A Review: Relative Clause Sentence Processing

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ABSTRACT

This study, in examining ambiguity decisions, a fundamental parsing procedure in natural language processing, aims to address whether there are distinctions in how native speakers and second language learners process speech or whether there are cross-linguistic effects. Studies have looked into how L1 and L2 speakers of different languages handle the RC ambiguity differently. In order to address the issues of transfer effects as well as the distinctions between L1 and L2 interpreting, differences between native speakers' and L2 learners' parsing selections, as well as some factors (working memory, animacy, discourse, syntax or semantic information, etc.) used during the experiments in ambiguity resolution, may add an entirely novel viewpoint. Although most of the studies tried to bring a solution with one-stage or two-stage models, the argument of this study is that there are definitely differences between the L1 and L2 processing and ambiguity resolving, and also, universality is impossible. Therefore, there needs to be much more evidences with the same instruments, tasks, and same sources of information conducted to vast amount of participant groups (from different ages, or different backgrounds) in order to reach a certain conclusion to state the reason behind this difference.

Keywords: Ambiguity, attachment, relative clause, sentence processing.

Bir Derlem: RC Cümle İşlemleme

Öz

Bu çalışma, dil işleme sürecinde kullanılan temel ayrıştırma prosedürlerinden biri olan belirsizlik iliştirme tercihinde, ana dili konuşanlar ile ikinci dil öğrenenlerin dili nasıl işlediği veya dille arası etkilerin olup olmadığı sorusuna cevap aramayı hedefler. Araştırmalar, L1 ve L2 konuşanlarının ilgi tümceciği (RC) belirsizliğini nasıl ele aldıklarını farklı bir bakış açısıyla değerlendirmiştir. Aktarım etkileri ile L1 ve L2 transferini ayırt etme arasındaki farklılıklara dikkat çekmek için, L1 konuşmacıların ve L2 öğrenenlerinin ayrıştırma seçimleri arasındaki farklar, ayrıca belirsizlik çözümlemesi deneylerinde kullanılan bazı faktörler (çalışma belleği (WM), canlılık, söylem, sözdizim veya anlamsal bilgi vb.) tamamen yeni bir bakış açısı ekleyebilir. Çoğu çalışma tek aşamalı veya çift aşamalı modellerle çözüm sunmaya çalışsa da, bu çalışmanın esas savı şudur: L1 ve L2 işleme ve belirsizliği çözme arasında kesinlikle farklılıklar olduğu ve aynı zamanda evrenselliğin imkansız olduğudur. Bu nedenle, bu farkın arkasındaki nedeni belirtmek için çok daha fazla kanıta ihtiyaç vardır. Aynı araçlar, görevler ve bilgi kaynaklarıyla yürütülen, farklı yaş gruplarından, çeşitli eğitim seviyelerinden ve akademik başarıdan katılımcı gruplarının geniş bir yelpazesine yapılan çok daha fazla çalışma gereklidir.

Keywords: Belirsizlik, cümle işleme, ilgi tümceciği, iliştirme.

Introduction

Relative clause attachment ambiguity has significantly influenced linguistic studies, especially in the last three decades. It is crucial to investigate potential cross-linguistic impacts of relative clause attachment on participants and determine whether their processing methods differ between their native language and second or third languages. Ambiguity studies constitute the primary elements for establishing reliable and substantial contributions as independent variables in the investigation of relative clause attachment. Additionally, the inclusion of language relationships, which influence inference or provide additional explanations, represents another notable advancement in this field.

