in Spanish, though the sensitivity was dependent on proficiency. This result is essential because it highlights that L2 learners are capable of integrating information about gender in Spanish rapidly in a resource demanding task, which requires a task of clicking on the visual and evaluating the semantic plausibility of the sentence at the same time. In contrast to previous studies proposing L2 and native speakers differ in respect to sentence processing and anticipatory abilities (Martin et al., 2013; Lew-Williams and Fernald, 2010; Grüter et al., 2012), Dussias et al., (2013)'s findings run counter to the previous evidence. Interestingly, Italian-speaking Spanish learners in this study anticipated the noun with a feminine determiner but did not anticipate the noun with a masculine determiner. This contradictory result was apparently attributed to the existence of two masculine determiners in Italian, but only one in Spanish. However, the question remaining for further examination here is not only about whether L2 learners and native speakers differ in employing predictive mechanisms, but also about what drives these mechanisms (Kaan, 2014).

In summary, the RAGE hypothesis, which is proposed to account for the differences between native and nonnative sentence processing, attributes the differences to the reduced ability of L2 speakers to anticipate linguistic information. The premise of the RAGE hypothesis is that cognitive resources are exhausted in integration of lexical and

syntactic information, and so limited proactive processes become available for prediction (Grüter et al., 2014; 2017).

The SSH and the RAGE are convergent on the idea that nonnative processing is qualitatively different from one another, but divergent on the underlying reasons. While the SSH emphasizes the dominance of surface-level information over the detailed syntactic representations, the RAGE posits that L2 speakers do have detailed syntactic representations, and therefore, limited resources become available for anticipation, and as a result, processing delays and/or difficulties arise. Thus, we set out to investigate whether Turkish speaking L2 learners of English would present a similar pattern to the previous assumptions (i.e., the SSH or the RAGE), or a different one at a grammatical phenomenon which is not investigated before. One limitation of the SSH as stated by Clahsen and Felser (2006a; 35) is the fact that the existing empirical studies have only looked at a restricted set of grammatical phenomena, and it is not clear whether the findings reported above generalize to other kinds of syntactic and morphological phenomena, or to languages or L1/L2 combinations other than those that have been examined thus far." Therefore, this study aims to fill this gap by providing evidence from conditional constructions, which are both syntactically and semantically complex for L2 learners, in a Turkish-English L1/L2 combination, which is also not tested before in this domain. Secondly, we aim to further test the intuition that Grüter and colleagues have for the limited capacity of the L2 processor due to lexical and structural integration. Different from the previous linguistics representations tested, conditionals do not include syntactic ambiguities or long-distance dependencies. The structure under investigation in this study, conditional constructions, is briefly outlined in the next section.

2.4. Conditionals

Conditionals are defined as "a relation between two propositions, the protasis (p) and the apodosis (q)" in logic (Comrie, 1986). During everyday communication,

conditional statements are widely used since they play a crucial role to motivate hypothetical thinking, express permissions, and obligations, suggest consequences and as a result influence people's behavior. Given an if p then q utterance, listeners are likely to assume a hypothetical situation p, and then link it to the computed consequence q, disregarding the not-p cases (Evans, Neilens, Handly & Over, 2008). These hypothetical states of affairs are described in a bi-clause structure of a subordinate clause (i.e., antecedent) and the main clause (i.e., consequent) (Comrie, 1986). Conditional utterances are difficult to isolate cross-linguistically, and do exist in many languages such as Greek, English, German, Chinese, Latin, Turkish and many others (Traugott, Meulen, Reilly & Ferguson, 1986), and may not be categorized in a unified way because of their semantic and syntactic complexity (Bowerman, 1986). In addition to the studies reporting the difficulty of acquisition of conditionals in L1 by children (Bowerman, 1986; Reilly, 1986; Crutchley, 2004), Celce-Murcia and Larsen-Freeman (1999) reports that conditionals are difficult to acquire for second language learners of English due to the syntactic and semantic complexities embedded in conditional constructions.

Semantic complexity of conditionals can be attributed to concepts such as contingency, hypotheticality, and inference. Contingency, which is a central property of most conditionals, refers to the causal dependency between the situation in the consequent clause and the situation in the antecedent. In other words, the occurrence of one event is contingent on the other in conditional utterances. Secondly, successful comprehension of conditionals requires readers to think hypothetically - i.e. to simulate situations which do not coincide with actuality. As for the last factor, the necessity of the ability to draw inferences about unknown situations on the basis of what is stated or explicit also contributes to the complex semantic nature of conditionals (Bowerman, 1986). Any absence of these cognitive prerequisites or a combination of these prerequisites would make the processing of conditional utterances difficult for both native and nonnative speakers.

As for syntactic complexity of conditionals, parameters of clause order, marking of conditionality, modal auxiliaries, negation and time reference (i.e., back-shifting in tense to label counterfactuality) can be taken into consideration (Comrie, 1986; Celce-Murcia & Larson-Freeman, 1999).

2.4.1 Conditionals in English and in Turkish

Semantic and cognitive complexity of conditional statements discussed in the previous section holds cross-linguistically. However, the syntactic representation of conditionals may vary across languages. Conditionals in English and Turkish are greatly different from each other in linguistics representation.

In English conditionals, the time (i.e., past, present, or future) and the truth-value (i.e., factual, possible, counterfactual) of the events are explained explicitly by three features of the verb phrases in both the subordinate and the main clause: [±past], [± perfect], and [±modal auxiliary]. Of semantically divided two main categories, factual conditionals express that on the condition that the antecedent clause is fulfilled, the likelihood of something occurring in the future can be entertained. In contrast, counterfactual conditionals, also named imaginative conditionals, refers to imaginative results that are assumed to become true when the situation in the antecedent clause, which cannot be fulfilled, is met. In English, factual future conditionals are usually expressed by the present tense; counterfactual present events are expressed by the past tense and counterfactual past events are expressed by the past perfect, which is called back-shifting in tense (Comrie, 1986). Realization of tense shifting in counterfactuals is one of the aspects that contributes to syntactic complexity of the conditionals among others such as modal auxiliaries, bi-clausal structure, tense and aspect (Celce-Murcia & Larsen-Freeman, 1999).

In addition to If-conditionals, there are also some meaning distinctions indicated by other conditional connectors. Unless, for example, marks conditions that are exclusive

or exceptive. In other words, it highlights the idea that no other condition will bring about the stated result. On the other hand, if and if…not express a weaker and neutral condition in which exclusion or exception was not emphasized. Thus, the semantic relationships described by these two conditional subordinators are different (Dancygier, 1985; Declerck & Reed, 2000; Geis, 1973). Since negativity in unless conditionals are signified in its exceptive nature, an explicit negation marker (-not) is not used with unless sentences, unlike if-conditionals (Wright & Hull, 1986). Moreover, unless is thought to be more difficult than other conditionals because it implies negative entailment (Wing & Scholnick 1981). In other words, the truth of relationships expressed by unless implies the falseness of the other: If one proposition is true, the other is necessarily false. Thus, unless may require an extra step in processing.

In Turkish, there are four markings for the subordinate clause of a conditional with some differences and overlaps in meaning: (i) -(y)sA (usually attached to aorist -(A/I)r or -mAz) (ii) -sA (iii) -sAydI (-sA+past copula) (iv) -sAymIş (-sA+evidential copula) (Göksel & Kerslake, 2005). These postclitic copular morphemes correspond to the unbound copular morpheme -ise, which both mean "if" (Kornfilt, 1997). To express a condition which cannot be fulfilled (i.e., counterfactuals), -sAydI is used. It is also possible in Turkish to construct conditional constructions without conditional suffixes. These kinds of forms resemble the non-finite adverbial constructions (as in 15). Whereas if-conditionals are expressed with a conditional marker (-sA), unless is represented without a conditional suffix. The equivalent of unless is -mEdIkçE in Turkish, with an explicit negative marker (Bakırlı, 2010). Linguistic representation of unless in Turkish can be seen in (15) below.

(15)

'Sonuç-lar-a dikkat çek{me-dikçe}, insan-lar uyarıy-ı göz ardı eder-ler.'

Result-PL-DAT point-out -NEG-COND.COP, people-PL warning-ACC ignore-AOR-3PL.

{Unless} you point out the consequences, people ignore the warning.
(Bakırlı, 2010)

In sum, although hypotheticality and counterfactuality are commonly expressed by conditional constructions in both languages, the syntactic representations differ. Turkish requires an explicit negation marker for unless constructions whereas in English an overt negation marker violates grammaticality of the sentences.

2.4.2 Previous Research on Acquisition of Conditionals

Most of the research conducted in L1 points out that conditional sentences appear late in children's speech, usually through the end of the third year of age (Bowerman, 1986; Reilly, 1986). While factual conditionals (such as Present Generic and Future Predictive) emerged fairly early, counterfactuals were very late. Wing and Scholnick (1981) investigated the acquisition order of several subordinating conjunctions (because, although, if and unless) and reported that children were more accurate in their judgments when the events in two clauses were positively connected as in if and because than negatively related as in unless and although. As an expression of negative entailment and uncertainty, unless is reported to be the most difficulty conjunction for children to evaluate (Wing & Scholnick, 1981). Crutchley (2004) explored the acquisition of past counterfactuals as in If she had shut the door, the rabbit wouldn't have escaped using an elicitation task with 6- to 11-year old children. The results also show that children start using target counterfactuals at the age of six, and the frequency and accuracy of past counterfactuals gradually increase by age. However, there were some 11-year-old children unable to produce target structures, suggesting that by age 11 the control of the past counterfactuals may not completely be achieved.

Assuming that the pattern in L1 acquisition can be transferrable to L2 acquisition, a limited number of acquisition of conditionals in L2 studies are carried out. Berent (1985) investigated the acquisition order of English conditionals in learners from

different L1 backgrounds and examined developmental differences of the learners. Factual conditionals are labeled as the easiest to acquire, followed by unreal conditionals and past unreal conditionals, respectively by proficiency, which was in line with the acquisition order followed by children. Furthermore, in a production study by Chinese-speaking L2 English learners conducted by Chou (2000), L2 learners showed systematic variation in their production, which was taken as the indication of L1 transfer effects. It is also important to highlight that L1 transfer effects interact with the syntactic complexity of English conditionals, more difficult constructions resulting in more L1 interference.

CHAPTER 3

EXPERIMENT

This chapter revisits the aim of this study followed by the detailed information regarding the methodology. A detailed description of the experimental tool, participants, materials and design, the procedures and data trimming phases are provided below.

3.1 Aim

With the purpose of investigating how Turkish-speaking L2 speakers of English process conditionals in real-time, an on-line self-paced reading task was conducted. The aim of this experiment was to explore the processing patterns of nonnative speakers on a construction that is syntactically and semantically complex and to find out whether L2 learners process conditionals in an incremental fashion.

3.2 Method

3.2.1 Self-Paced Reading Task

Self-paced reading (SPR) is a computerized method of recording reading times (RTs) for a pre-determined word or a phrase. It is called self-paced or subject-paced since participants themselves determine how long they spent in each segment. The first segment of the sentence appears upon a button-press with a series of dashes, which suggest that there are more masked segments. When the participant is ready to continue, upon a second button-press the next segment appears and so on (Jegerski, 2014). In our study, a noncumulative linear display was chosen, in which only one

segment at a time visible and each new button press reveals a new segment while re-masking the previous one. SPR is often used to examine processing difficulties as a result of ambiguities, syntactic anomalies and distance dependencies (Jegerski, 2014). In our study, SPR was designed to record reading times for a violation of a syntactic rule (i.e., syntactic anomalies) and discourse-related anomalies (congruent context versus incongruent context) since longer RTs are accepted as indicators of processing difficulties and shorter RTs as the effect of facilitation. In addition, SPR enables to test implicit grammar knowledge more accurately than an offline method because L2 learners cannot make use of their explicit grammar knowledge efficiently due to time pressure. Our assumption is that stimuli with syntactic anomalies will induce longer RTs at or after the violation if only participants can detect anomalies, which suggests the difficulty parser tries to incorporate a word that does not match the previous structure, and this will enable us to come up with a processing pattern for nonnative speakers.

3.2.2. Participants

The participants of this study comprised of 124 adult Turkish-speaking L2 learners of English aged between 19 and 29 (M = 21.89, SD = 1.55). There were 25 male and 99 female participants in total. All participants were native speakers of Turkish and only three of the participants reported themselves being Turkish-Kurdish, Turkish-Arabic, and Turkish-Bosnian Serbian bilinguals.

Table 1. *Participants' Characteristics*

	L2 Group (n=124)			L1 Group (n=11)		
	Mean	Range	SD	Mean	Range	SD
Age (years)	21.94	20-37	2.03	29.36	25-43	5.37
Age of onset (years)	9.72	4-16	1.66			

Table 1. *Participants' Characteristics (Cont'd)*

Length of exposure (years)	12.04	4-25	2.57
Proficiency (OPT scores)	46.95	37-60	5.21

They were selected from the undergraduate student population of English Language Teaching Department of Middle East Technical University. As we are interested in how proficient L2 learners process conditionals in their L2, all participants took a standardized English proficiency test (Oxford Quick Placement Test; Allan, 1992). Taking into consideration the construction under investigation, participants were chosen among upper intermediate, lower advanced and upper advanced proficiency levels. 11 participants were classified as upper-advanced level obtained scores between 55 and 60 (M = 56.90, SD = 1.92) and 59 participants were classified as lower-advanced level obtained scores between 48 and 54 (M = 49.67, SD =1.74) and 46 participants were classified as upper-intermediate level obtained scores between 40 and 47 (M =42.58, SD=1.72) and 8 participants were scored between 30 and 39 (M=38.36, SD=.91) and were classified as lower intermediate level. For simplicity, both upper- and low-intermediate learners will be referred as intermediate L2 learners and both upper- and low-advanced learners will be referred as advanced L2 learners in this study.

Of a total of 124 participants, the distribution of 124 participants across experimental lists as follows: 23 participants in List 1, 22 participants in List 2, 22 participants in List 3, 19 participants in List 4, 19 participants in List 5 and 19 participants in List 6.

Participants took part in the study on a voluntary basis. The first group of participants were given course credit for the participation and randomly selected 6 participants from the second group were given gift cards for their participation. Each participant took part in only one experimental list. The data was collected over a two-month period and all the participants were naive with respect to the purpose of the experiment or the

structure under investigation. When asked to describe what was being investigated, no participant reported the experimental manipulation correctly.

As a control group, 11 native speakers of English aged between 25 and 43 (M = 29.36, SD = 5.37) took part in the study. 5 of them were English language teachers and 6 of them were teachers of other subjects. All the participants took part in the study on a voluntary basis.

3.2.3 Materials and Design

The study modeled after Stewart et al. (2009) presented participants with a two-sentence-long discourse. The first sentence was the context sentence either in the congruent or incongruent condition, which was followed by a sentence composed of a subordinate clause and a main clause. Each subordinate clause begins either with a conditional (unless, if…not, unless…not) or causal conjunction (because, since). In total, there were 24 critical items and 16 filler items, and each connector condition composed of 8 sentences. Of these 8 sentences, 4 appeared in congruent contexts and 4 in incongruent contexts. We manipulated the Context Type (congruent, incongruent) and Connector Type (unless, unless…not, if…not, since, because) as between-subjects factors. Each participant only took part in one of the lists either with X or with Y (see Appendix D for a full list)

Six different counterbalanced lists were created so that each list included 24 critical and 16 filler items and each experimental item was tested in all the conditions (connector-wise and context-wise). Each list was pseudo-randomized so that two critical items from the same condition does not appear consecutively. Unlike Stewart et al. (2009)'s study, all the critical items and filler items were modified such that each context sentence required participants to make simple inferences rather than explicitly given factual statements. Each experimental stimulus started with a context sentence, starting with an agent who is either interested in something (as in John is interested in

pastry arts) or knows a lot about a concept (as in Mary knows a lot about flowers) in congruent contexts, or not interested in something (as in John is not interested in pastry arts) or now knowing anything about a concept (as in Mary doesn't know anything about flowers) in incongruent context.

Then, the sentence followed either by a matching profession (i.e., in a context given "knowing a lot about flowers", the profession was "a florist") or a mismatch (i.e., in a incongruent context given "not knowing anything about flowers", the profession was again "a florist"). A sample item for each condition was presented in (16) and (17). Before the experiment was administered, the experimental sentences were piloted by a group of non-native speakers. As a result of their judgments, the test items were revised several times. After the items were finalized, two native speakers of English rated the plausibility of the sentences and they reported that the sentences were plausible.

(16) Sample Critical Item:
Congruent Context:
a. Betty is interested in sea life.
Unless/If Betty had (not) once been a marine biologist, she wouldn't be leading research on dolphins now.
b. Incongruent Context:
Betty isn't interested in sea life.
Unless/If Betty had (not) once been a marine biologist, she wouldn't be leading research on dolphins now.

(17) Sample Filler Item:
a. Congruent Context:
Clara knows a lot about holiday destinations.
Since/Because Clara had once been a travel agent, she can advise student travel club now
b. Incongruent Context:
Clara doesn't know anything about holiday destinations.
Since/Because Clara had once been a travel agent, she can advise student travel club now.

All the conditional sentences were counterfactuals. The counterfactual sentences were chosen on purpose because we wanted to create a clear match or mismatch between the

context sentence and the conditional with no room for other possibilities. Given a context statement "Mary knows a lot about flowers", in a counterfactual conditional such as "If Mary hadn't once been a florist…", it is plausible to suppose that "Mary was a florist at some time in the past". Or, in an incongruent context "Mary doesn't know anything about flowers", the counterfactual "If Mary hadn't once been a florist" does not make any sense because of the mismatch, which is the desired effect we wanted to create. In contrast, given the same context statement "Mary knows a lot about flowers", in an indicative conditional such as "If Mary is not a florist…", it sounds infelicitous to utter such a sentence because indicative conditionals refer to future probabilities, and it is hard to argue whether there is a match or mismatch between the context and the indicative conditional.

Each experimental item was divided into eight segments, and the division of the sentences into segments was as follows: the conditional conjunction or causal conjunction (Segment 1), the subject NP (Segment 2), the (negated) copula (Segment 3), an adjectival phrase and the pronoun (Segment 4), the (negated) auxiliary (Segment 5), the verb (Segment 6), the object NP (Segment 7) and the adverbial phrase (Segment 8). A sample division is illustrated below in Table 2.

Table 2. *The Division of Experimental Items by Each Time Window*

Segment 1	**Segment 2**	**Segment 3**	**Segment 4**
Unless/If	Mary	had (not) once been	a marine biologist, she
Segment 5	**Segment 6**	**Segment 7**	**Segment 8**
wouldn't	lead	research on dolphins	now.