The focus of recent L2 phrase processing research has been on the distinctions between L1 and L2 processing. There could be various causes for these variations. For instance, learners may use particular techniques to make up for an approximate absence of processing speed or grammatical

expertise. According to Clahsen and Felser (2006), such L2-specific interpreting could lead to L2 learners focusing more on lexical and semantic than syntactic input. Transfer of habits from the L1 to the L2, if processing is thought to be language-dependent, would be evident. Having the capacity to process linguistic information is crucial for effective language learning, hence it is especially necessary to have a better knowledge of the principles underlying L2 processing (Carroll, 2001). Findings from research on multilingual speakers of languages with distinct relative clause attachment preferences can be used to understand the phenomenon of cross-linguistic transmission in multilingual people (Rah, 2010). The transfer of lexical categories, for instance, is suggested by Vainikka and Young-Scholten (1996), showing that only those classes are inspired. Yet, according to another viewpoint, feature strength, which controls overt mobility, may not be transferred whereas both lexical and functional categories may be susceptible to it (Eubank, 1994).

Despite extensive research, there isn't a conclusive model that adequately explains the workings of sentence processing. Unconsciously, our thoughts and emotions transform into words or travel from our lips to the brain. Therefore, the study of language production and interpretation falls under the umbrella of sentence processing. Various models attempt to depict speech creation. The primary focus in sentence processing approaches revolves around the fundamental distinctions between two-stage models and constraint-based models, as well as the differentiation between syntax and discourse information. According to two-stage sentence processing models, the interpreter initially analyzes the sentence considering only the syntactic information. However, from the perspective of constraint-based models, diverse types of information (including discourse, pragmatics, lexical, among others) can interact and mutually influence comprehension.

In this context, the aim of the research has been defined as examining studies on RC attachment preferences through a systematic literature review and evaluating the methodological characteristics of these studies within the scope of this research. A literature review is a research design that involves a comprehensive examination of existing research, publications, or articles (Snyder, 2019). In such studies, researchers compile works conducted on a specific topic, field, or issue, summarize the current information, and present their findings. Generally, these reviews are conducted to identify current research trends, conflicts, or gaps, serving as a basis for future research directions. Literature reviews are used to comprehend and disseminate existing knowledge rather than implementing new experimental designs. In this review, I exhibit the most current and accessible studies which contain word-by-word online reading-time tasks or offline experiments, with different participant groups who are monolingual, bilingual, or multilingual. There are not any restrictions to structure the article because I want to discuss the studies that have examined how L1 and L2 learners process ambiguous constructions. To this end, I try to answer the following research questions:

1. Do L2 learners dissolve the ambiguity with similar parsing strategies that L1 speakers do?
2. How is the difference in parsing strategies between L1 and L2 speakers explained, if any?

After giving information regarding the theories that have been more extensively studied, and the previous studies on RC attachment ambiguity, I introduce the findings from each study that are combined in the last part, and broad conclusions about the aforementioned research questions are made.

Method

Research Design

For this review, a mixed-methods literature review was selected as the research design. To reach results, this method entails compiling, assessing, and integrating both qualitative and quantitative studies (Heyvaert et al., 2013). In respect to the research questions, it enables the analysis of studies, papers, implementations, and reviews from different domains. Four main goals can be achieved by a mixed-methods literature review, according to Arksey and O'Malley (2005): The initial objective is to ascertain the characteristics, connections and prevalence of relevant concepts and the components that go along with them. Furthermore, it compiles data for generalization by summarizing research findings and the theoretical background.

Literature Review Process

The databases used in the study consisted of Web of Science, Educational Resources Information Center (ERIC), Proquest dissertation, PsycINFO, PubMED, Scopus, ULAKBİM, National Thesis Center, and PubMED. These databases covered research from linguistics, psychology, and language education, among other disciplines. The Turkish and English translations of the terms "relative clause, attachment ambiguity, attachment preferences, sentence processing" were sought in the databases. The topic of the literature study was taken into consideration when choosing keywords.