Participants were also presented a simple Yes/No comprehension question after randomly at 50% of the trials (12 for critical items and 8 for filler items). Participants' responses and reading times were recorded with millisecond accuracy.

Furthermore, as a complementary data collection tool, a grammaticality judgment task (GJT) was designed (see Appendix C). The aim of this task was to directly test explicit grammar competence/knowledge of participants on the structure under investigation. Since offline techniques are not considered as efficient as online methods due to impracticality of masking the data for exploration of mental processes, it was utilized as a complementary tool. The same experimental items used in SPR task were used, but there was no context condition here. Participants were provided with sentences in isolation and asked to decide whether the given utterance is grammatical or not. In total, there were 20 items (12 critical and 8 filler); 4 sentences for each connector condition (unless, unless…not, if…not, since, because). If one experimental item was labeled as ungrammatical, participants were instructed to provide a reason for the ungrammaticality. The GJT comprised of the same experimental items because we wanted to see whether L2 learners in this study had acquired the syntactic rules governing conditionals and were able to utilize online. The use of the same experimental items was also aimed to exploit any possible differences in L2 learners' offline and online competence. Since the items used in the GJT was the same, the GJT was applied at least two weeks later than the SPR task. The GJT data was collected using an online data collection platform.

The experimental items and the design were reviewed and approved by METU Ethics Committee prior to data collection (see Appendix A) for ethical considerations.

3.2.4 Procedure

The SPR experiment was conducted on an ASUS laptop computer with a 15.6-inch monitor, controlled by Open Sesame psychological software version 3.2.8 (Matôt, Schreij & Theeuwes, 2012) and participant responses were collected upon a keyboard button-press. All data were collected through the same computer in order to eliminate any chance of device-based fluctuations. The SPR experiment was piloted on 3 subjects

and required modifications (such as font point and instructions) were applied upon participants' feedback.

Before the experiment, the participants were given an informed consent form and a language background questionnaire to collect biodata of the participants (see Appendix B for the language background questionnaire). To eliminate any kind of distraction, participants were individually taken into a silent room dedicated for experimental purposes and their cellphones were taken away. Oral description of the experiment was provided, and participants were told to read the sentences at their own pace (they were instructed not to try to be faster than their normal pace) and as quickly and accurately as possible. As well as verbal instructions, participants were also provided with written instructions in their native language. They were told that they would be presented with several sentences on a segment-by-segment basis. In order to continue, they were instructed that they had to press "Space" bar on the keyboard at their own pace. Participants were also warned beforehand that each new button press would be blanked out the previous segment so they would see only one segment at a time. They were informed that a Yes/No comprehension question might appear at the end of the sentences. If so, they were reminded that they had to respond as quickly and accurately as possible, as well. The participants responded by pressing a designed button on the keyboard (Y-Yes; N-No), and then the next trial began. Before the real experiment started, participants were exposed to 4 practice sentences (2 of them with a comprehension question) to become familiar with the procedures of the SPR. The experiment approximately took 15 minutes to complete and no break was given.

After the SPR experiment, participants were provided with a link to Oxford Quick Placement Test (OQP) and instructed to complete it individually. After two weeks, participants were also sent a link to GJT. All the participants completed both OQP test and GJT.

3.2.4 Data Trimming

Before the analysis, the data collected in the SPR task was analyzed in two steps. First, participants' responses to comprehension questions were analyzed. If a participant answered fewer than 80% of the comprehension questions correctly (16 correct responses were targeted out of 20 questions), then the participant was excluded from the data set to make sure the participants devoted enough attention to the task itself (Nikolayeva, Buz, Liu, Watts & Jaeger, 2015). According to the accuracy rates in the comprehension questions, a total of 12 participants were excluded from the data set (2 participants from List 1, 3 participants from List 2, 1 participant from List 3, 2 Participants from List 5 and 4 participants from List 6) and the final data set included 112 participants. This exclusion caused around 9.67% of data loss.

The second step was the exclusion of outliers. Typically, any trials with reading times of less than 100 ms (per region), which might be an indication of not real reading behavior, and above 3000 ms (per region) for native and 4000 ms (per region) for nonnative readers, which indicates external distraction factors, for all the participants, can be excluded from the final analysis, and they are usually referred to as outliers (Nikolayeva et al., 2015; Havik, Roberts, Schreuder & Haverkort, 2009). To increase the power of parametric tests, outliers were eliminated from the data set, and the missing values were replaced by all the other participants' mean RTs in relevant condition in relevant region. In addition, further outliers by condition per each segment were detected by Quartile calculation in Microsoft Excel (Hubert & Vandervieren, 2008). The quartile is a dividing point that splits the data into 3 quarters. The first quarter (Q1) is based on lower values and the third quarter (Q3) is based on upper portion of the data. The difference between the two is called inter-quartile range (IQR). By statistical definition, outliers are based outside the IQR, which is 1.5 times below or above the IQR. After detecting and excluding the outliers (approximately 8% of the data), the missing values were replaced with the mean RT for each participant in the relevant condition. In other words, the missing values were replaced by all the other

participants' mean RTs in relevant condition in relevant region. The same data trimming procedure applied to control group's data, as well. Approximately 3% of the data were detected as outliers and the same replacement procedure took place for the control group. The final set of data was analyzed through a statistical analysis software, SPSS version 25.0.

CHAPTER 4

RESULTS AND DISCUSSION

This chapter comprises two main sections: The results of Grammaticality Judgment Task and Self-paced Reading Task are reported. The results of reading times in nonnative and native speakers are analyzed separately. Finally, the results are discussed with specific reference to earlier studies in the literature.

4.1 Grammaticality Judgment Task

This offline Grammaticality Judgment Task was conducted to test L2 learners' sensitivity to syntactic anomalies regarding the use of conditionals and to compare the patterns in their offline and online judgments.

A total of 121 participants completed the GJT and there were 484 responses by each condition in total (4 sentences in each connector type). The judgments of the participants for unless and if…not condition as "grammatical" and for unless…not condition as "ungrammatical" were coded as accurate responses. For responses labeled as "ungrammatical", participants were also asked to explain the reasons behind ungrammaticality. The analysis of the accuracy of responses and quantitative responses were done manually. Table 3 below shows frequency rates of accurate responses by connector type.

Table 3. *Accuracy Rates in GJT by Connector Type*

	Total Accurate Responses	**Accuracy Rates**
If…not	452 / 484	93.88 %
Unless	388 / 484	86.78 %
Unless…not	456 / 484	94.22 %

As shown in Table 3, 94.22% of the participants were able to detect syntactic anomalies in unless…not condition. When the reasons provided analyzed, 71.92% of this group stated that "unless cannot be used in negative sentences" and 10.53% of the group stated that "unless should be replaced with another connector such as if or a causal one". That is, of this 94.22% of participants, only 82.45% of them were able to detect ungrammaticality with an accurate reason. The rest attributed ungrammaticality to the place of time adverbial once or unless not being used in mixed type conditionals, which are not true. In fact, the reasons provided for the ungrammaticality of sentences in unless and if…not condition was in parallel with the same misconception.

4.2 Reading Times

After the data trimming and exclusion, the final set of data included 112 participants from six different lists. To remind the content of each segment, the regions were repeated in Table 4. The dataset was analyzed to explore the possible effects of Self-priming, Proficiency, Connector Type, Context Type, Reading Speed, and Native Language and the results were reported separately below.

Table 4. *The Division of Experimental Items by Each Time Window*

Segment 1	**Segment 2**	**Segment 3**	**Segment 4**
Unless/If	Mary	had (not) once been	a marine biologist, she
Segment 5	**Segment 6**	**Segment 7**	**Segment 8**
wouldn't	lead	research on dolphins	now.

4.2.1 Analysis of the Effect of Proficiency and Between-subjects Factors

For the analysis, an 8x3x2x2 repeated-measures analysis of variance (ANOVA) was conducted with Segment, Connector Type (unless, unless…not, if…not) and Coherence Type (congruent, incongruent) as within-subject factors and Proficiency (advanced, intermediate) as between-subject factors. The values of all analyses were Greenhouse-Geisser corrected for non-sphericity whenever applicable. This analysis demonstrated that there were a significant main effect of the segment [$F(2.69, 1204.95) = 1088.02$, $p<0.001$], the context [$F(1, 446) = 72.64$, $p<0.001$] and marginally significant effect of connector [$F(1.96, 877.49) = 3.02$, $p = 0.05$] as well as two-way interactions between segment and connector type [$F(6.40, 2861.79) = 18.25$, $p<0.001$], segment and context type [$F(3.26, 1455.31) = 19.99$, $p<0.001$], and connector type and context type [$F(2, 893.77) = 21.59$ $p<0.001$]. The effect of connector was not significant [$F(1.97, 878.49) = 2.89$, $p>0.05$], but there was a three-way interaction between segment, connector type and context type [$F(5.92, 2654.32) = 11.57$, $p<0.001$]. The effect of proficiency was not significant [$F(1, 446) = 1.11$, $p>0.05$] and there was no interaction between the proficiency and other factors.

Figure 2.1 illustrates the RTs participants show at each segment by each connector in congruent context and Figure 2.2 displays the RTs in the incongruent context. When these figures were compared, we saw that context congruent and incongruent versions do not look very different, except for Segment 3 in unless…not condition in incongruent contexts and Segment 4 in unless condition in congruent ones. There was an increase in RTs from Segment 2 to 3 and then to 4 (critical regions), and RTs decreased back in Segment 5 but increased once more in from Segment 6 to 7, with the integration cost of the verb in the matrix clause. To understand this pattern better and to unpack the source of interaction, we conducted separate analyses for each segment.

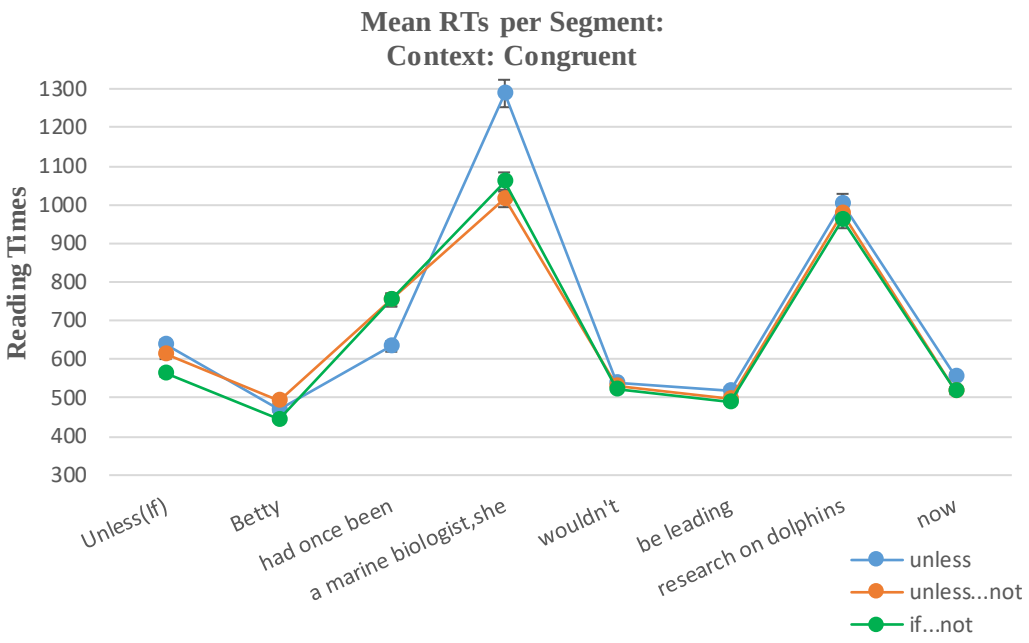


Figure 2.1. *Segment-by-Segment RTs in Congruent Context. Error bars show the standard error of the mean.*

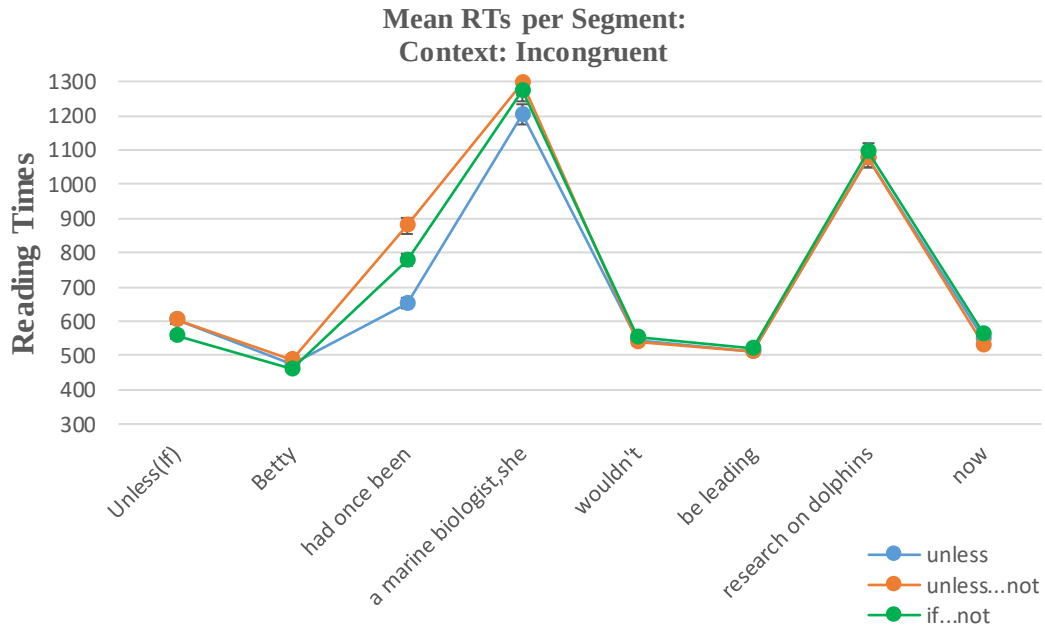


Figure 2.2: *Segment-by-Segment RTs in Incongruent Contexts. Error bars show the standard error of the mean.*

4.2.2 Analysis of Each Segment in L2 Speakers

Segment 1 compared two different connectors (unless vs if) in congruent and incongruent contexts. The ANOVA revealed a significant effect of connector type F (1.90, 850.53) = 20.64, $p<0.001$), but no significant main effect of context type ($p>0.05$). The pairwise comparisons showed that this was because of the significantly shorter RTs in if…not condition (M = 560.98, SD = 155.57) compared to unless (M = 620.92, SD = 212.92) and unless…not (M = 609.05, SD= 194.03) condition. That means, sentence-initial connector unless elicited significantly longer RTs then sentence-initial marker if across the context.

For Segment 1, the overall pattern suggests that participants read connector if significantly faster than unless, which is an expected pattern. Irrespective of the context, the discrepancy between RTs for unless and if can be attributed to two-step processing of unless. Here is our interpretation of this finding: If is acquired earlier, and then unless is coded as the negated or the exceptive version of if (i.e., if…not, except if or only if) (Wing & Scholnick, 1981). Wing & Scholnick (1981) states that unless expresses a more complex logical relation and it includes two non-positive beliefs; one is negative entailment and the other is uncertainty. Although the uncertainty belief is also evident in if, negative entailment requires an extra step in processing unless. Thus, as soon as participants read unless, they retrieve another conditional marker (i.e., if…not or except if), and thus it takes more time to process unless.

The next segment (Segment 2) is composed of a private name and only the effect of connector type was significant [F (1.95, 870.76) = 26.43, $p<0.001$]. The pairwise comparisons revealed that if…not condition (M = 452.92, SD = 99.80) elicited significantly shorter RTs than unless (M = 472.32, SD = 107.75) and unless…not (M = 489.93, SD = 118.37) condition. The pattern in this segment was the same as Segment 1, suggesting that it was due to a possible spill-over effect (Jegerski, 2014).

Segment 3 was the critical region in the study, where experimental manipulation occurred. It investigated the effect of negation marker (-not) in sentences with unless and if. The manipulation in this region enabled us to have three different marker type as unless, unless…not and if…not. The effect of connector type [F (1.887, 843.282) = 71.221, p<0.001)] and context type [F (1, 447) = 23.041, p<0.001) were significant. There was also a significant interaction between connector type and context type [F (1.889, 844.394) = 8.947, p<0.001). The pairwise Bonferroni post hoc comparisons revealed that participants showed faster RTs for unless condition in congruent contexts (M = 633.33, SD = 286.67) as opposed to unless…not (M = 753.62, SD = 368.01) and if…not (M = 753.20, SD = 335.79) conditions in congruent contexts. The difference between unless…not and if…not in congruent contexts, however, was not significant. That is, participants read those regions equally faster. On the other hand, the pairwise comparisons for incongruent contexts showed that unless…not condition (M = 878.27, SD = 495.21) elicited significantly longer RTs than if…not (M = 779.24, SD = 377.285) and unless (M = 653.12 SD = 322.31) condition, respectively (as illustrated in Figure 3). In addition, the difference between unless…not in congruent and incongruent context was significant (p<0.001) whereas the difference between unless and if…not condition across context type was insignificant (p>0.001) (as shown in Table 5).

Table 5. *Post-hoc Comparisons of RTs in Each Connector Type and Context Type*

		Mean Difference	**SE**	**t**	**p** $_{bonf}$
if…not, congruent	if…not, incongruent	-26.033	19.950	-1.305	1.000
	unless, congruent	119.828	20.382	5.879	< .001
	unless, incongruent	100.092	20.652	4.847	< .001
	unless…not, congruent	-0.413	20.382	-0.020	1.000
	unless…not, incongruent	-125.065	20.652	-6.056	< .001

Table 5. *Post-hoc Comparisons of RTs in Each Connector Type and Context Type*

		Mean Difference	SE	t	p bonf
if…not, incongruent	unless, congruent	145.862	20.652	7.063	< .001
	unless, incongruent	126.125	20.382	6.188	< .001
	unless…not, congruent	25.621	20.652	1.241	1.000
	unless…not, incongruent	-99.031	20.382	-4.859	< .001
unless, congruent	unless, incongruent	-19.737	19.950	-0.989	1.000
	unless…not, congruent	-120.241	20.382	-5.899	< .001
	unless…not, incongruent	-244.893	20.652	-11.858	< .001
unless, incongruent	unless…not, congruent	-100.504	20.652	-4.867	< .001
	unless…not, incongruent	-225.156	20.382	-11.047	< .001
unless…not, congruent	unless…not, incongruent	-124.652	19.950	-6.248	< .001

Note. Bonferroni adjusted confidence intervals.