Results

RC Attachment Ambiguity

One of the primary goals in investigating sentence processing is to comprehend the features of the parsing system, which utilizes various linguistic data to interpret the given information. The thorough examination of syntactic ambiguity within this framework has been crucial, as it aids in understanding the foundations of parsing techniques and constraints (Frazier and Clifton, 1996). Local processing of receiving words is preferred by locality constraints, for instance, as it uses up less memory space (Gibson and Pearlmutter, 1998). Surprisingly, it has been discovered that speakers of specific languages indicate an inclination for either high attachment (HA) or low attachment (LA) when it comes to the RC attachment ambiguity shown in (1), in which the RC may be linked to either the first noun phrase (NP1) (HA; interpretation: "*The servant of the actress was on the balcony*") or the second noun phrase (NP2) (LA; interpretation: "*The actress was on the balcony*"). Plenty of research looking into the variables influencing a range of RC attachment preferences was sparked by the discovery of such cross-linguistic disparities (Mitchell and Brysbaert, 1998).

1. Someone shot [NP1 the servant] of [NP2 the actress] [RC who was on the balcony].

According to this cross-linguistic diversity in RC attachment preferences, L2 scholars have begun to look at how L2 learners handle this kind of uncertainty to figure out how L1 processing and L2 processing differ from one another. Because the conversion of grammatical features has been extensively demonstrated in L2 acquisition research (Schwartz, 1998), it is additionally feasible that L2 learners transfer their L1 processing strategies to interpret L2 texts. Furthermore, it is intriguing to investigate if L2 learners are capable of developing tactics when they diverge from the rest of their L1s, despite the fact that it is commonly said that L2 learners do not develop native-like grammatical proficiency (Hawkins and Chan, 1997).

Previous investigations have been carried out to examine RC attachment preferences in separate languages (Aydin Yildiz, 2018; Hemforth et al., 2015; Kırkıcı, 2004; Papadopoulou and Clahsen, 2003) each focusing upon a particular aspect, and the methods it impacts attachment preferences. There are cross-linguistic deviations in RC attachment preferences, according to studies on this kind of structural ambiguity. On the contrary, earlier analysis has demonstrated that adult native English speakers prefer to attach an unclear RC to NP2 in this sort of phrases (Dekydtspotter et al., 2008). NP2 attachment preference has also been documented in other languages except English, including Japanese (Jun and Koike, 2008), Swedish, Romanian, and Norwegian (Ehrlich et al., 1999).

On the reverse aspect, statements similar to (1) have been documented to have high attachment (NP1) tendencies in languages like Arabic Arabic (Bidaoui and Abunasser, 2016), Dutch (Desmet et al., 2006), French (Dekydtspotter et al., 2008), German (Hemforth et al., 2015), Greek (Papadopoulou and Clahsen, 2003), Persian (Arabmofrad and Marefat, 2008), Russian (Iudina and Fedorova, 2009), Spanish (Dussias and Sagarra, 2007; Fernandez, 2003) and Turkish (Aydin Yildiz, 2018).

Sentence Processing Theories on RC Attachment

Several parsing models have been proposed to explore RC attachment patterns across various languages, as mentioned earlier. In this article, I specifically focus on some of these models, as they are relevant to the research discussed below. The resolution of syntactic ambiguity has been a focal point in comprehending L1 sentence comprehension. To understand how native speakers manage structural ambiguities in real-time processing and the methods or types of information they employ, numerous researchers have investigated globally or momentarily ambiguous constructions. In the realm of online processing, there are generally two categories of sentence processing models with differing assumptions regarding how ambiguous text gets resolved (Papadopoulou, 2005).

Investigating cross-linguistic parallels and variances has given birth to numerous recent studies on sentence processing, many of which have made an effort to determine whether a theory is universal or particular. The primary concepts of two-stage models like Frazier's Garden-Path by Frazier (1978) have been the focus of sentence processing approaches since they stress an internationally applicable set of interpretation principles. It is important to acknowledge that some distinctions have an impact on sentence processing, despite the constraint-based models' emphasis on the number of instances in which languages lack universal techniques (Bates, et al., 1999). For instance, the two-stage models state that the interpreters digest sentences as one entire sentence at once. Dealing with challenges of different severity is brought on by rebounds from initial misanalysis (Bader et al., 1999). Constraint-based interpretation attempts multiple analyses concurrently to get around these issues. As the interpreter creates alternatives of information across the text of more or less favoured conclusions, it is difficult to sort out the two-stage parsing. Readers can easily use many structures at once with constraint-based parsing, though. The parser does not require further options due to the fact that two-stage models propose revising the first evaluation from the perspective of computational economy.