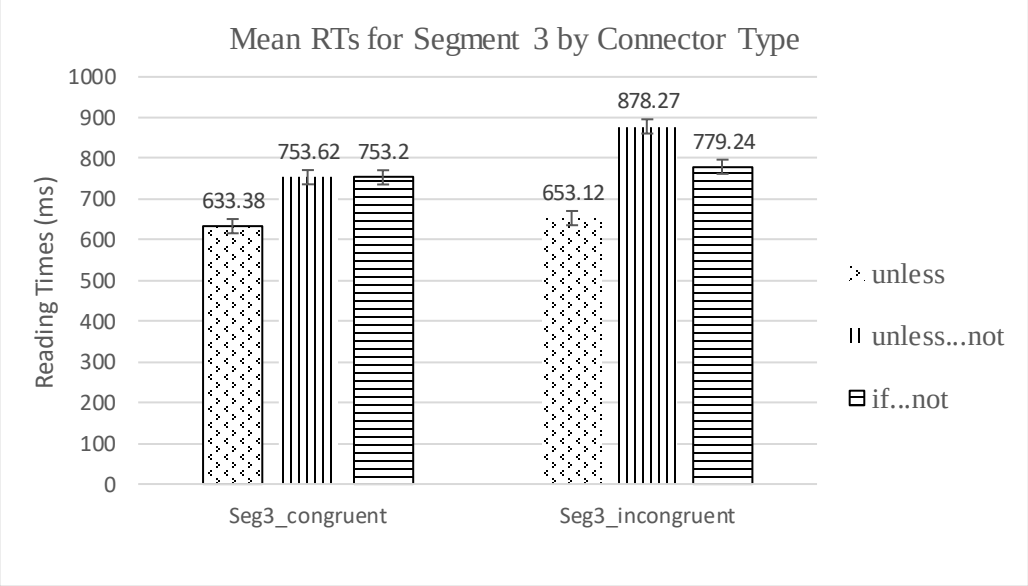


Figure 3. *Mean RTs for Segment 3 by Connector*Context. Error bars show the standard error of the mean.*

Segment 3 was the first region in which the main effect of context was present and thus participants' predictions about the upcoming structure would either be validated or not

here. After the exposure to the congruent context, participants must come up with a continuation. The predictions which we think they had generated were shown by region according to the elicited RTs in Table 4a and 4b. To begin with connector-wise differences, participants read if…not and unless…not condition equally slower than unless condition in congruent contexts. As predicted in Table 4, although their predictions are met in all these conditions, the overall slower processing of these two (if…not and unless…not) might be related to the processing of negation marker itself (Kaup, Lüdtke, Zwaan, 2006; 2007; Giora, Balaban, Fein, Alkabets, 2004; Giora, Fein, Aschkenaz, Alkabets-Zlozover, 2007). Two-step processing theory of negation proposes that negation facilitates both a state of affair being negated and a state of affair which is present. That is, to understand the negated sentence, initially, speakers should understand what is being negated. In other words, entertaining the situation described by an affirmative counterpart and then shifting to the negated state representation is what two-step processing theory of negation predicts (Kaup et al., 2006; 2007). Likewise, at this time-window, significantly faster integration of unless condition must be connected to lack of a negation marker. In congruent contexts, the preliminary results so far suggest that the expectation of the participants are not violated in Segment 3. Regarding the connector-wise differences in incongruent contexts, RTs in incongruent contexts presented a different pattern. Unless condition elicited significantly shorter RTs followed by if…not and unless…not condition, respectively. Unless producing shortest RTs seems to be matching the predictions formed by the participants at this time window (see Table 6.1 & 6.2).

As for context-wise differences, however, it is striking to discover that unless in incongruent context does not elicit longer RTs than congruent context, which is contrary to our expectations. One explanation for this lack of discrepancy between two conditions (unless in congruent vs unless in incongruent contexts) could be due to participants' inability to integrate discourse-level information online as efficiently as they should do (Grüter et al., 2014; Marull, 2017). It is proposed for L2 learners that the parser immediately deals with integrative processes (i.e., integrating incrementally

upcoming information) of lexical and syntactic information, and thus it is fully occupied. Little or no resources left for generating and updating predictions (Grüter et al., 2014). Therefore, our findings match with this proposal to the extent that without syntactic or lexical integration or violation of syntactic expectations, L2 learners are not able to update their expectations based on discourse-level cues. This may explain the lack of contextual integration effect in unless condition in Segment 3.

Seeing that the effect of context was observable in unless…not condition, longer RTs in incongruent context than in congruent context, but not in unless condition, we concluded that participants were expecting an overt negation marker (-not) in unless condition. Without their structural expectations being met, they were unable to integrate available context and fully comprehend the sentences in unless condition. This made us conclude that participants are able to disentangle the effect of discourse-level information as reflected in significantly longer RTs in incongruent contexts than congruent ones only in unless…not and if…not conditions.

On the other hand, as for context-wise differences in if…not condition, it is interesting that there is not a significant difference between RTs in congruent if…not condition and incongruent if…not condition for Segment 3 although participants produced longer RTs in the incongruent ones. We do not have a clear explanation for this, but the best explanation here would be the difference in processing time. Participants process sentences in if…not condition overall faster and thus, we can argue that processing may be shallower compared to unless…not condition. That's why the processing difficulty might not have been observed in Segment 3 just as it was evident in unless…not condition. That is, our participants might have read the sentences in unless…not more carefully and thus were able to detect discourse-based anomalies, unlike if…not condition. However, the lack of context effect in if…not condition in Segment 3 might be observed in later regions (e.g., Segment 4, as spill-over effect).

Table 6.1. *Predictions that Participants Might Have Generated by Each Region in the Subordinate Clause in Congruent Contexts*

Congruent Context Sentence:	**Mary knows a lot about flowers.**		
	If…not	Unless…not	Unless
Initial Expectation	[A florist], [someone interested in flowers]	[A florist], [someone interested in flowers]	[A florist], [someone interested in flowers]
Segment 1 & 2	[+hypotheticality]	[+hypotheticality]	[+hypotheticality]
Updated Expectation	[not florist]	[not florist]	[florist]
Segment 3	[not florist]	[not florist]	[florist]
Segment 4	[not florist]	[not florist]	[florist]**

Table 6.2. *Predictions that Participants Might Have Generated by Each Region in the Subordinate Clause in Incongruent Contexts*

Incongruent Context Sentence:	**Mary doesn't know anything about flowers.**		
	If…not	Unless…not	Unless
Initial Expectation	[Not a florist, not someone interested in flowers]	[Not a florist, someone not interested in flowers]	[Not a florist, someone not interested in flowers]
Segment 1 & 2	[+hypotheticality]	[+hypotheticality]	[+hypotheticality]
Updated Expectation	[florist]	[florist]	[sb else]
Segment 3	[florist]**	[florist]**	[sb else]
Segment 4	[florist]**	[florist]**	[sb else]**

Segment 4 was another region of interest in this study due to a possible spillover effect (Jegerski, 2014) and because of being an earlier resolution point. Spillover effect occurs as a result of the effect of experimental manipulation in a previous critical region. Thus, differences in RTs can happen both on the experimentally manipulated region (i.e., Segment 3 in this study) and several words later (i.e., Segment 4 in this study) (Jegerski,

2014). Normally, we would not expect a discourse-based resolution effect in Segment 4, but the results revealed that comprehenders did not wait until the clear resolution point later in the sentence (Segment 7).

For Segment 4, the main effects of connector [F (1.955, 874.09) = 7.503, p<0.001)] and context [F (1, 447) = 43.93, p<0.001)] were also significant, and there was an interaction between the two [F (1.941, 867.81) = 26.27, p<0.001)] (see Table 7). To further examine the source of the interaction, Bonferroni corrected pairwise comparisons were conducted, which showed that in congruent contexts, unless (M = 1288.80, SD = 751.25) elicited significantly slower RTs compared to unless…not (M = 1016.11, SD = 474.07) and if…not (M = 1059.21, SD = 523.438) conditions. However, in incongruent contexts, although participants read sentences with unless (M = 1203.89, SD = 624.32) faster, there was no significant difference between RTs for unless, unless…not (1295.83, SD = 752.48) and if…not condition (M = 1273.72, SD = 673.08). Analyses within each connector disclosed that sentences with unless…not and if…not were read slower in incongruent condition as opposed to in congruent condition, which was a significant difference (p<0.001). In contrast, for unless condition, the RTs in congruent condition slower than the incongruent one, but the difference was not significant (p>0.05) (see Table 8) (see also Figure 4).

Table 7. *Results of Repeated Measures Analysis of Variance in Segment 4*

	Sphericity Correction	Sum of Squares	df	M Square	F	p
connector	None	**4.379e +6***	**2.000***	**2.189e +6***	**7.503***	**< .001***
	Greenhouse-Geisser	**4.379e +6***	**1.955***	**2.239e +6***	**7.503***	**< .001***
Residual	None	2.609e +8	894.000	291794.674		
	Greenhouse-Geisser	2.609e +8	874.097	298438.612		
context	None	1.251e +7	1.000	1.251e +7	43.936	< .001
	Greenhouse-Geisser	1.251e +7	1.000	1.251e +7	43.936	< .001
Residual	None	1.273e +8	447.000	284717.931		

Table 7. *Results of Repeated Measures Analysis of Variance in Segment 4 (Cont'd)*

	Sphericity Correction	Sum of Squares	df	M Square	F	p
	Greenhouse-Geisser	1.273e +8	447.000	284717.931		
connector ✻ context	None	1.694e +7*	2.000*	8.469e +6*	26.273*	< .001*
	Greenhouse-Geisser	1.694e +7*	1.941*	8.724e +6*	26.273*	< .001*
Residual	None	2.882e +8	894.000	322350.377		
	Greenhouse-Geisser	2.882e +8	867.819	332075.352		

Note. Type III Sum of Squares
*Maunchly's test of sphericity indicates that the assumption of sphericity is violated ($p<0.05$).

Table 8. *Post Hoc Comparisons in Segment 4 by Connector and Context Type*

		Mean Difference	SE	t	p_{bonf}
if…not, congruent	if…not, incongruent	-214.504	37.190	-5.768	< .001
	unless, congruent	-229.594	37.025	-6.201	< .001
	unless, incongruent	-144.688	36.261	-3.990	0.001
	unless…not, congruent	43.096	37.025	1.164	1.000
	unless…not, incongruent	-236.618	36.261	-6.525	< .001
if…not, incongruent	unless, congruent	-15.089	36.261	-0.416	1.000
	unless, incongruent	69.817	37.025	1.886	0.893
	unless…not, congruent	257.600	36.261	7.104	< .001
	unless…not, incongruent	-22.114	37.025	-0.597	1.000
unless, congruent	unless, incongruent	84.906	37.190	2.283	0.339
	unless…not, congruent	272.690	37.025	7.365	< .001
	unless…not, incongruent	-7.025	36.261	-0.194	1.000
unless, incongruent	unless…not, congruent	187.783	36.261	5.179	< .001
	unless…not, incongruent	-91.931	37.025	-2.483	0.197
unless…not, congruent	unless…not, incongruent	-279.714	37.190	-7.521	< .001

Note. Bonferroni adjusted confidence intervals.

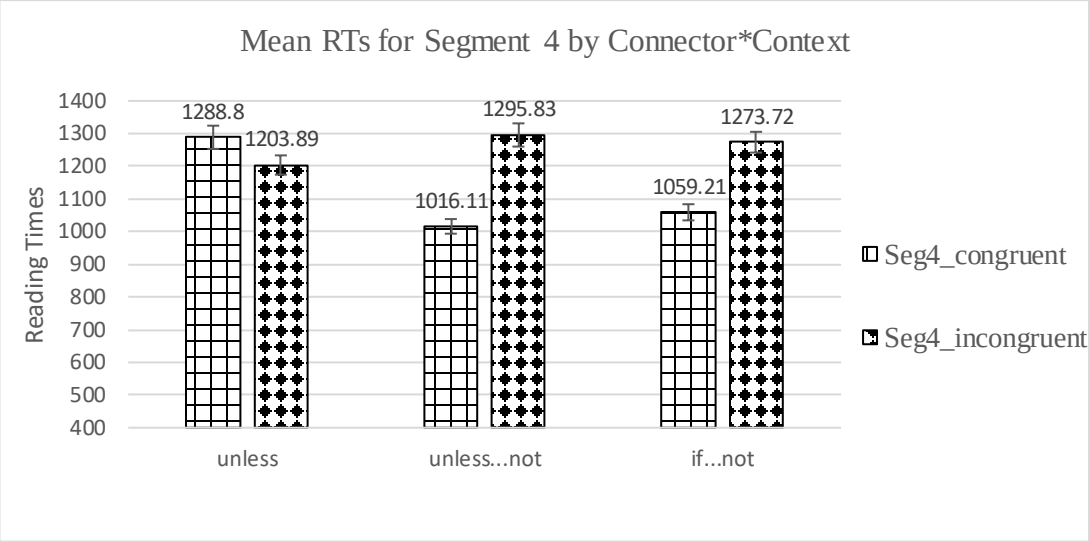


Figure 4. *Mean RTs for Segment 4 by Connector Type and Context. Error bars show the standard error of the mean.*

Segment 4 was the spillover region. To begin with the connector-wise differences, participants showed equally slower RTs in each connector condition in incongruent contexts, which was an expected outcome due to the early surprisal effect caused by the contextual mismatch. In other words, the effect of incongruent contexts (i.e., semantic anomalies) might have overridden the connector-wise differences. However, in congruent contexts, unless condition showed the longest RTs compared to unless…not and if…not condition. The unexpectedly slower processing of unless in congruent contexts confirms our proposal for Segment 3. That is, participants were obviously looking for a negation marker in Segment 3 and seeing that Segment 4 also did not match with their expectations, the effect of expectation violation was bigger. Furthermore, context-wise differences in unless condition also validates this assumption. Equally slower RTs in unless condition regardless of the context validates the idea that L2 learners might have reduced abilities to integrate higher-level information (e.g., discourse, pragmatics) without their lower-level (e.g., syntactic or lexical) expectations are fulfilled (Grüter et al., 2014). This explains the contradictory pattern (slower RTs in congruent contexts and faster RTs in incongruent contexts) in

unless condition. This segment was apparently an earlier resolution point for the context effect.

Comparing the patterns in Segment 3 and Segment 4, previously, the lack of processing difficulty in unless condition in Segment 3 across contexts attributed to the fact that participants' expectations are met at Segment 3 (see Table 6.1 & 6.2) and lack of a negation marker. However, the first assumption turned out to be wrong in Segment 4 because the shortest RTs for unless was not due to the match in participants' predictions, but due to participants' inability to integrate the effect of context properly without an explicit negation marker. Thus, the shortest RTs in Segment 3 in unless can be attributed to shallow processing as well as lack of a negation marker, and the processing difficulty arises in spillover region (i.e., Segment 4).

For Segment 5, there was a main effect of context [$F(1, 447) = 8.113$, $p<0.005$), but no significant effect of connector type and no interaction between the two. Post hoc comparisons using Bonferroni test indicated that sentences in congruent contexts ($M = 529.86$, $SE = 5.52$) elicited significantly shorter RTs than in incongruent contexts ($M = 544.60$, $SE = 5.52$) when connector type was collapsed due to lack of significant main effect ($p<0.005$). As for Segment 6, the main effect of context was marginally significant [$F(1, 447) = 3.93$, $p=0.048$), and there was no main effect of connector type or the interaction between connector type and context. Similar to Segment 6, the effect of context was significant [$F(1, 447) = 23.80$, $p<0.001$)] but there was no significant effect of connector type or an interaction between the two variables. For both segments, participants read sentences in congruent contexts ($M = 514.30$, $SE = 6.28$, for Segment 6; $M = 980.45$, $SE = 19.36$, for Segment 7) faster than in incongruent one ($M = 513.46$, $SE = 5.72$, for Segment 6; $M = 1082.58$, $SE = 19.36$, for Segment 7).

In Segment 5 and Segment 6, there was no difference between connector types and the RTs were equally faster connector-wise. The effect of context was successfully

integrated as expected with longer RTs in incongruent condition than the congruent one.

For Segment 7, which is a critical region in this study due to the resolution effect of discourse manipulation, there was only a significant main effect of context [$F(1,447) = 23.24$, $p<0.001$]. The effect of connector type and the interaction between the connector type and context type were not significant. The pairwise comparisons revealed that in all connector conditions (i.e., unless, unless…not, if…not), participants produced significantly longer RTs in incongruent contexts than in congruent ones.

We expected to see a clear resolution effect in Segment 7 with the integration of matrix verb, and although the effect of context was exploitable, there was no difference between the connector types. However, we saw an earlier resolution effect in Segment 4. The parser might be showing an eager effect at the first possible resolution point despite the fact that this was not a clear resolution point. This should be addressed in future studies.

The last segment was composed of a time adverbial (now). For Segment 8, there was a significant main effect of connector [$F(2, 890.66) = 7.88$, $p<0.001$)] and context [$F(1, 447) = 8.25$, $p=0.004$)]. The interaction between the context and the connector was also significant $F(2, 894) = 6.99$, $p<0.001$). Context-wise Bonferroni adjusted Post Hoc tests revealed that participants produced significantly shorter RTs in congruent contexts ($M = 516.56$, $SD = 153.77$) than in incongruent ones ($M = 564.77$, $SD = 207.89$) for if…not condition ($p<0.001$) whereas the difference between two contexts for unless and unless…not conditions was found to be non-significant ($p>0.05$). Connector-wise, there was no significant difference between RTs in unless…not and if…not condition ($p>0.05$) in congruent context, but unless condition produced significantly slower RTs than the other connectors ($p < 0.05$).

The findings in the final region that the learners produced significantly longer RTs in unless condition than the others may be an indication of a wrap-up effect, rather than processing difficulty (Jegerski, 2014). In other words, main effects and interactions in the wrap-up region are said to reflect later phases of comprehension, in which persistent or delayed processing difficulty might be indicated rather than actual processing difficulties concerning that specific Segment (Jegerski, 2014). Thus, the findings in this region cannot be attributed to processing difficulties due to the integration of adverbial phrase now, but as a result of a wrap-up effect.