According to Hopf et al. (2003), the Garden-Path phenomenon (which was improved by Frazier, 1978) is the processing difficulties that results from uncomfortably altered parsing biases. The two-stage processor initially evaluates favouring the syntactical information when it detects RC attachment uncertainty. This circumstance results in an accurate reconsideration of ambiguities if the previous assessment was inaccurate. As there is not additional source of data, the parsers pause during comprehending the phrases whenever there are ambiguities and a lack of syntactic information. The interpreters re-examine the details from the sources after running into any potential ambiguities in order to determine the correct reading. The constraint-based interpreter uses several sources of information (such as discourse or pragmatics) all at once, as opposed to the two-stage parsing, therefore reanalysing a phrase is not necessary. Interestingly, this theory contends that the first choice is based solely on the syntactic description. Altough, the modification in the next stage may be taken into knowledge from other sources, such as verb-thematic information (Frazier, 1990), discourse framework (Ferreira and Clifton, 1986); and several additional sources of knowledge (Mitchell, 1994).

Late Closure is a strategy where the most recent elements are typically associated with the latest item that needs processing rather than with the elements at the beginning of a phrase. The fundamental principle of Late Closure is to utilize syntactic information as the initial basis for interpretation. Subsequently, Frazier and Dean Fodor (1978) suggested that this technique is inherent and universally applied, implying that all languages employ the same approach when dealing with ambiguous sentences. The central hypothesis is that there exists a universal processing strategy that evaluates the grammatical content of the languages without taking into account any potential distinctions. However, according to certain scholars (such as Cuetos and Mitchell, 1988; Just and Carpenter, 1992; Mazuka and Lust, 1990), languages have many distinct viewpoints and may even vary from person to person. This poses an immediate challenge to the known as universality of the Late Closure.

According to the Minimal Attachment Theory (by Frazier and Fodor, 1978), interpreters attempt to understand phrases in regard to the most basic syntactic structure that is consistent with the

information that is now available. The Minimal Attachment Theory states that the receiving data should be connected to the term being formed utilizing the fewest possible processing steps. Because the interpreters employ the most elementary interpretation that is believed to be the most appropriate one. Holmes et al. (1987), nevertheless, discovered that there was not any proof that Minimal Attachment was the primary interpretation method in a self-paced reading task. In order to be clear, it is pertinent to say that the Minimal Attachment principle cannot foresee whether low or high NP will be bound in RC ambiguity phrases like "...the secretary [NP1- high] of the lawyer [NP2- low] who is talking on the phone..." considering that the interpreter is going to employ the identical quantity of syntactic structure phrase.

The Constraint-Satisfaction Model operates on principles of parallel computing and has been influenced by earlier interactive models (McClelland and Rumelhart, 1981). While constraints on sentence comprehension are assumed to compete for resolution, Bates and MacWhinney (1987) formulated this model. The process involves concurrently constructing multiple interrelated representations of diverse kinds, termed as interpretation. Unlike the constraint-satisfaction model, which rejects a flexible and specific parsing approach combining grammatical information with specialized algorithms such as minimal attachment or late closure, both syntactic and lexical components are integrated for resolving ambiguities. The lexicon serves as the primary source of information, playing a crucial role in resolving both syntactic and lexical ambiguities (Trueswell et al., 1994). Within the lexicon, all data pertaining to phrases, particularly their syntactic functions, are stored, incorporating grammatical and uncertain connections among various forms of information rather than solely identifying them.