Finally, to see whether the effect of the connector type and the context would be reflected in the total RTs, a separate repeated-measures ANOVA was conducted. The pattern was the same as the critical region of the study (Segment 4). The results revealed that there was a marginally significant main effect of connector type [$F(1.96, 877.49) = 3.023$, $p = 0.05$)] and a significant main effect of context type [$F(1,447) = 72.514$, $p<0.001$)]. Also, a significant interaction between these two was observed $F(2, 894) = 21.59$, $p<0.001$). Pairwise comparisons revealed that sentences in unless condition ($M = 5646.75$, $SD = 1607.23$) were read significantly slower than unless…not ($M = 5399.67$, $SD = 1372.01$) and if…not ($M = 5311.31$, $SD = 1297.86$) conditions in congruent contexts. In incongruent condition, unless ($M = 5617.64$, $SD = 1486.07$) elicited significantly faster RTs than unless…not ($M = 5920.10$, $SD = 1710.39$) and if…not ($M = 5802.92$, $SD = 1527.20$) condition, and the difference between unless…not and if…not were found to be non-significant ($p>0.05$), with slower RTs for unless…not (see Figure 5).

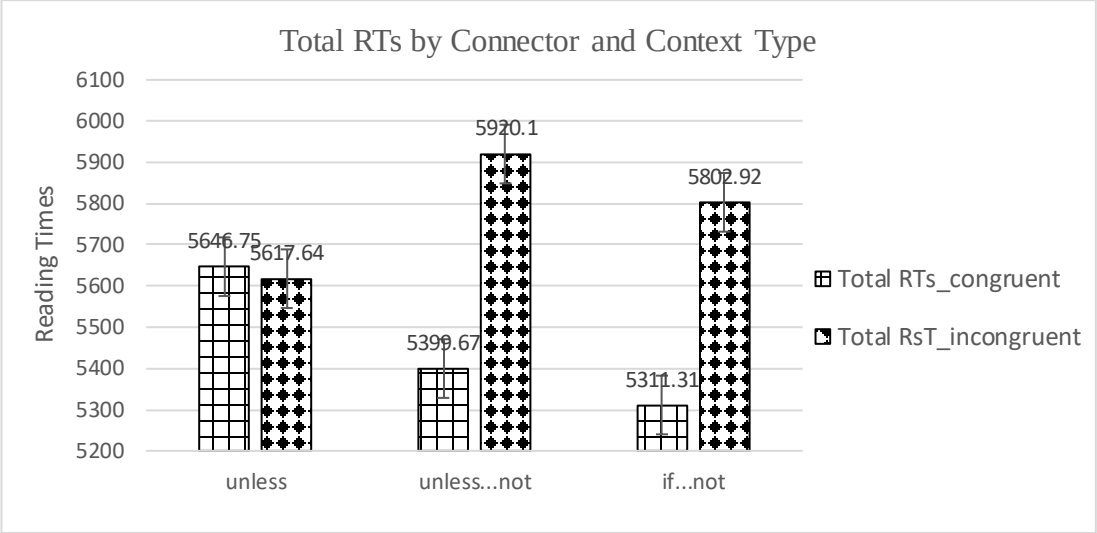


Figure 5. *Total RTs by Connector*Context. Error bars show the standard error of the mean.*

Table 9 summarizes the patterns in each condition. Overall, the results revealed that the real-time processing patterns of nonnative L2 English speakers are different from their offline judgments. Although 82.45% of the participants labeled sentences in unless…not condition as ungrammatical with the explanation that in English it is not permitted for unless to be followed by negation, they failed to detect syntactic anomalies due to the presence of an additional negation in unless sentences (i.e., unless…not condition) online. In fact, lack of an explicit negation marker (-not) in unless condition caused a significant burden in processing capacity of L2 learners and they failed to disentangle the effect of either congruent or incongruent context in unless condition. This was in line with the one prong of the RAGE, suggesting that L2 learners allocate cognitive resources first to integrative mechanisms and little or no is left for proactive mechanisms such as updating or utilizing predictions (Grüter et al., 2014; Hopp, 2013).

Table 9. *Summary of the Processing Patterns for Each Segment by Context.*

'>' refers to longer RTs, '<' refers to shorter RTs, and '=' refers to lack of statistically significant difference

RTs	Segment 1	Segment 2	Segment 3	Segment 4
Congruent	If…not < Unless = Unless…not	If…not < Unless = Unless…not	Unless < Unless…not =If…not	Unless > If…not =Unless…not
Incongruent			Unless…not > If…not > Unless	Unless…not = If…not = Unless
RTs	**Segment 5**	**Segment 6**	**Segment 7**	**Segment 8**
Congruent	Unless = If…not = Unless…not	Unless = If…not = Unless…not	Unless = If…not = Unless…not	Unless> Unless…not =If…not
Incongruent	Unless = If…not = Unless…not	Unless = If…not = Unless…not	Unless = If…not = Unless…not	If…not= Unless…not >Unless

Note.Bonferroni adjusted confidence intervals.

4.2.3 Analysis of RTs in Native Speaker Control Group

For the analysis, an 8x3x2 repeated-measures analysis of variance (ANOVA) was conducted with Segment, Connector Type (unless, unless…not, if…not) and Coherence Type (congruent, incongruent) as within-subject factors. The values of all analyses were Greenhouse-Geisser corrected for non-sphericity whenever applicable. This analysis demonstrated that there were a significant main effect of the segment [$F(4.24, 182.16) = 39.94$, $p<0.001$], the context [$F(1, 43) = 9.21$, $p = 0.004$] as well as two-way interactions between segment and connector type [$F(8.39, 360.82) = 5.25$, $p<0.001$], segment and context type [$F(4.93, 211.98) = 3.57$, $p = 0.004$]. The effect of connector was not significant [$F(2, 86) = 2.08$, $p >0.05$], and there was no interaction

between connector type and context type, but there was a three-way interaction between segment, connector type and context type [F (8.20, 352.8) = 4.32, p<0.001].

Figure 6.1 illustrates the RTs native speakers show at each segment by each connector in congruent context and Figure 6.2 displays the RTs in incongruent context. When the figures analyzed, it seems that native speakers were able to detect syntactic anomalies in unless…not condition, and thus showed the longest RTs in unless…not condition in both contexts. Overall, RTs across contexts gradually increased with the integration of the verb in the subordinate clause until Segment 4, and then there was another increase point at Segment 7, which can be attributed to the integration cost of the verb in the matrix clause. When the two figures compared, it appears that nonnative speakers showed processing difficulties while comprehending sentences in unless…not condition, which is evident in their inconsistent RTs across contexts. To understand this pattern better and to unpack the source of interaction, we conducted separate analyses for each segment.

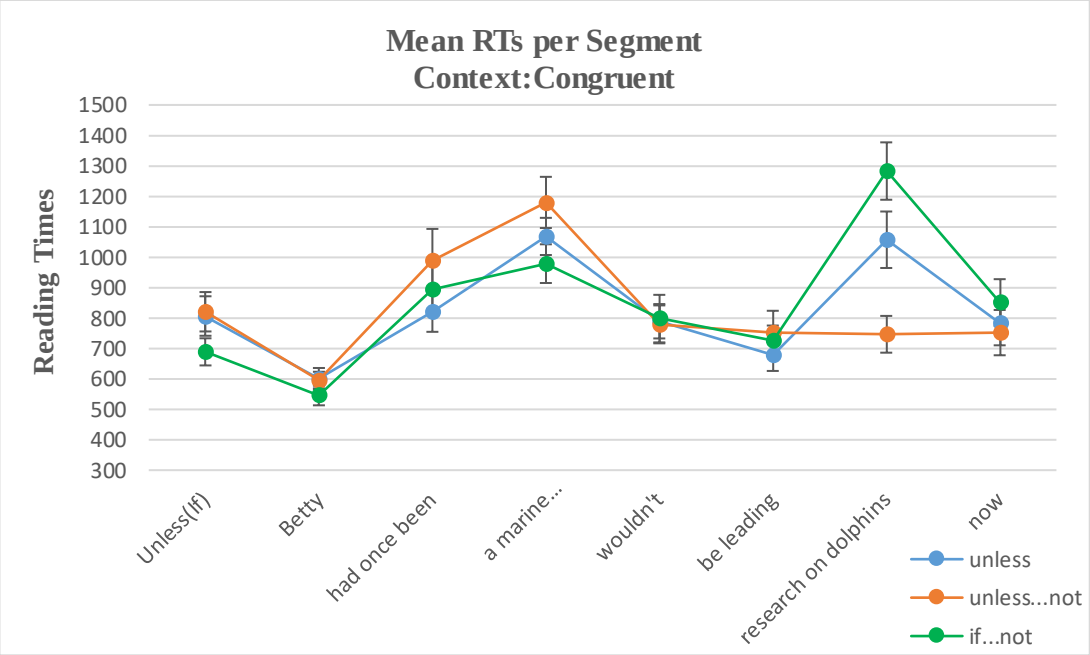


Figure 6.1. *Mean RTs per Segment in Congruent Contexts in Native Speakers. Error bars show the standard error of the mean.*

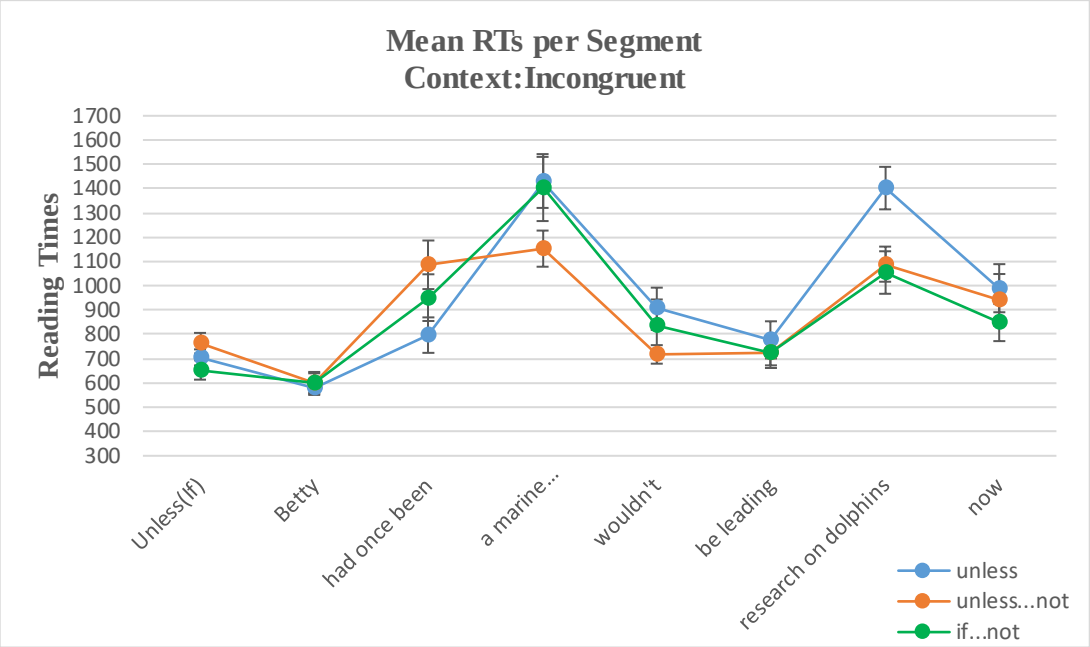


Figure 6.2. *Mean RTs per Segment in Incongruent Contexts in Native Speakers. Error bars show the standard error of the mean.*

Segment 1 compared two different connectors (unless vs if) in congruent and incongruent contexts. The ANOVA revealed a significant effect of connector type $F(2, 86) = 5.09$, $p=0.008$), but no significant main effect of context type ($p>0.05$) or an interaction ($p>0.05$). The pairwise comparisons showed that this was because of the significantly shorter RTs in if…not condition ($M = 671.10$, $SE = 34.42$) compared to unless ($M = 755.79$, $SE=43.63$) and unless…not ($M = 792.01$, $SE= 45.29$) condition. That means, sentence-initial connector unless elicited significantly longer RTs then sentence-initial marker if across the context. In Segment 2, there was no significant effect of connector type or context type ($p>0.05$).

Similar to nonnative speakers' pattern, native speakers read connector if significantly faster than unless. This pattern might be explained with unless, as a negative entailment, requiring an extra step in processing (Wing & Scholnick, 1981).

Segment 3, a region of syntactic experimental manipulation, revealed a significant main effect of connector [$F (2, 86) = 7.85$, $p<0.001$], but no main effect of the context

or an interaction between the two ($p>0.05$). Overall, pairwise comparisons showed that unless…not condition ($M = 1937.98$, $SE = 90.48$) elicited significantly longer RTs than if…not ($M = 923.06$, $SE = 79.76$) and unless ($M = 808.62$, $SE = 62.68$) condition. Although the RTs for if…not condition was longer than unless, the difference between was not significant ($p>0.05$).

Significantly longer RTs of native speakers in unless…not condition can be explained with the fact that they were able to detect the ungrammaticality due to the use of double negation. The pattern here was different from nonnative speakers' since they failed to detect syntactic anomalies. For nonnative speakers, the integration cost of unless…not and if…not was higher because of the negation marker and possibly two-step processing of negation (Kaup et al., 2006; 2007; Giora et al., 2004; Giora et al., 2007). Even though native speakers showed an effect of integration of negation marker in if…not condition (producing longer RTs in if…not than unless condition), the difference was not significant. In sum, compared two groups of participants, the slower processing of unless…not in native speakers might be due to their surprisal whereas, for nonnative speakers, it was only due to integration cost of the negation marker.

Segment 4, our spillover region for syntactic manipulation and earlier resolution point for discourse-based manipulation, revealed a significant effect of context [$F (1,43) = 25.59$, $p<0.001$] as well as a significant interaction between the two [$F (2,86) = 5.69$, $p = 0.005$]. To further examine the source of the interaction, Bonferroni corrected pairwise comparisons were conducted. As for context-wise differences, if…not ($M = 1404.45$, $SD = 914.21$) and unless ($M = 1425.84$, $SD = 697.35$) condition elicited significantly longer RTs in incongruent contexts than congruent ones (For unless; $M = 1067.95$, $SD = 404.99$; for if…not, $M = 978.54$, $SD = 421.80$) (see Figure 7 for a comparison). However, the difference between unless…not in incongruent contexts and congruent ones was not significant. In fact, native speakers read sentences in congruent condition ($M = 1179.70$, $SD = 557.23$) longer than incongruent one ($M = 1153$, $SD = 493.35$).

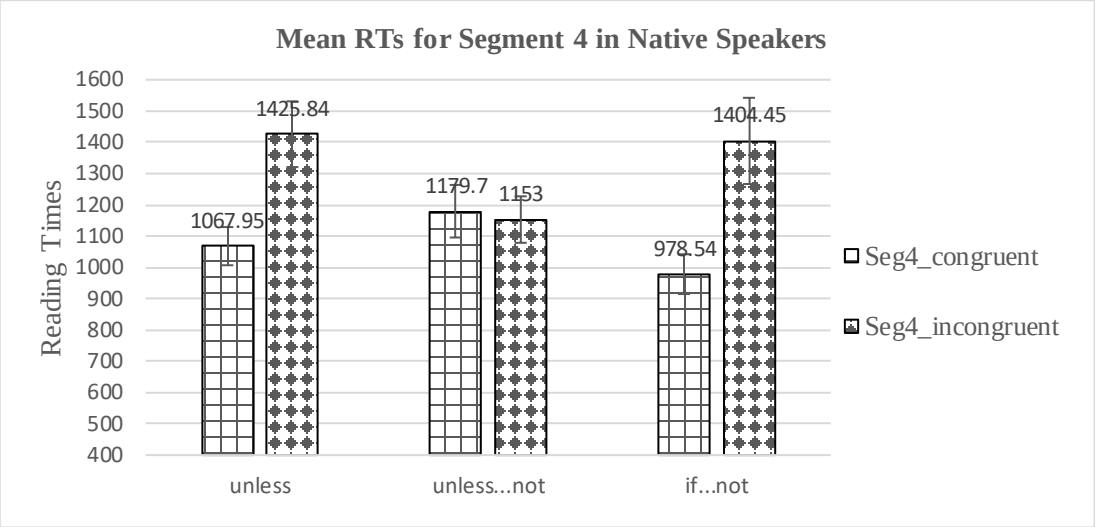


Figure 7. *Mean RTs in Segment 4 in Native Speakers. Error bars show the standard error of the mean.*

The earlier resolution point revealed that native speakers were able to disentangle the effect of context efficiently given that they showed significantly longer RTs in incongruent contexts than congruent ones, which can be taken as an indication of their surprisal due to contextual mismatch. However, this pattern was not observed in unless…not condition. Crucially, this pattern was the mirror image of the pattern of the nonnative speakers. For L2 speakers, they were not able to disentangle the effect of context in unless condition. Thus, we can say that both native speakers and nonnative speakers showed a reduced ability to integrate context. On the other hand, the same pattern was only evident in unless…not condition in native speakers. In contrast to nonnative speakers, they were rightfully not expecting an overt negation marker (i.e., double negation), and thus their structural expectations were violated. In return, they were unable to integrate the discourse-based information efficiently. Therefore, they read sentences in incongruent contexts in unless…not condition faster.

For Segments 5 and 6, there was neither significant main effect of Connector Type and Context Type nor a significant interaction between the two ($p>0.05$). For Segment 7 (Segment with the integration of matrix verb), there was a main effect of connector [F

(2, 86) = 15.89, p<0.001] and context [F(1,43) = 9.20, p = 0.004] as well as an interaction between connector and context [F (2,86) = 13.07, p<0.001]. To unpack the source of interaction, Bonferroni corrected pairwise comparisons carried out. The comparisons revealed that unless in congruent contexts (M = 1057.04, SD = 615.63) read significantly faster than in incongruent ones (M = 1402.34, SD = 580.62). The pattern was the same in unless…not condition, with significantly faster integration in congruent contexts (M = 746.38, SD = 400.75) than in incongruent ones (M = 1089.114, SD = 479.78). As for if…not, there was no significant difference between RTs across contexts with longer RTs in congruent one (M = 1282.75, SD = 625.35) [if…not in incongruent contexts (M = 1054,68; SD = 580.46)]. As for connector-wise differences, unless…not elicited significantly the shortest RTs in congruent contexts whereas the difference between unless and if…not was not significant (see Figure 8).

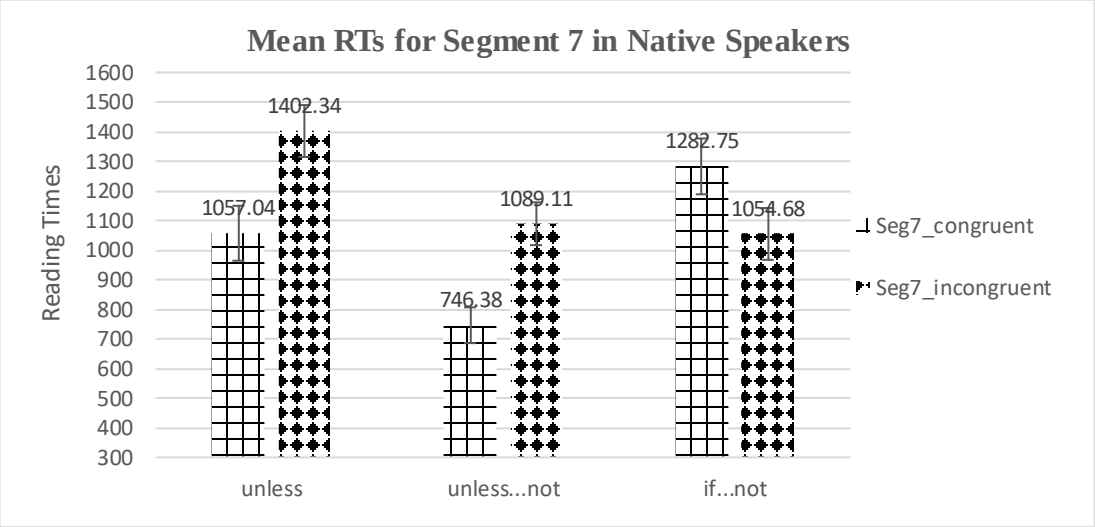


Figure 8. *Mean RTs in Segment 7 in each context type and connector type. Error bars show standard error of the mean.*

Native speakers presented a different pattern in Segment 7 than nonnative speakers (compare also Figure 7.1 and Figure 7.2). It seems reasonable to conclude that native stopped processing the sentences in unless…not condition in congruent contexts as the integration cost of the matrix verb was not similar to the one in unless and if…not

condition. One possible explanation for this pattern could be the fact that after they detected double negation, they might have stopped looking for other cues to update their expectations because the contextual information was already congruent with the utterance. In support of this claim, on the other hand, the significant increase in unless…not condition in incongruent sentences might be an indication that native speakers were still looking for a correction or an explanation for the syntactic violation. Given that the context was also incongruent, they might have expected for syntactic and discourse-based anomalies (which were first observed in Segment 4) to resolve in later parts of the sentence (e.g., in Segment 7 with the matrix verb).

Recall that native speakers failed to disentangle the effect of contextual information in Segment 4 in unless…not condition because their structural expectations were violated (double negation). It is very likely that when there is a syntactic violation, their integration of higher-level information might be delayed and the expected integration was observed in Segment 7 in incongruent contexts. As for nonnative speakers, there was no indication of delayed integration in unless condition. This pattern fits our proposal and requires a minor modification for native speakers. We propose that structural integration was prioritized in both native and nonnative language processing. If there is a mismatch between the structure and the expectation, then, processing difficulties arise, and either prevent (as in nonnative speakers) or delay (as in native speakers) discourse-based integration. Although the pattern in native speakers was not conclusive due to the number of the participants, it provides additional support for our modification of this proposal and a future direction.

Note that earlier resolution in Segment 4 in native and nonnative speakers was not expected, but obviously, there was a reason for it. The data from both groups were consistent within participants and within groups. Although L2 speakers failed to show a resolution effect in Segment 7, for native speakers, the integration of contextual information in different connector types was evident in both Segment 4 and Segment

7. That is, both groups checked whether or not the contextual information was congruent with the utterance with the use of earlier cues.

4.2.4 A Post-hoc Analysis: The Effect of Self-priming

Given a context utterance and then a complex sentence with a dependent subordinate clause (starting either unless or if) and an independent matrix clause, we thought the effect of context would only be evident at the end of the matrix clause, which was Segment 7. However, in the light of the context provided, from Segment 1 onwards, it was assumed that participants would start generating predictions as for what will follow next because all the stimuli were constructed in such a way that in congruent contexts there was always a match between the context sentence and the following profession ("knowing a lot about flowers" and "being a florist") whereas there was always a mismatch ("not knowing anything about flowers" and "being a florist") in incongruent contexts. To check whether there was any effect of self-priming (i.e., it is highly likely that participants will be trained after some exposure to the experimental sentences), test items were divided into two groups as the first half and the second half. The variable was named as List. A repeated-measures ANOVA was conducted to see whether there was a main effect of the list. The analysis demonstrated that there was a significant main effect of the list [$F(1,446) = 59.27$, $p<0.001$] and a two-way interaction between the connector and the list [$F(2, 892) = 4.681$, $p<0.05$]. The pairwise comparisons showed that participants produced significantly shorter RTs for the second half of the experiment suggesting that they started to generate predictions about the upcoming structure at some point and sped up as shown in Table 10 below.

Table 10: *Paired Samples t-test Results Comparing RTs in Half of the Experiment by Each Time Window*

		t	**df**	**p**
Segment1_first	Segment1_second	4.385	419	< .001
Segment2_first	Segment2_second	7.279	419	< .001

Table 10: *Paired Samples t-test Results Comparing RTs in Half of the Experiment by Each Time Window (Cont'd)*

		t	df	p
Segment3_first	Segment3_second	5.330	419	< .001
Segment4_first	Segment4_second	5.560	419	< .001
Segment5_first	Segment5_second	4.537	419	< .001
Segment6_first	Segment6_second	4.744	419	< .001
Segment7_first	Segment7_second	5.868	419	< .001
Segment8_first	Segment8_second	0.348	419	0.364
TotalRT_first	TotalRT_second	10.04	419	< .001

Note. All tests, hypothesis is measurement one greater than measurement two.

Furthermore, to unpack the source of the two-way interaction between the connector and the list, pairwise comparisons with connector type were carried out. The comparisons revealed that the significant differences between the first list and the second list were due to the differences in processing speed. The pattern revealed for the first list was exactly the same as the second list, but only significantly slower (see Figure 9.1 and 9.2). Therefore, participants could not be self-primed because they showed a similar pattern across connectors. The pattern that L2 speakers followed in critical regions in this study (Segment 3, Segment 4 and Segment 7) was shown below.

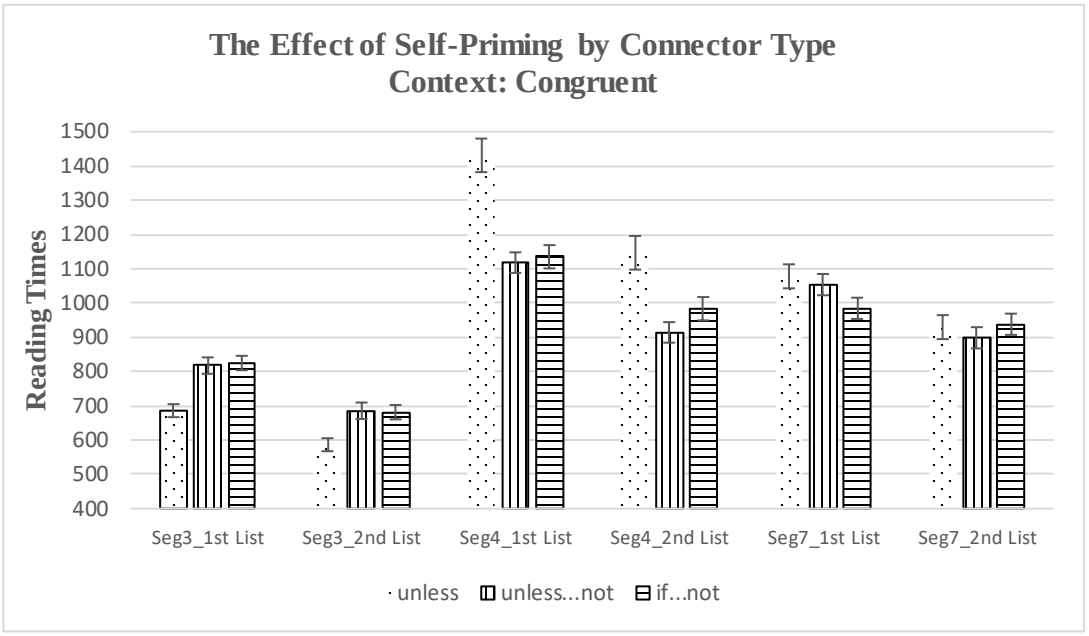


Figure 9.1. *The Effect of Self-Priming by Connector Type in Congruent Contexts. Error bars show the standard error of the mean.*

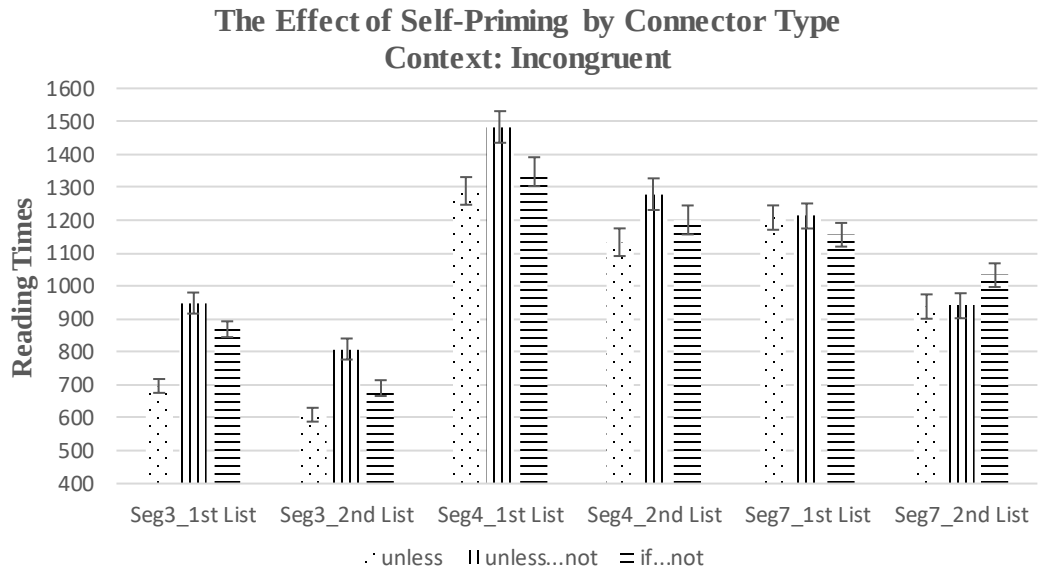


Figure 9.2. *The Effect of Self-Priming by Connector Type in Incongruent Contexts. Error bars show the standard error of the mean.*

4.2.5 A Post-Hoc Analysis: Reading Speed

To investigate whether individual differences in reading speed might cause variations in L2 processing patterns, as reported in previous studies (e.g., Roberts & Felser, 2009; Jegersky, 2012; Hopp, 2013), a post-hoc analysis carried out and participants were divided into two groups: fast processors and slow processors. To detect fast processors, Quartile formula was used. The RTs lower than the first quartile (Q_1) in each region and in each condition for critical items was taken as an indication of fast reading[1]. For each time window (8 in total) and each connector type (3 in total) and each context type (2 in total), RTs lower than Q_1 was detected. Then, the participants who produced RTs lower than Q_1 in half of the conditions (at least 24 conditions out of 48) were labeled as fast processors. In total, there were 37 participants in the fast processor group and 75 in the slow processor group. For each segment in each condition, there was a significant difference between fast readers and slow readers ($p<0.001$). We entered participants' reading speed as a between-subjects factor into a repeated-measures ANOVA. This analysis demonstrated that there was a main effect of Reading Speed [$F(1,446) = 217.78$, $p<0.001$], a significant interaction between Segment and Reading Speed [$F(7, 3122) = 34.351$, $p<0.001$] and a three-way interaction between Connector Type, Context Type and Reading Speed [$F(2,892) = 3.18$, $p <0.05$].

To investigate whether reading speed would result in variations, processing patterns of slow readers and fast readers are compared for the critical region (Segment 4) where the effect of syntactic and discourse-based experimental manipulation was observable. Regarding connector-wise differences, the pairwise comparisons within fast readers revealed that there was no significant difference between the RTs produced by Connecter Type in congruent contexts ($p>0.05$). Unless condition ($M = 1006.63$, $SD = 693.56$) elicited equally faster RTs as unless…not ($M = 843.47$, $SD = 428.03$) and if…not condition ($M = 864.37$, $SD = 477.61$). However, slow readers produced significantly slower RTs in unless ($M = 1428.01$, $SD = 740.54$) condition than

[1] Approximately 25% of the RTs in the dataset lie below Q_1 and 75% lie above Q_3

unless…not (M = 1101.28, SD = 473.17) and if…not (M = 1155, SD = 519.03) condition in congruent contexts (see Figure 10.1). On the other hand, although fast readers read sentences in the incongruent condition significantly faster, there was no difference between the processing patterns of fast readers and slow readers (see Figure 10.2). In other words, in incongruent contexts, both fast and slow readers read all connector types equally faster/slower. As for the context-wise differences, there was no significant difference between all the connector types in congruent and in incongruent contexts for fast readers ($p>0.05$). However, slow readers showed elevated RTs in incongruent contexts in unless…not and if…not condition, but not unless condition compared to the RTs in congruent contexts, which was similar to the pattern produced by the whole group. As we stated above, this might be due to the fact that slow readers were less efficient in integrating the effect of context, and thus failed to disentangle the contextual information.

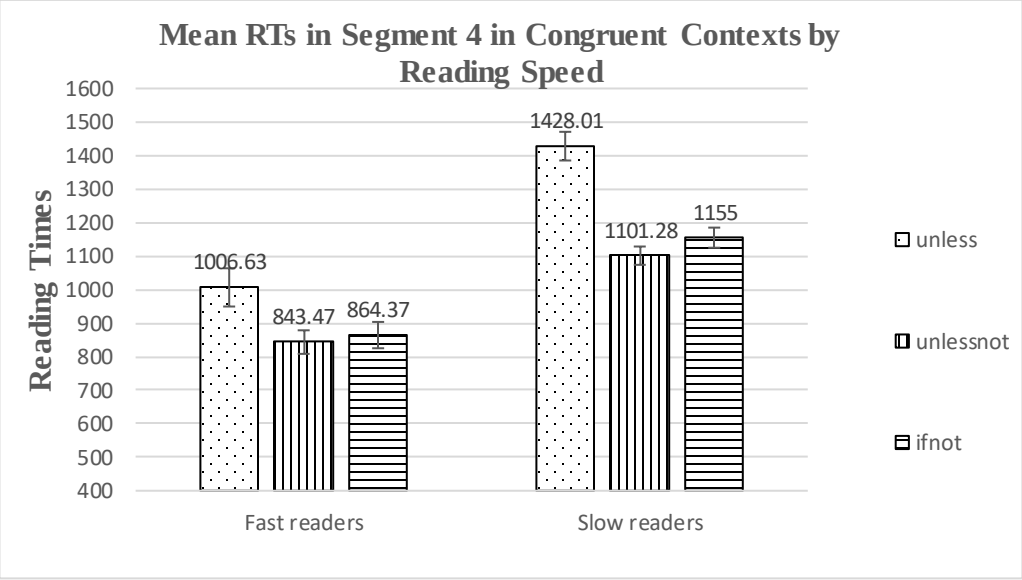


Figure 10.1. *Mean RTs elicited in Segment 4 in Congruent Contexts by Reading Speed. Error bars show the standard error of the mean.*

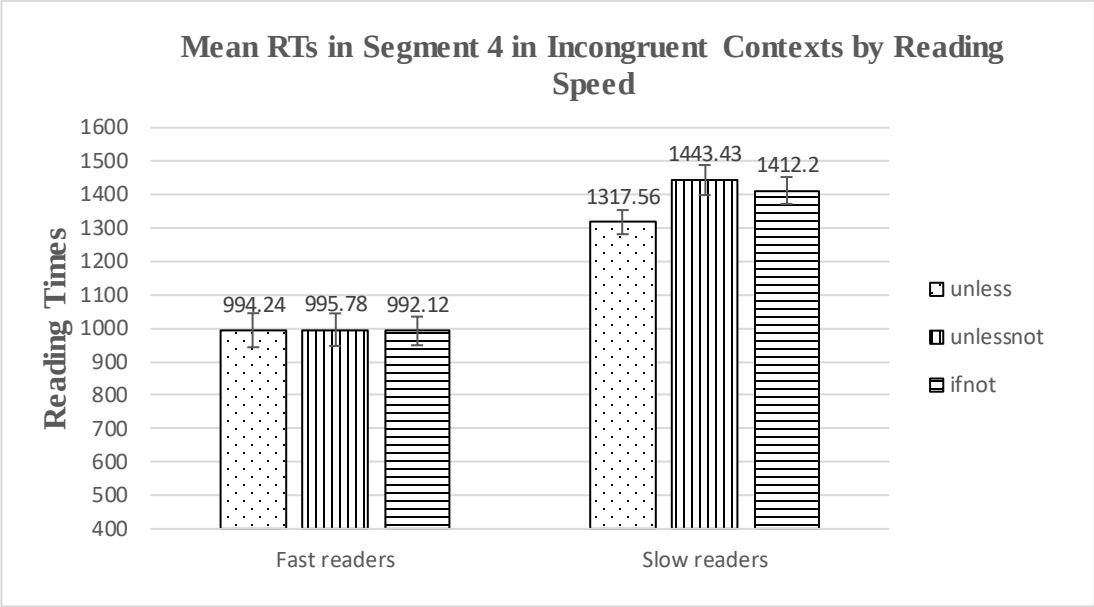


Figure 10.2. *Mean RTs elicited in Segment 4 in Incongruent Contexts by Reading Speed. Error bars show the standard error of the mean.*

Overall, fast readers in our study showed a different processing pattern in congruent contexts for the critical region. Although they could not integrate the effect of discourse-level information just as slow readers, they do not seem to experience the syntactic conflict that slow readers do to the same extent. In congruent contexts, slow readers produced significantly longer RTs in unless condition, and this could be attributed to the violation in their expectation of an overt negation marker. The lack of processing difficulty in unless condition for fast readers could also suggest that they can recover quickly from the effect of an expectation mismatch. In indirect support of this claim, Robert and Felser (2009) reported that fast readers were better at recovering garden-path effects than slow readers, similar to native speakers.

The difference in processing patterns of participants in terms of their reading speed indicates that individual differences also play an important role in L2 processing (e.g., Hopp, 2009; 2013) and a more careful investigation as to working memory (WM) capacities of participants will be included in our following studies.

CHAPTER 5

GENERAL DISCUSSION

This chapter, first, presents a brief summary of the present study and the results followed by a general discussion on the basis of the results. Then, the results are discussed within the scope of L2 processing mechanisms with some implications.