Constraint-based approaches are often one-stage models in which the interpreter conducts a single assessment while at the same time taking into account multiple sources of data. Furthermore, scholars agree that the foundation of constraint-based processing approaches is a preference for the already-existing sources of data (Spivey-Knowlton and Tanenhaus, 1998). In the two-stage interpreting, the user offers no less than one structural explanation. In contrast, the interpreter's attention offers multiple sources of data for the constraint-based computation. Current studies (Clifton and Duffy, 2001; Rayner and Clifton, 2002) have demonstrated that several additional sources of knowledge, besides the syntactic information, can alter the attachment preferences in settling the RC ambiguity by obscuring or removing it. As numerous variables, rather than just syntactic information, determine the first trigger in constraint-based sentence processing assets, these variables also keep affecting the availability of the analysis (MacDonald et al., 1994).

Van Gompel et al. (2000) created the Unrestricted Race model. The two-stage approach and the constraint-based approach are integrated in this model. As a result, the interpreter draws from multiple sources. The interpreter can favour discourse over various forms of data or syntactic information. According to this paradigm, the interpreter initially employs both syntactic and other sources of information when combining RC attachment.

The primary tenet of the Tuning Hypothesis is that the first selection of structural evaluations in interpreting is decided not by broad interpreting principles, but rather by the perspective that the specific viewer or participant may have had on previous occasions with uncertainties of the identical kind. This hypothesis was developed by Mitchell et al., in 1995. When the interpreter encounters an ambiguity, they will first solve it in the manner that was previously used (Cuetos et al., 1996). In a nutshell, the reader will attempt to figure out the ambiguity in a similar manner in subsequent interactions if the ambiguity was previously resolved in a specific manner. The most crucial source of information for ambiguity management is statistics.

Last but not least, Fodor (1998) put up the implicit prosody theory, which claims that whilst reading silently, the prosodic conceptions reflected upon analysing the attachment ambiguity are what actually govern sentences understood as RC attachment preferences. This implicit prosody explanation was initially inspired by research showing that shortened RCs typically attach locally while long RCs typically attach non-locally (Fernandez, 2003; Fodor, 1998). These findings were discovered to

correspond with the pattern of prosodic breaks in an actual experiment, where required non-local attachment sentences lengthened NP2 and required local attachment sentences lengthened NP1. The Implicit Prosody hypothesis was further reinforced by Jun (2003), who tested native speakers of English, Greek, Spanish, French, Farsi, Japanese, and Korean. He demonstrated that in each language, the standard prosody given upon reading worldwide ambiguous sentences including RC attachment demonstrates characteristics that connect with the stated attachment preferences in reading studies. Still, hardly any of these investigations demonstrate that the prosody is actually utilised throughout the on-line processing of RC attachments; instead, they are all secondary sources of support for the Implicit Prosody Hypothesis.

Clahsen and Felser (2006) presented the Shallow Structure Hypothesis (SSH). It suggests that adult learners' L1 and L2 comprehension differs because they rely heavily on lexical-semantic dimensions than syntactic signals for processing. The varying parsing procedures mainly in L1 and L2 with less confidence, in accordance with this viewpoint, play a vital role in processing for L2 learners. However, relying just on syntax to account for the variations in L1 and L2 learning is problematic because there are other possible causes that could also contribute. Examples include non-target-like prosody, "underlearned" or "overlearned" lexical access habits, heteromorphy of semantic areas, and the potential for RC discrepancies to reveal various interpretation instances. As was already established, SSH claims that foreign speakers absorb sentences differently than L1 speakers and choose to concentrate on lexical, semantic, and pragmatic information rather than using the sentence's structure to analyse it. As a result, L2 speakers do not acquire structural norms like syntax decoding; instead, they do it with information from other sources.

In the light of the mentioned theories, the next section will give information about previous L1 and L2 studies.