5.1. General Discussion

The goal of this study was to determine whether processing patterns of Turkish-speaking L2 learners of English would match existing L2 processing accounts, which maintain that nonnative language processing is different from native language processing in some respects. The construction employed in our experiment was counterfactual conditionals, a structure which is semantically and syntactically complex, and syntactically different in learners' L1. In their native language, the syntactic representation of the conditional marker unless is different with regard to the use of an explicit negation marker. Thus, our aim is to (i) examine the processing pattern that nonnative speakers follow to comprehend this phenomenon (i.e., a pattern similar to their native language or to the second language) and (ii) investigate the effect of discourse on their interpretation. To do this, we conducted a self-paced reading task, accompanied by an offline grammaticality judgment task. In our SPR task, we manipulated the conditional constructions to test which condition would be favored: (i) a structure with unless…not, available structure in the native language, but a violation in the target language; (ii) a structure with unless, available structure in the target language, but has a different representation in the native language; (iii) a structure if…not available and have the same representation in both languages. The context was

also manipulated to check whether L2 learners are able to integrate context during their online processing and whether/how the context (congruent vs incongruent) influence their parsing patterns. The main findings of this study can be summarized as follows:

- For the group of 112 Turkish-speaking L2 learners of English, processing patterns were affected by Connector Type and Context Type in the reading measures of the critical region (the segments with syntax-based and discourse-based experimental manipulation occurred). Collapsed connector type, overall, sentences in congruent contexts were read faster than in incongruent contexts, and this suggests that L2 learners were able to integrate the context in their interpretation on condition that their structural expectations are fulfilled.

- L2 speakers in our study represented unless correctly when their metalinguistic processing is also in place during the grammaticality judgment test, but they failed to detect this during their online processing. In other words, they tended to expect an overt negation following unless (i.e., they favored unless…not over unless). This preference could initially be attributed to L1 interference because Turkish equivalent of unless (-madıkça/-madığı sürece) is composed of an explicit negation marker (-ma), and so the representation in learners' native language might be transferred to their target language as unless…not. On the other hand, high accuracy rates (around 80%) in participants' offline judgments provide contradictory evidence for L1 transfer. It shows that they have a correct and/or native-like representation of unless. Thus, the reduced ability of nonnative speakers to detect syntactic anomalies that they seem to acquire already could be explained with the idea that cognitive demands being higher in real-time integration.

- Analysis of each time-window with Connector and Context interaction revealed that our participants failed to disentangle the effect of context only in unless condition, producing the slowest RTs in congruent contexts and equally slower

RTs in both congruent and incongruent contexts. Whereas they were able to integrate the context effectively during their online processing of the conditions with unless…not and if…not, the same was not true in unless condition. When the pattern was analyzed closely, it appeared that L2 speakers' integration of the contextual information was prevented in unless condition. Efficient integration of the context was the indication that our participants favored unless…not over unless. For the time being, this made us propose that nonnative speakers prioritize one source of information over the others (syntactic information in our study) and without their expectations being fulfilled, they cannot process higher-level information (discourse-based information in our study).

- Our group consisted of both intermediate and advanced-level L2 learners. However, there was no significant main effect of language proficiency on their processing patterns. The null effect of proficiency level might be due to the structure under investigation was challenging for both groups, and thus processing difficulties that L2 learners experience can surface even in higher proficiency levels.

- On a separate angle, we realized that we had two groups of participants: slow processors and fast processors. When we checked whether the fast-processor group behaved similarly to the rest of the group, we found that although the general pattern was more or less the same as the rest of the group, they were significantly faster. In the earlier resolution region (Segment 4), they did not slow down as much as the slow-processor group when their structural expectations were not met in unless condition (due to lack of an overt negation marker). In other words, their integration of unless did not significantly differ from unless…not and if...not contrary to the slow-processor group. The fast-processor group was also unable to integrate the contextual information efficiently (no significant difference in unless condition in congruent and

incongruent contexts), but the processing cost was overall lower. These findings suggest that individual differences as in their working memory capacity might be affecting their processing, and future investigation should be carried out to explore possible effects of WM capacities of the learners.

- Lastly, the native speaker control group presented a different processing pattern. To begin with, similar to nonnative speakers, they failed to disentangle the contextual information when their structural expectations were violated. That is, native speakers did not parse sentences in unless…not condition efficiently (possibly due to double negation) whereas nonnative speakers did not parse sentences in unless (possible due to lack of an overt negation marker) condition efficiently. This confirms our proposal that syntactic violations prevent the integration of higher-level information. However, contrary to nonnative speakers, native speakers showed evidence for delayed integration of discourse-based information in later regions. This modifies our proposal such that syntactic violations of expectations prevent and/or delay the integration of higher-level information.

In this section, the findings in response to previous work will be discussed regarding the implications of the present study for the models of L2 processing outlined in Section

5.2 Mechanisms in L2 Processing

It is well-attested in L1 processing literature that speakers not only integrate each upcoming word into the existing structure in an incremental fashion but also generate predictions as to what syntactic and semantic structure follows (Kamide, Altmann & Haywood, 2003; Altmann & Kamide, 2004; 2007; 2009). However, in L2 processing literature, there is some consensus on L2 learners' different (i.e., reduced) processing abilities in that they are to spend more time integrating the upcoming words or fail to comprehend utterances efficiently enough, but the reasons to account for these

differences differ among existing hypotheses. The SSH (Clahsen & Felser, 2006a; 2006b; 2006c; 2018) attributes these differences to lack of detailed syntactic representations in L2 and so over-dependence on surface-level cues such as semantic and pragmatic information. In the second assumption, the RAGE (Grüter et al., 2014; Kaan, 2010; 2014), processing is viewed in connection to prediction (top-down), nonnative speakers are assumed to have detailed hierarchical syntactic representations, but simply do not utilize this information as effectively as native speakers to generate expectations during on-line processing tasks. To account for our data, it seems necessary to include the implications of another L2 sentence processing hypothesis: Interface Hypothesis (Sorace, 2005; 2011) also views processing as integration (bottom-up) as the SSH, but it relates the reduced abilities of nonnative speakers to an increased integration cost in structures at the interface conditions (e.g., syntax-pragmatics interface), and to the fact that L2 speakers being less automatic even though they have detailed syntactic representations. Our data provide counter-evidence for the SSH and partially correlates with the proposals of the IH and the RAGE. However, we will propose some modifications in the latter assumptions to fully accommodate our data.

5.2.1 L1 Interference

To begin with, we find that Turkish-speaking L2 learners of English fail to detect syntactic anomalies real-time. This inability to detect violations might be due to the use of an explicit negation marker (-not) in unless…not condition, which L2 speakers have in their native language. In other words, the online data suggests that L2 learners have favored unless in the target language as unless…not just as if…not and accepts unless…not as the base form. In an initial analysis, this may reveal possible effects of L1 transfer in second language processing (for evidence see Hartsuiker et al., 2004; MacWhinney, 2005 in offline tasks and Frenck-Mestre & Pynte, 1997; Weber & Cutler, 2003 for phonological and lexical transfer real-time) because an explicit negation marker is evident in the native language representation and L2 learners might

want to see the same representation in the target language. However, the participants' offline performance in the Grammaticality Judgment Task provided contradictory evidence for L1 inference since most of the participants (around 80%) were able to detect syntactic anomalies in unless…not condition and stated that double negation is not allowed in unless in English. This kind of performance differences in offline and online language processing is also observed in several previous works (Dussias, 2013; Felser & Cunnings, 2012; Grüter et al., 2012). One possible explanation for the difference comes from the Interface Hypothesis (Sorace, 2005; 2011). It maintains that having more than one grammar representation increases cognitive cost due to L2 speakers' additional efforts to inhibit one representation (usually their L1). This is called linguistic inhibition and it is regarded as an indispensable aspect of bilingual brain (Bialystok, Craik, Green & Gollan, 2009). Given the case is the same for our L2 speakers, they must allocate some cognitive resources to inhibit their first language, and thus, even if their underlying linguistics representations are nativelike, there may still be some variations in their performance (Sorace, 2005). In parallel with this assumption, our data revealed that Turkish-speaking L2 learners of English have residual L1 interference in their online processing. In addition to the resources allocated for inhibitory control, participants are supposed to integrate discourse constantly and update their existing syntactic representation with each upcoming word. Therefore, the reduced ability of our participants to detect syntactic violation in unless…not condition and process sentences in unless condition not efficiently enough in SPR task can primarily be attributed to (a) cognitive resources deployed for the integration of different types of information (i.e., lexical, syntactic and discourse-based in our study) (Hopp, 2006; McDonald, 2006; Roberts, Gullberg & Indefrey, 2008), (b) access to knowledge being less automatic (Hahne, 2001; Hahne & Friederici, 2001), (c) co-occurring L1 interference when processing demands are high (Felser, 2009; Sorace, 2011), and/or (d) mismatch in their structural expectations with the available input.

5.2.2 Shallow Processing Account

Our data provide contradictory evidence for the SSH, which proposes that (a) L2 speakers privilege semantic, pragmatic and discourse-based information at the expense of syntactic information and (b) L1 grammatical representations somewhat transfer to L2 or not at all (Clahsen & Felser, 2006a; 2006b; 2006c). As the SSH predicted, we would expect our Turkish-speaking L2 learners to comprehend sentences in unless and unless…not condition equally efficiently when the context is congruent. In other words, as long as they encountered a match between contextual information and the utterance, they were expected to show reduced RTs as an indication of ease of processing thanks to surface-level cues. In contrast, they were expected to fail to detect syntactic anomalies only in incongruent context as the surface-level cues would not be exploitable, and thus L2 learners must show elevated RTs for sentences in unless…not condition. The results provided a different picture and are incompatible with the predictions of the SSH.

Our data revealed that Turkish-speaking L2 learners do not seem to prioritize discourse-level information at the expense of the syntactic information when they are processing conditional structures. Although sentences in incongruent contexts elicited longer RTs than congruent contexts irrespective of the connector type, unless condition produced significantly longer RTs than unless…not condition and if…not condition in congruent contexts overall. To remind the processing pattern of our participants again, unless…not was taken as the correct construction in real-time. As a result, grammatical version (unless) caused additional processing difficulties as opposed to predictions of the SSH. In other words, our participants did not disregard the anomalies in the syntactic structure (i.e., they failed to integrate the contextual information when their syntactic expectations were violated) even though the discourse was supportive in unless condition. Furthermore, unlike what the SSH proposed for L1 interference, our participants interpreted unless constructions similar to their native language equivalent during online processing, and thus, the representation in their target language seems to

be replaced with the representation in their native language (i.e., unless seems to be replaced with unless…not as the base form). In fact, our data suggest that L2 learners are primarily driven by syntactic constraints and prioritize syntactic information rather than surface-level cues. If their structural expectations are met as in unless condition (due to lack of an overt negation marker), they fail to discriminate the effect of context, and comprehend sentences in both congruent and incongruent condition equally slower in unless condition. To sum up, this pattern suggests that L2 learners do not always depend on surface-level cues by ignoring the syntactic information. Thus, the question regarding what mechanisms then are L2 learners employing will be discussed in the next section.

5.2.3 The Reduced Ability to Integrate Contextual Information

The second theoretical assumption trying to account for the asymmetries between native and nonnative processing, the RAGE (Grüter et al., 2014; 2017), views processing as prediction and attributes the differences in nonnative language processing to their reduced predictive ability. Our experimental setting allowed participants to rely on the context provided and relate syntactic representations to discourse appropriateness or inappropriateness. In terms of the RAGE, our participants are sensitive to discourse-level information and were able to formulate expectations in line with the existing contexts. The effect of self-priming, which showed that participants read the sentences in the first half of the experiment significantly faster in almost all regions, made us conclude that participants began to generate expectations after some time. In line with this, we claim that they are sensitive to the match between their expectations and the utterances in congruent contexts as well as to the mismatch between their expectations of utterances in incongruent contexts, and so they showed significantly longer RTs in incongruent ones in unless…not and if…not condition. This indicates that they can generate expectation and then a reaction to any possible mismatch. Our participants read the sentences in congruent conditions were read faster because they were in line with the contextual and syntactic expectations (i.e., a

conditional marker which signals hypotheticality). Our data so far suggests that L2 speakers are able to predict upcoming utterances on the basis of available syntactic and discourse-level cues to comprehend sentences. This does not concur with the RAGE. On the other hand, the case was the opposite in unless condition across both contexts. The significant difference of the context on processing ease and/or difficulty in unless…not and if…not condition (as a consequence of match or mismatch) was not observed in unless condition. This may indicate that as a result of expectation violation in unless condition (due to a lack of overt negation marker), our L2 speakers were either (i) unable to update their existing expectations or (ii) could not generate expectations to integrate discourse at all on the condition that their structural expectations were not met. Thus, there is a need to update our previous explanation for Segment 3 (that the L2 speakers can effectively predict upcoming utterances): As long as their lower level (i.e., lexical and syntactic) expectancies are fulfilled, L2 speakers can integrate higher level (i.e., discourse-based) information efficiently. In other words, it may be the case that the prediction abilities of nonnative speakers depend on the realization of syntactic pre-requisites. In our study, the syntactic expectation that L2 speakers expect was an explicit negation marker in unless condition. Without this, they produced shorter RTs in incongruent contexts than in congruent one. In support of this claim, there is some evidence that L2 learners primarily predict on the basis of best of their competence (i.e., syntactic, lexical or morphosyntactic) (Hopp, 2009; 2013). That is, L2 learners prioritize the integration of the information that they are most competent at utilizing. In a similar vein, cognitive resource allocation view proposed by Wilson (2009) assumes that nonnative speakers utilize one kind of information and direct attentional resources to integrate that specific source of information, and so other sources of information may be delayed or prevented (Wilson, 2009; Sorace, 2010; Hopp, 2013). Additionally, Just and Carpenter (1992)'s capacity theory suggests that when cognitive demands are greater due to different competing sources of information (i.e., lexical, syntactic, morphosyntactic, semantic, pragmatic and discourse-based), lower-level processes are fulfilled, and as a result higher-level processes may not be realized or it would be more costly. These existing assumptions can accommodate our data with

some clarifications. Our data confirm that lower-level processes (i.e., syntactic information) are prioritized, and if the parser cannot find what it is looking for, expectation violation occurs, and higher-level processes cannot be achieved efficiently. For our proposal, additional evidence comes from the native speaker control group. Although they were able to detect syntactic anomalies in unless…not condition, they produced equally shorter RTs in unless…not condition in both congruent and incongruent contexts, which can be taken as an indication of reduced ability to integrate contextual information. However, the fact that they were able to show elevated RTs in later segments in incongruent contexts in unless…not condition might still account for our proposal with a minor modification: The integration of syntactic information is prioritized by both native and nonnative speakers, and as a result of the expectation violation, native speakers show delayed effects of integrating discourse-based information whereas nonnative speakers are prevented to disentangle the effect of context.

The RAGE hypothesis also claims that the capacity of the L2 processor is limited, and parser deals with immediate incremental integration of lexical or syntactic information. The parser is so occupied that only limited resources are available for generating or updating expectations on the basis of available cues. This is just an "intuition", as proposed by Grüter and colleagues (2014) and further research is required to experimentally test their view. Once again, our data provide supportive evidence for the first part of the intuition, which covers primary integration of lower-level resources, and modifies the second part of it as full attainment of lower-level processes is a pre-requisite for integrating higher-level sources of information as well as sustaining generating predictions.

Although our native control group consisted of 11 participants, which was very limited in number and prevented us having strong conclusions, the pattern they showed in critical region matches our initial explanation for L2 speakers that their reduced ability to update their existing expectations about the upcoming structure or to integrate the

contextual information at all. The intuition that Grüter (2014; 2017) and colleagues had for resource allocation was that during sentence processing structural and lexical integration were prioritized at the expense of generating and updating expectations based on higher-level information sources (such as pragmatic or discourse-based). Our results for nonnative speakers seem to confirm the first prong of this intuition, claiming that structural integration was prioritized. However, we propose to update the second prong of the proposal as follows: structural and lexical integration might be prioritized and if there is a mismatch between the structure and the expectation, then, processing difficulties arise, preventing and/or delaying the integration of higher-level information sources such as discourse and pragmatics. Therefore, we can conclude that the integration at higher-level sources in L2 speakers is not delayed all the time, but it becomes more difficult when there is a mismatch. And crucially, native speakers and L2 speakers' processing patterns resulted in a mirror image. Although the reason for this pattern was not exactly the same, both groups failed to integrate the effect of contextual information during a mismatch condition. Mismatch condition for L2 speakers can be defined as grammatical but unexpected version (i.e., unless) due to the representation in their native language, and for native speakers ungrammatical and unexpected version (i.e., unless…not). Therefore, the integration of the context during a mismatch condition cannot be attributed to non-native processing patterns.

5.3. Limitations and Future Directions

This study has its own limitations which can be improved in future studies. First of all, the number of participants in the native control group was limited to reach firm conclusions. The pattern in native speakers' processing of conditional constructions provided a clear picture, but the results might not be generalizable due to its scope. Therefore, we are in the process of extending our work further.

In addition, to the best of our knowledge, an online study aiming to reveal the pattern that second language learners follow to process conditional constructions has not been

conducted so far in Turkish-English or any other L1/L2 combinations. This made it impossible to compare our results with the previous research.

Due to the time limitation, we were only able to test unless, unless…not and if…not. However, to explore the wider picture and make a direct comparison, conditional constructions with if should also be tested in future studies.

Lastly, our post-hoc analysis of reading speed revealed that there were two different groups as fast-readers and slow-readers. In fact, these two groups differed in their processing patterns and this indicates that individual differences might be affecting their processing, so to explore WM capacities of the learners, a follow-up will be carried out.

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APPENDICES

A: APPROVAL OF METU HUMAN SUBJECTS ETHICS COMMITTEE

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
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01 AĞUSTOS 2019

Konu: Değerlendirme Sonucu

Gönderen: ODTÜ İnsan Araştırmaları Etik Kurulu (İAEK)

İlgi: İnsan Araştırmaları Etik Kurulu Başvurusu

Sayın Dr. Duygu ÖZGE

Danışmanlığını yaptığınız **Ebru EVCEN'in "Processing of *unless* statements by Turkish learnes of English"** başlıklı araştırması İnsan Araştırmaları Etik Kurulu tarafından uygun görülmüş ve **306 ODTÜ 2019** protokol numarası ile onaylanmıştır.

Saygılarımızla bilgilerinize sunarız.