Previous Studies

The foundation of theories in sentence processing aims to elucidate how interpreters manage ambiguity. The body of literature challenging overarching theories suggesting explicit processing differences among languages is rapidly expanding. Consequently, the preference tends to be associated with the prominent pronoun, NP1 (Hemforth et al., 2015). This is because German attachment patterns seem more sensitive to pronouns compared to English attachment tendencies. Another supported aspect is the distinction between subject and object, as explored in the study conducted by Hemforth et al. (2015). Forty-eight German native speakers took part in the examination of subject and object NPs accompanied by relative clauses, revealing that the RC structure in German functions as both an anaphoric and syntactic mechanism.

In a separate study by Bergmann et al. (2008), English and Spanish subjects read aloud sentences, yet no correlation was found between prosodic patterns and attachment preferences. Despite uttering a substantial number of phrases in both languages, the major prosodic break occurred after NP2. Spanish speakers tended towards a high attachment interpretation, while English speakers favored a low attachment, evident from their responses to comprehension questions immediately following each performance. These findings challenge a prosodic interpretation as a general guide for attachment styles in this structure, also providing insights into the mechanics of reading aloud. In their 1999 research, Carreiras and Clifton juxtaposed the eye movements of Spanish- and English-speaking readers as they read identical sentences in their native tongues. They discovered that while English has a noticeable reading time benefit once the RC acts to adjust the second noun phrase, Spanish does not. When advanced English-Spanish and Spanish-English L2 speakers in the US were evaluated, Dussias (2003) discovered that both groups displayed an NP2 choice in their L2 off-line but did not exhibit this tendency when working online. The L1 effect can explain the results for English-Spanish speakers, but since Spanish speakers favour NP1, the NP2 selection in the Spanish-English sample cannot be explained by their L1. This might mean that Spanish-English L2 learners have picked up processing techniques resembling targets. Nevertheless, the RC preferences for attachment of advanced Spanish, German, and Russian speakers of Greek as well as Greek native speakers were examined by

Papadopoulou and Clahsen (2003) utilizing an offline acceptability assessment activity and an online self-paced reading task.

A clear inclination toward High Attachment (HA) would be expected when dealing with L2 Greek, given that speakers of these languages' L1s have previously shown a preference for it in earlier studies. This could either result from the transfer of L1 processing methods or the development of target-like strategies. However, the outcomes contradicted both hypotheses: L2 learners did not demonstrate any distinct attachment preferences. Frenck-Mestre and Pynte (2000) employed eye-tracking tests, revealing distinct RC attachment tendencies. The study involved low and high English-French L2 speakers and low Spanish-French speakers, unveiling signs of learning and transfer in French RC attachment. While Spanish speakers consistently favored NP1, low-proficiency English speakers displayed a trend favoring NP2. Conversely, akin to French native speakers, highly proficient English-French L2 participants exhibited a preference for NP1. Nitschke et al. (2010) explored how German and Italian speakers processed sentences in their L2 post L1 transfer. In a syntactic priming test, both L1 and L2 speakers altered their preferred interpretations of ambiguous RC formulations, suggesting an influence of L1 transfer on L2 processing. Goad et al. (2021) investigated the impact of prosodic cues on English sentence understanding among Spanish-speaking learners, using a comprehension task with auditory inputs. Findings indicated that learners' proficiency correlated with the cues, suggesting L1 transfer effects. Despite conflicting evidence, recent research discovered that L2 readers are unresponsive to specific morphological marking necessary in L2 but not in L1 during online sentence comprehension (Jiang, 2007). Barto-Sisamout et al. (2009) examined two scenarios where L2 readers might encounter interference from their L1. In both scenarios, Spanish-English bilinguals did not exhibit processing issues, confirming interference effects. However, late Spanish English learners displayed a pattern suggesting interference effects when reading English sentences with personal direct objects in the "L1+L2-" condition.