Prof. Dr. Tülin GENÇÖZ
Başkan

Prof. Dr. Tolga CAN
Üye

Doç.Dr. Pınar KAYGAN
Üye

Dr. Öğr. Üyesi Ali Emre TURGUT
Üye

Dr. Öğr. Üyesi Şerife SEVİNÇ
Üye

Dr. Öğr. Üyesi Müge GÜNDÜZ
Üye

Dr. Öğr. Üyesi Süreyya Özcan KABASAKAL
Üye

B: LANGUAGE BACKGROUND QUESTIONNAIRE FOR L2 GROUP

1. Full Name:	
2. Age:	
3. Gender:	
4. What is/are your native language(s)?	
5. What other languages do you speak?	
6. At what age did you start learning English?	
7. Have long have you been learning English?	
8. How frequently do you use English every day (1=almost never, 2=rarely, 3=sometimes, 4=often, 5=very often)? a. *Reading b. *Writing c. *Speaking d. *Listening	
9. Have you ever lived in countries where English is spoken as a primary language? (Provide the name of the country and the total length of stay. Otherwise, leave blank.	
10. How do you self-rate your overall English proficiency?	
11. Have you ever taken TOEFL, IELTS, YDS or METU proficiency exam? Provide your most recent score and the month and year you took the test.	

C: ITEMS FOR THE OFF-LINE GRAMMATICALITY JUDGMENT TASK

1. Unless Jennifer had once been a vet, she wouldn't lead an animal rights group now.	Grammatical / Ungrammatical
2. Since Andrea had once been a historian, she can establish a personal museum now.	Grammatical / Ungrammatical
3. Unless Henry hadn't once been a mountaineer, he wouldn't advise the mountaineering club now.	Grammatical / Ungrammatical
4. Because Clark had once been a travel agent, he can advise student travel club now.	Grammatical / Ungrammatical
5. If Jane hadn't once been a lawyer, she wouldn't establish a foundation for lawyers now.	Grammatical / Ungrammatical
6. Since Oliver had once been a butcher, he can give seminars on steak cooking methods.	Grammatical / Ungrammatical
7. Unless Ed had once been a sexologist, he wouldn't organize seminars about adolescent problems now.	Grammatical / Ungrammatical
8. Since Martin had once been a carpenter, he can organize a woodcraft exhibition now.	Grammatical / Ungrammatical
9. Unless Veronica hadn't once been a brain surgeon, she wouldn't direct the neuroscience unit now.	Grammatical / Ungrammatical
10. If Ruth hadn't once been an economist, she wouldn't be advising business people now.	Grammatical / Ungrammatical
11. Unless Emma had once been a professional basketball player, she wouldn't train the school team now.	Grammatical / Ungrammatical

12. Since Thomas had once been an architect, he can establish a foundation for protecting historical building	Grammatical / Ungrammatical
13. Because Harry had once been a farmer, he can organize seminars on organic farming now.	Grammatical / Ungrammatical
14. If Kevyn hadn't once been an activist, she wouldn't organize seminars about gay rights now.	Grammatical / Ungrammatical
15. Unless Dave hadn't once been a baker, he wouldn't be organizing a baking workshop now.	Grammatical / Ungrammatical
16. Because William had once been a professional karate player, he can train young amateurs now.	Grammatical / Ungrammatical
17. Unless Tim had once been a referee, he wouldn't train the amateur football team now.	Grammatical / Ungrammatical
18. Because Jones had once been a repairman, he can lead a team for modified car fans.	Grammatical / Ungrammatical
19. Unless Alex had once been a photographer, he wouldn't organize a photography exhibition now.	Grammatical / Ungrammatical
20. Unless Kim hadn't once been a music teacher, he wouldn't manage the choir now.	Grammatical / Ungrammatical

D: ITEMS FOR THE SELF-PACED READING TASK

Context Sentence	Critical Sentence
Jessica is interested in cycling.	1. Because Jessica had once been a member of bicycle club, she can arrange cycling tours for students now.
Betty is interested in sea life.	2. If Betty hadn't once been a marine biologist, she wouldn't lead research on dolphins now.
Jennifer doesn't know anything about animals.	3. Unless Jennifer had once been a vet, she wouldn't lead an animal rights group now.
Andrea is interested in history.	4. Since Andrea had once been a historian, she can establish a personal museum now.
Henry doesn't know anything about climbing sites.	5. Unless Henry hadn't once been a mountaineer, he wouldn't advise the mountaineering club now.
Clark doesn't know anything about holiday destinations.	6. Because Clark had once been a travel agent, he can advise student travel club now.
Rick knows a lot about human psychology.	7. Unless Rick had once been a psychologist, he wouldn't organize group therapy sessions for addicts now
Oliver doesn't know anything about meat cutting techniques.	8. Since Oliver had once been a butcher, he can give seminars on steak cooking methods.
Jane doesn't know anything about legal issues.	9. If Jane hadn't once been a lawyer, she wouldn't establish a foundation for lawyers now.
Lewis knows a lot about fish species.	10. Unless Lewis hadn't once been a fisherman, he wouldn't own a fish market now.
Susan is interested in robotics.	11. Because Susan had once been a mechanical engineer, she can offer courses on computer-aided design tools now.
Rose is interested in precious stones.	12. If Rose hadn't once been a jeweller, she wouldn't open a jewellery making course now.

Ed isn't interested in gender and sex issues.	13. Unless Ed had once been a sexologist, he wouldn't organize seminars about adolescent problems now.
Martin is interested in woodcraft.	14. Since Martin had once been a carpenter, he can organize a woodcraft exhibition now.
Veronica doesn't know anything about human brain.	15. Unless Veronica hadn't once been a brain surgeon, she wouldn't direct the neuroscience unit now.
Liam doesn't know anything about ancient civilizations.	16. Because Liam had once been an archeologist, he can give seminars on the prehistoric era.
Darren knows a lot about plants.	17. Unless Darren had once been a gardener, he wouldn't open a flower shop now.
Thomas doesn't know anything about building design.	18. Since Thomas had once been an architect, he can establish a foundation for protecting historical building
Ruth doesn't know anything about the latest economic policies.	19. If Ruth hadn't once been an economist, she wouldn't be advising business people now.
Amelia is interested in learning languages.	20. Unless Amelia hadn't once been a translator, she wouldn't be offering translation courses now.
Harry is interested in farming methods.	21. Beucase Harry had once been a farmer, he can organiz seminars on organic farming now.
Kevyn knows a lot about human rights.	22. If Kevyn hadn't once been an activist, she wouldn't organize seminars about gay rights now.
Naomi isn't interested in aircrafts.	23. Unless Naomi had once been a pilot, she wouldn't give training on flight simulation now.
Edie is interested in literature.	24. Since Edie had once been an author, he can train amateur authors now.
Mary isn't interested in how languages work.	25. Unless Mary hadn't once been a linguist, she wouldn't organize seminars about language learning now.
Holy doesn't know anything about flowers.	26. Because Holy had once been a florist, she can organize flower arrangement workshop now.
Emma is interested in basketball.	27. Unless Emma had once been a professional basketball player, she wouldn't train the school team now.

Ashley doesn't know anything about healthy eating.	28. Since Ashley had once been a dieterian, she can lead the healthy-eaters neighboorhood group.
Charlotte isn't interested in vlogging.	29. If Charlotte hadn't once been a social media influencer, she wouldn't be delivering a speech on the conference now.
Dave is interested in pastry arts	30. Unless Dave hadn't once been a baker, he wouldn't be organizing a baking workshop now.
William is interested in martial arts.	31. Because Willliam had once been a professional karate player, he can train young amateurs now.
Tim knows a lot about the rules of football.	32. Unless Tim had once been a referee, he wouldn't train the amateur football team now.
Jessy doesn't know anything about child behavior.	33. Unless Jessy had once been a kindergarten teacher, she wouldn't advise a neigborhood mother community now.
Sheldon is interested in archery.	34. Since Sheldon had once been a professional archer, he can establish a federation for young archers now.
Archie isn't interested in dance.	35. Unless Archie hadn't once been a professional dancer, he wouldn't create choreographies now.
Jones doesn't know anything about cars.	36. Because Jones had once been a repairman, he can lead a team for modified car fans.
Alex is interested in photography.	37. Unless Alex had once been a photographer, he wouldn't organize a photography exhibition now.
Isabella doesn't know anything about child health.	38. Since Isabella had once been a pediatrician, she can establish an association for pediatrics.
Erica isn't interested in fashion.	39. If Erica hadn't once been a fashion designer, she wouldn't lead the jury committee now.
Kim knows a lot about music.	40. Unless Kim hadn't once been a music teacher, he wouldn't manage the choir now.

E: TURKISH SUMMARY / TÜRKÇE ÖZET

KOŞULLU YAPILARIN İKİNCİ DİLDE İŞLEMLENMESİ

Giriş

İnsanlar dilbilimsel bir girdiyi otomatik olarak analiz etme, anlama, işlemleme ve üretme yeteneğine sahiptir. Bu becerinin temelini sözdizimsel işlemleme sırasında sözcükleri biçimbilimsel, edimbilimsel, anlambilimsel ve diğer ilgili dilsel ve dilsel olmayan bilgilere göre çözümleyebilme (parsing) oluşturur. Sözdizimsel analiz ve hiyerarşik cümle yapısını kavramayı sağlayan bu yetenek evrensel olsa da, anadil ve ikinci dil konuşularının dili işlemleme kapasiteleri farklıdır (Altmann & Mirkovic, 2009; Kaan; 2014; Özge, Küntay & Snedeker, 2019).

İkinci dilde cümle işlemleme mekanizmaları literatürde farklılık gösterirken, anadil ve ikinci dil konuşucularının dili anlama ve yorumlama şeklinin farklı olduğuna dair bulgular ortaktır. Anadil konuşucularının ana dillerini artımlı çözümlediğine (incremental parsing) işaret edilirken, ikinci dil konuşularının daha yavaş ve çözümlemenin gidişatına dair öngörüde bulunmakta (prediction) daha az etkin oldukları saptanmıştır (Dussias et al., 2013; Grüter et al., 2012; Williams, 2006; Hopp, 2013; Martin et al., 2013, Lew-Williams & Fernald, 2010; Grüter & Rohde, 2013). İki grup arasındaki farklılıkların sebepleri hedef dildeki sözdizimin yetersiz edinimi (Hahne et al, 2006), anadilin ikinci dile olan etkisi (Harthsuiker et al., 2004), bilişsel beceriler temelinde bireysel farklılıklar (Juffs, 2004), yüzeysel çözümleme (Clahsen & Felser, 2006) ve dili tahminleme daha az etkinlik (Grüter et al., 2014) şeklinde listelenebilmektedir. Bu hipotezlerden Yüzeysel Çözümleme Hipotezi (Shallow Structure Hypothesis) ve Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi

(Reduced Ability to Generate Expectations Hypothesis) bu çalışmanın temelini oluşturmaktadır.

Yüzeysel Çözümleme Hipotezi ikinci dil konuşmacılarının daha yüzeysel ve daha az detaylı hiyerarşik cümle yapısı oluşturabildiklerini, bu sebeple anlambilimsel, edimbilimsel ve bağlamsal bilgiler ışığında dili anlamlandırdıklarını savunmaktadır. Diğer yandan, Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi ise ikinci dil konuşucularının detaylı cümle yapılarına sahip olduklarını, fakat bilişsel kaynakları biçimbilimsel verilerin işlemlenmesine kullandıkları için dili tahminleme yetkinliklerinin azaldığını önesürmektedir. Literatüre bakıldığında bu hipotezlerin çoğunlukla sözdizimsel-anlamsal belirsizlik içeren cümlelerde ve karmaşık ne-soru öbeklerinde yapılan araştırmalarla desteklendiği görülmüştür.

Bu çalışmada ise bu hipotezlerin anlambilimsel ve sözdizimsel açıdan karmaşık olan koşullu yapılar üzerinde test edilmesi amaçlanmaktadır. Koşullu önermelerin anlamını kavrayabilmek bilişsel bazı önkoşullara bağlıdır. Söz konusu yapıların olasılık bildirmesi, varsayımsal olması ve çıkarım gerektirmesi bu yapıların anlambilimsel karmaşıklığını arttırmaktadır. Sözdizimsel ve anlambilimsel karmaşıklığa ek olarak, bu araştırmada karşıolgusal koşullu önermeler test edilmiştir. Karşıolgusallık bağlama ve önermelerin doğruluk durumuna dair çıkarımlar yapılmasını mümkün kılmatadır. Koşullu yapılardan unless (-madıkça/-madığı sürece), Türkçe'de ve İngilizce'de farklı sözdizimsel yapılara sahiptir. Bu sebeple, unless anadili Türkçe olan ikidil koşucularının hangi yapıyı tercih edeceği ve bu tercihin değişkenlere bağlı olarak değişiklik gösterip göstermediğinin test edilmesini mümkün kılmaktadır.

> 'Sonuç-lar-a dikkat çekme-dikçe, insan-lar uyarıy-ı göz ardı eder-ler.'
> Result-PL-DAT point-out -NEG-COND.COP, people-PL warning-ACC ignore-AOR-3PL.
> Unless you point out the consequences, people ignore the warning.
>
> (Bakırlı, 2010)

Amaç ve Araştırma Soruları

Bu araştırmanın iki ana amacı vardır. İlk olarak, ana dili Türkçe olan ve İngilizceyi ikinci dil olarak öğrenen konuşucuların koşullu yapıların işlemlenmesinde Yüzeysel Çözümleme Hipotezi'nin öne sürdüğü şekilde davranıp davranmayacağını test etmeyi amaçlamaktadır. İkinci olarak, ikidil konuşucularının koşullu yapıları artımlı bir şekilde çözümleyip çözümlemediğini görmeyi amaçlar. Bu araştırmayı oluşturan başlıca araştırma soruları aşağıdaki gibidir:

1. Yüzeysel Çözümleme Hipotezinin bulguları amlamsal-sözdizimsel belirsizlik ve ne-sorusu içermeyen karmaşık cümlelerin (koşullu önermeler) işlemlenmesinde de geçerli midir?
2. Anadil Türkçe olan İngilizce konuşucuları koşullu yapıları artımlı şekilde çözümlemekte midir?
3. Anadili Türkçe olan İngilizce konuşucuları bağlamsal bilgiyi artımlı bir şekilde çözümlemelerine entegre edebilmekte midir?
4. İkinci dil konuşmacılarının koşullu yapıları çözümleme örüntüleri hedef dil yetkinlikleri ile bağlantılı mıdır?

Katılımcılar

Bu çalışmada anadili Türkçe olan ve İngilizceyi ikinci yabancı dil olarak öğrenen bireyler ile anadili İngilizce olan bireyler yer almıştır. Anadili Türkçe olan 124 katılımcının yaş ortalaması 21.89'dur. Araştırmaya 25 erkek 99 kadın katılımcı katılmıştır. Bütün katılımcılar Orta Doğu Teknik Üniversitesi İngilizce Öğretmenliği bölümü öğrencileri arasından seçilmiştir. Aynı katılımcı grubu Oxford Quick Placement Test uygulanarak ikinci dildeki yeterlilik seviyelerine göre ikiye bölünmüştür. Katılımcıların 70'i ileri düzeyde 54'ü ise orta düzeyde İngilizce bilenler olmak üzere gruplanmıştır.

Çalışmaya kontrol grubu olarak katılan 11 anadili İngilizce olan bireylerin yaş ortalaması 29.36'dır. Bu katılımcıların 5 tanesi İngilizce öğretmeni olarak, 6 tanesi diğer branş dallarının öğretmenleri olarak çalışmaktadır.

Veri Toplama Araçları

Bu çalışmada off-line dilbilgisal yargı testi ve on-line kendi hızında okuma testi olmak üzere iki farklı yöntem kullanılmıştır. Dilbilgisel yargı testi katılımcıların hedef dil deki koşullu yapıları edinip edinmediğini ortaya çıkarmayı amaçlamaktadır. Bu test toplam 20 cümle içermektedir. Bağlaç Türü (unless, unless…not, if…not) arasında değişkenlik göstermiştir. Kendi hızında okuma testi ise katılımcıların koşullu yapıları işlem leme örüntülerini ortaya çıkarmayı amaçlamıştır. Toplam 40 adet cümleden oluşan bu deneyde, bağlam cümlesi kaıtlımcılara bir bütün olarak sunulmuş, ardından hedef cümle katılımcıların kendi belirlediği hızda verilmiştir. Hedef cümlelerin yarısı okuduğunu anlama sorularıyla devam etmektedir. Bu deneyde Bağlaç Türü (unless, unless…not, if…not) ve Bağlam Türü (tutarlı, tutarsız) değişkenlik göstermiştir. Her iki deneyde de aynı test maddeleri kullanılmıştır. Örnek bir test maddesi aşağıda verilmiştir. Taksim işaretleri hedef bölgeleri göstermektedir.

1. Örnek Test Maddesi:
   A. Tutarlı Bağlam:
      Betty is interested in sea life./ Betty deniz canlıları ile ilgilidir.
      Unless(If)/ Betty/ had (not) once been/ a marine biologist, she/ wouldn't/ be leading/ research on dolphins/ now. /Betty bir zamanlar deniz biyoloğu olmasaydı, şimdi yunus balıkları üzerine araştırma yürütüyor olmazdı.

   B. Tutarsız Bağlam:
      Betty isn't interested in sea life./ Betty deniz canlıları ile ilgilenmez.
      Unless(If)/ Betty/ had (not) once been/ a marine biologist, she/ wouldn't/ be leading/ research on dolphins/ now. /Betty bir zamanlar deniz biyoloğu olmasaydı, şimdi yunus balıkları üzerine araştırma yürütüyor olmazdı.

2. Örnek Amaç Saklayıcı Madde:
   A. Tutarlı Bağlam:
      Clara knows a lot about holiday destinations./Clara tatile gidilecek yerler hakkında çok şey bilir.
      Since(Because)/ Clara/ had once been/ a travel agent, she/ can/ advise/ student travel club/ now./Clara bir zamanlar seyahat acentası çalışanı olduğu için, şimdi öğrenci gezi kulüplerine tavsiyelerde bulunabilir.

   B. Tutarsız Bağlam:
      Clara doesn't know anything about holiday destinations./ Clara tatile gidilecek yerler hakkında hiçbir şey bilmez.
      Since(Because)/ Clara/ had once been/ a travel agent, she/ can/ advise/ student travel club/ now./ Clara bir zamanlar seyahat acentası çalışanı olduğu için, şimdi öğrenci gezi kulüplerine tavsiyelerde bulunabilir.

Her bir deney maddesinin her koşulda (Bağlamsal ve Bağlaçsal) test edilebilmesi için 6 farklı dengeli liste oluşturulmuştur. Listeler iki tane aynı koşullu maddenin birbirini takip etmemesi için randomize edilmiştir. Araştırmada kullanılan cümleler katılımcıların basit çıkarım yapmasını gerektirmektedir. Her bir deney maddesi tutarlı veya tutarsız bir bağlam cümlemesiyle başlamaktadır. Tutarlı bağlam cümlesinde eylemi yapan kişi bir konsept (örn. çiçekler) hakkında ya "çok fazla bilgilidir" ya da bu konsepte "ilgi duymaktadır". Tutarsız bağlam cümlesinde ise eylemi yapan kişi konsept hakkında "hiçbir şey bilmemektedir" ya da konsepte "ilgi duymamaktadır." Bu bağlam cümleleri, bir meslek (örn. çiçekçilik) ile takip edilmektedir. Bu meslek ve takip eden cümle, bağlam cümlesi ile ya tutarlı ya da tutarsızdır. Deney cümlelerin hepsi karşıolgusallık içermektedir. Karşıolgusallık cümleler ve bağlam arasında açık bir tutarlılık veya tutarsızlık yaratmak için kasten seçilmiştir.

Yöntem ve Veri Analizi

Off-line deney için veriler zaman ve mekan kısıtlaması olması sebebiyle internet tabanlı bir platformda toplanmıştır. Katılımcılar on-line deneye katıldıktan yaklaşık iki hafta sonra e-posta yolu ile bilgilendirilmiş ve dilbilgisel yargı testine davet edilmiştir. Kendi hızında okuma deneyi ise Open Sesame adlı program kullanılarak laboratuvar ortamında katılımcılar tek tek davet edilerek yürütülmüştür. Bu deneyin tamamlanması

yaklaşık yirmi dakika sürmüştür. Katılımcılar deney öncesi deneyin amacı gizli tutularak programın kullanımı ve prosedürler ile ilgili sözlü ve yazılı olarak bilgiledirilmiştir.

On-line deneyin analizi için verideki uçdeğerler Quartile hesaplaması ile tespit edilmiş ve bu değerler ortalama okuma zamanları ile değiştirilmiştir. Sonuçlar SPSS 25 istatistiksel analiz programı kullanarak çeşitli testlerle saptanmıştır.

Genel Sonuçlar ve Tartışma

Bu araştırmanın amacı Türkçe konuşan ve İngilizceyi ikinci dil olarak öğrenen katılımcıların koşullu yapıları çözümleme örüntülerinin var olan ikinci dilde işlemleme kuramlarıyla örtüşüp örtüşmediğini açığa çıkarmaktır. Bu amaç doğrultusunda, kendi hızında okuma deneyinde, koşullu yapılar şu şekilde manipüle edilmiştir: (i) katılımcıların anadilinde var olan fakat hedef dilde hata olarak kabul edilen yapı unless…not, (ii) katılımcıların hedef dilinde var olan fakat ana dilllerinde farklı olan yapı unless, (iii) kontrol yapısı olarak düşünülen ve her iki dilde de aynı şekilde var olan yapı if…not. Bağlaç türüne ek olarak, bağlam türü de tutarlı ve tutarsız olmak üzere katılımcıların bağlamı entegre edip edemediğini gözlemlemek amacıyla manipüle edilmiştir. Genel bulgular şu şekilde özetlenebilir:

- Ana dili Türkçe olan ve İngilizceyi ikinci yabancı dil olarak öğrenen 112 katılımcının koşullu yapıları işlemleme örüntüleri göstermiştir ki Bağlaç Türü ve Bağlam Türü koşullu yapıların işlemlenmesinde etkilidir. Bağlaç türünün etkisi göz ardı edildiğinde, katılımcıların tutarlı bağlamda verilen cümleleri tutarsız bağlamda verilen cümlelere göre daha hızlı okudukları gözlemlenmiştir. Bu durum D2 (ikinci dil) konuşucularının bağlamın etkisini koşullu yapıların çözümlenmesine başarılı bir şekilde entegre edebildiklerini göstermektedir.

- Bu çalışmadaki D2 konuşucuları Dilbilgisel Yargı Testi sonuçlarına göre unless yapısının edinimini tamamlamışlardır. Diğer bir değişle, unless yapısını takiben bulunan olumsuzluk ekinin doğru olmadığını, İngilizcenin sözdizim kurallarıyla çeliştiğini belirtmişlerdir. Fakat, on-line Yanıt Süresi Deneyi'nde unless yapısının olumsuzluk eki ile birlikte kullanıldığı durumları fark etmekte başarısız olmuşlardır. Yani, D2 konuşucuları unless yapısının olumsuzluk eki ile birlikte kullanıldığı durumları unless yapısının olumsuzluk eki olmadan kullanıldığı durumlara göre tercih etmişlerdir (unless…not yapısı unless yapısına tercih edilmiştir). Bu durum ilk bakışta anadil etkisi olarak yorumlanabilir. Türkçede unless bağlacı "-madıkça/-madığı sürece" şeklinde olumsuzluk eki ile beraber ifade edilmektedir. Fakat, bu sav Dilbilgisel Yargı Testi'ndeki yüksek doğruluk oranı ile (%80) çelişmektedir. Katılımcılar metalinguistik düzeyleri yüksekken offline ölçekte unless yapısını ve sözdizimsel kurallarını edindiklerini göstermiştir. Bu sebeple, D2 konuşmacılarının online ölçekte unless…not yapısı için var olan dilbilgisel yanlışları fark edememesi bilişsel yükün bu ölçekte daha fazla olmasıyla açıklanabilir.

- Her bir Bağlaç Türü ve Bağlam türü için bölgelerin ayrı ayrı analizi katılımcıların unless durumunda bağlam etkisini etkili bir şekilde entegre edemedikleri ve dolayısıyla tutarlı bağlamda en yavaş okuma hızına ve tutarsız bağlamda unless…not ve if…not yapısıyla neredeyse eşit okuma hızına ulaştıkları görülmüştür. Aslında, unless…not ve if…not bağlaçları için tutarlı bağlamda bağlamın etkisini başarılı bir şekilde yorumlamalarına yansıttıkları görülürken, unless bağlacında başarısız olmuşlardır. Bu örüntü daha yakından incelendiğinde D2 konuşmacılarının unless durumunda bağlamsal bilgiyi anlamlandırma sürecine dahil edişleri kısıtlanmıştır. Bağlamsal bilginin etkili bir şekilde yorumlanması katılımcıların unless…not yapısını unless

yapısını tercih ettiklerinin bir işareti olmuştur. Bu durum, bizim ikinci dil konuşucularının bir bilgi kaynağını diğerlerine göre öncelikli olarak değerlendiriyor olabileceğini (bizim araştırmamızda sözdizimsel bilgi) ve bu kaynağa yönelik beklentileri karşılanmadan, üst-seviye bilgiyi (bizim araştırmamızda bağlam bilgisi) işlemlemede başarısız oldukları öne sürmemize sebep olmuştur.

- Araştırma grubumuz hem orta-düzey hem de ileri-düzey İngilizce bilen konuşuculardan oluşturmaktadır. Fakat dil yeterliliğinin işlemleme örüntülerine bir etkisi olmadığı gözlenmiştir. Bu durum araştırılan yapının, koşullu yapılan, her iki seviye grup için de oldukça zor bir yapı olmasıyla ve D2 konuşmalarının oldukça ileri seviyelerde bile bu yapıları çözümlemede zorlanıyor olabileceklerini gözler önüne sermiştir.

- Diğer bir pencerede, yapılan ek analizlerde, hızlı-okuyucular ve yavaş-okuyucular olarak iki farklı alt grubumuz olduğu gözlemlenmiştir. Bu iki grubun koşulları yapıları çözümleme örüntüleri incelendiğinde genel olarak her iki grubunda örüntülerinin aynı olduğunu, fakat Bölge 4 (erken çözülme bölgesi) için hızlı-okuyucu grubun farklılık gösterdiği gözlemlenmiştir. Bu grup yapısal beklentileri ihlal edildiğinde (unless bağlacında), yavaş-okuyucu grup kadar yavaşlamamış, diğer bir deyişle, bu ihlalin etkisini atlatmaları daha hızlı olmuştur. Hızlı-okuyucu grup da bağlamsal bilgiyi entegre etmekte başarısız olmuştur, fakat işlemleme yükü yavaş-okuyucu gruba göre daha azdır. Bu ön bulgular işleyen bellek kapasitelerine göre katılımcıların bireysel farklılıklar gösterebileceğini, ve işleyen bellek kapasitesi etkisinin çözümleme örüntülerine etkisi gelecek çalışmalarda incelenecektir.

- Son olarak, ana dili İngilizce olan 11 konuşmacı kontorl grubu olarak araştırmamıza katılmıştır. D1 (anadil) konuşmacıları da tıpkı D2 konuşmacıları gibi yapısal beklentileri ihlal edildiğinde bağlamsal bilgiyi entegre etme becerileri kısıtlanmıştır. Yani, D1 konuşmacıları unless…not koşulunda (iki olumsuzluk bildirgeci sebebiyle), D2 konuşmacıları ise unless koşulunda (olumsuzluk bildirgecinin olmaması sebebiyle) cümleleri etkili bir şekilde çözümleyememiştir. D1 konuşmacılarının da D2 konuşmacılarına benzer şekilde davranması, yapısal beklentiler karşılanmadığında veya ihlal edildiğinde konuşmacıların üst-seviye bilgiyi (anlambilimsel, edimbilimsel, bağlamsal) entegre etme becerilerinin kısıtlanması savımızı destekler niteliktedir. Fakat, D1 konuşmacıları cümlenin ikinci kritik bölgesinde (Bölge 7) hem unless (beklenen yapı) hem unless..not (beklenmeyen yapı) bağlacı için bağlamsal bilgiyi etkili bir şekilde yorumlayabilmiştir. Bu durum D2 konuşmacılarında gözlenmemiştir. Bu sonuç var olan savımızı yapısal beklentiler karşılanmadığında veya ihlal edildiğinde üst-seviye bilginin yorumlanması önlenir veya gecikir şekilde düzenlememize sebep olmuştur.

Bu çalışmanın bulguları literatürdeki ikinci dilde işlemleme hipotezleri kapsamında incelenmiştir.

İkinci Dilde Çözümleme Mekanizmaları

İnsanların anadillerinde otomatik olarak birbirini takip eden kelimelerin sözdizimsel ve anlambilimsel yapısına dair tahminler üretebildikleri D1 literatüründe yer edinmiştir (Kamide, Altmann & Haywood, 2003; Altmann & Kamide, 2004; 2007; 2009). Fakat, D2 konuşmacılarının bu becerilerinin kısıtlı olduğuna dair bir çoğunluk olsa da, bu kısıtın sebeplerine yönelik yapılan açıklamalar çeşitli savlar arasında farklılık göstermektedir. Yüzeysel Çözümleme Hipotezi (Shallow Structure Hypothesis) (Clahsen & Felser, 2006a; 2006b; 2006c; 2018), bu farklılıkları D2 konuşmacılarının

zayıf ve yüzeysel sözdizimsel çözümleme yapabilmesine, dolayısıyla dili anlamsal faktörlere dayanarak yorumladıklarını savunmaktadır. Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi (Reduced Ability to Generate Expectations Hypothesis) (Grüter et al., 2014; Kaan, 2010; 2014) ise Yüzeysel Yapı Hipotezi'nin zıttına, D2 konuşmacılarının detaylı sözdizimsel analiz yapabildiklerini, fakat D1 konuşmacılarından farklı olma sebeplerinin online işlemleme sırasında tahmin üretme becerilerinin kısıtlı olmasına dayandırmaktadır. Bu çalışmanın bulguları Yüzeysel Çözümleme Hipotezi'ni çürütürken, Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi'ni birkaç değişiklikle destekler niteliktedir.

Yüzeysel Çözümleme Hipotezi'ne göre, D2 konuşmacılarının tutarlı bağlamda verilen cümleler için unless, unless…not ve if…not koşullarında cümlelerin dilbilgisel olarak doğru olup olmamasına bakmaksızın (dilbilgisel olarak yanlış olan cümleleri de) cümleleri eşit kolaylıkla çözümleyecekleri öngörülmektedir. Tutarsız bağlamda verilen cümlelerde ise D2 konuşmacılarının dilbilgisel olarak yanlış olan cümleleri (unless…not koşulu) fark edecekleri ve bu cümleleri yorumlarken zorlanacakları öngörülmektedir. Yüzeysel Çözümleme Hipotezi'nin belirttiği üzere katılımcılar bağlamsal bilgi ile tutarlı bir cümle ile karşılaştıklarında, anlamsal açıdan ihlale maruz kalmayacakları için, sözdizimsel yapıyı göz ardı edecekleri düşünülmüştür. Bağlam tutarsız olduğunda ise anlamsal açıdan ihlale maruz kaldıklarında sözdizimsel açıdan yanlış cümleleri de fark edebilecekleri ve sonuç olarak cümleleri yorumlamakta zorlanacakları düşünülmüştür. Bu araştırmanın bulguları ise bu hipotezin öngörülerini desteklememektedir. Bu çalışmadaki D2 konuşmacıları bağlamsal bilgiye öncelik vererek dilbilgisel ihlalleri ve yanlışlıkları göz ardı etmemişlerdir. Bağlam tutarlı olduğunda da sözdizimsel ihlalleri fark edebilmişlerdir. Bu noktada şunun ayrımını yapmak gerekir ki İngilizcede dilbilgisel olarak doğru kabul edilen unless yapısı anadili Türkçe olan D2 konuşmacıları için "beklenmeyen" bir yapıdır. Bunun zıttına, unless…not yapısı dilbilgisel olarak yanlış bir kullanım olmasına ragmen bu çalışmadaki D2 konuşuları için "beklenen" bir yapıdır. Bu sebeple katılımcılar dilbilgisel fakat beklenmeyen unless yapısı ile karşılaştıklarında hem tutarlı hem de

tutarsız bağlamlarda cümleleri işlemlemekte başarısız olmuşlardır. Bu sonuçlar ışığında, bu çalışmadaki D2 konuşmacılarının koşullu yapıları işlemleme örüntüleri Yüzeysel Yapı Hipotezi'nin bulguları ile örtüşmemektedir.

Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi'ne göre ise D2 konuşmacılarının koşullu yapıların "varsayımsal" özelliğini entegre etmekte hem tutarlı hem de tutarsız bağlam koşulunda zorlanmaları beklenmektedir. Bu hipoteze göre D2 konuşmacıları cümle başında if veya unless bağlacını gördüklerinde koşullu yapıların varsayımsal özelliğini göz önüne alarak cümlenin geri kalanı için tahmin oluşturmaları beklenmektedir. Bu hipotez ise D2 konuşmacılarının tahmin üretme yeteneğinin kısıtlı olacağını beklediğinden çalışmadaki katılımcıların da iki bağlam ayrımını etkili bir şekilde yapamaması öngörülmektedir. Diğer yandan D1 konuşmacıları düşünüldüğünde, bu katılımcıların tutarlı bağlamdaki cümleleri tutarsız bağlamdakilere göre daha hızlı okuması ve bağlamsal bilgiyi etkili bir şekilde entegre etmesi beklenmektedir. Bu çalışmanın sonuçları Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi'ni tam anlamıyla desteklememektedir. Bu çalışmadaki D2 konuşmacıların tahminleri ve var olan yapı arasındaki tutarlılığa ve tutarsızlığa hassas olduğu gözlemlenmiştir. Var olan sözdizimsel ve bağlamsal ipuçlarına göre D2 konuşmacıları doğru tahminler yapabilmektedir. Fakat, bu durum D2 konuşmacıları için yalnızca unless....not ve if...not koşulları için, D1 konuşmacıları için ise unless ve if...not koşulları için geçerlidir. Hatırlatmak gerekirse, her iki grupta da katılımcıların bağlamsal bilgiyi etkili bir şekilde entegre edebildikleri koşullar katılımcıların yapısal beklentilerinin karşılandığı koşullardır. Bu sonuç bizim Öngörülü Çözümlemede Daha Az Etkinlik Hipotezi'ni revize ederek, bu çalışmanın bulgularını da açıklaması için, D2 konuşmacılarının alt-seviye (yapısal ve/veya sözcüksel) beklentileri ihlal edildiğinde veya karşılanmadığı durumlarda üst-seviye süreçler için (anlambilimsel, edimbilimsel, bağlamsal) tahmin üretme veya tahminlerini revize etme yeteneğinin kısıtlı olduğunu öne sürmemizi mümkün kılmıştır.

Sonuç olarak, üst-seviye bilgi kaynaklarının cümle çözümlemesine entegre edilmesi D2 konuşucuları için her zaman gecikmeli olmamakla birlikte, konuşucuların sözdizimsel beklentileri ile cümle arasında uyuşmazlık olduğu durumlarda bu entegrasyon daha zor olmaktadır. Daha da önemlisi, bu çalışmada D1 ve D2 konuşucularının koşullu yapıları çözümleme örüntüleri birbirinin yansımasıdır. Bu durum bu örüntünün yalnızca ikinci dilde işlemlemeye özgü olmadığını göstermektedir.

Kısıtlar ve Gelecek Çalışmalar

Bu çalışmada bulunan bazı kısıtlar aşağıda belirtilmiştir. Öncelikle, anadili İngilizce olan katılımcıların oluşturduğu kontrol grubu 11 kişiden oluşmaktadır ve kısıtlı katılımcı sayısı sonuçların genellenmesi için yeterli değildir. 11 kişiden elde edilen bulgular katılımcılar içerisinde tutarlı olmasına rağmen bu çalışmanın devamında D1 konuşucu sayısının arttırılması hedeflenmektedir.

Ayrıca, Türkçe'de veya başka dil kombinasyonlarında koşullu yapıların ikinci dilde işlemlenmesini araştıran online başka bir çalışma bulunmamaktadır. Bu durum sonuçların diğer benzer çalışmalarla karşılaştırılmasını imkansız kılmaktadır. Zaman ve katılımcı kısıtından ötürü, bu çalışmada yalnızca unless, unless...not ve if...not bağlaçları test edilmiştir. Daha geniş bir örüntüye ulaşmak ve direkt karşılaştırmalar yapmak adına gelecek çalışmalarda if bağlacıyla oluşturulmuş cümleler de test edilmelidir.

Son olarak, okuma hızı üzerine yapılan ek analizler, çalışmada hızlı-okuyucular ve yavaş-okuyucular olmak üzere iki farklı grup olduğunu ortaya çıkarmıştır. Bu grup koşullu yapıların işlemlenmesinde farklılık gösterdiğinden bireysel farklılıkların işlemleme sürecini etkileyebileceği düşünülmüş ve bu çalışmanın devamında katılımcıların işleyen bellek kapasitelerinin ölçülmesi düşünülmektedir.

F: TEZ İZİN FORMU / THESIS PERMISSION FORM

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TEZİN TÜRÜ / DEGREE**:** **Yüksek Lisans** / Master ☒ **Doktora** / PhD ☐

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