On the other hand, some studies showed that there is not any similarity in sentence processing between L1 and L2. For instance, Marefat and Farzizadeh (2018) investigated the comprehension processes used by 62 highly skilled L2 Persian speakers in their L1 and L2 English via a self-paced reading test. The findings demonstrated that L2 learners employ the identical method as native English speakers in both of their languages, demonstrating a decline of the L1 processing habit and an increase in the target language (in their L2). In the study of Yao (2013), it was discovered that the L2 learners of Mandarin Chinese reacted differently to ambiguity decisions than the native speakers. Furthermore, no L1 transfer impacts were seen; independent of their L1s, the participants were not able to apply structure-driven tactics or make non-native-like parsing judgments. In the study of Felser et al. (2003), a pair of groups consisting of proficient L2 English speakers who spoke Greek or German as their mother tongue took part in a series of offline and online challenges. According to the findings, L2 students do not understand ambiguous statements of this nature in the same manner that mature L1 speakers of English do. No evidence suggested that the learners utilized any form of structure-based ambiguity resolution techniques, similar to those thought to influence sentence interpretation in monolingual adults. However, the lexical-semantic features of the preposition connecting the two potential antecedent noun phrases (of vs. with) did influence the learners' disambiguation tendencies.

Surprisingly, how does L2 affect the L1 process? In the study of Liu et al. (1992) the bilinguals exhibit a range of transfer behaviours, such as differentiation (the application of animacy methods in Chinese and word order strategies in English) and backward transfer (the employment of L2 techniques for processing in L1, which may be a sign of language erosion). Such atypical transfer behaviours are the result of a complicated interaction between factors, such as the age of exposure to L2 and how it is used in daily life. Therefore, the transfer of syntactic cues can take place not only from the first language (L1) to the second language (L2) but also in the opposite direction when the L2 is more dominant (Rah, 2010).

Interestingly, some factors can alter the participants' preferences in L1 and L2. The findings of two self-paced reading tests (Havik et al., 2009) that looked at how German proficient L2 learners of Dutch processed subject-object ambiguity online in Dutch RC formulations such as; "Dat is de vrouw

die de meisjes heeft/hebben gezien" are presented. The experiment was created in the perfect setting for the transmission of L1 processing choices to occur because native speakers of both Dutch and German have been demonstrated to favour a subject reading over an object reading of such briefly uncertain statements. The findings imply that working memory may influence interpreting choices when the requirements of the assignment are high, and in this situation, learners with high working memory spans exhibited patterns similar to those of native speakers with reduced working memory. Working memory span, nonetheless, had not any impact on the L2 learners' online processing during only comprehension or while only contextual data was accessible to help interpret selections. This was in contrast to the native speakers' online decision-making, despite the fact that the L1 and the L2 are very similar. Similarly, when the working memory is concerned, the results can be contradictory but not insoluble. Kim and Christianson (2013) proposed that the disparity in findings between English and Korean is due to the influences stemming from head-directionality. The findings of the investigation are consistent with the hypothesis that disparities in RC attachment preferences are better explained by working memory-based theories than by earlier language-dependent hypotheses. The relation between a person's individual WM and a language's entirety framework, which is a key element in RC attachment, is something they contend has been missed by earlier language-dependent explanations of cross-linguistic variances in RC interpretation.

Another factor is animacy. One can count on noteworthy indicators found in the clause, such as the enclitic marker -i, semantic congruity, or in/animacy. The initial cue, the RC enclitic marker (EM) -i, which is linked to the low attachment, was examined in the study of Shabani (2018) in relation to its function as a clarifying indicator to suggest the appropriate antecedent word. To determine the 49 Persian native speakers' attachment habits in canonical and EM-supported phrases, a total of 20 sentence triggers were produced, each of which contained two preceding nouns, one containing the marker and the other one not, accompanied by an RC. In contrast to the confusing pattern for the EM-supported phrases, the data indicated an obvious NP1 attachment choice for the canonical sentences. In the Mandarin language, the animacy factor was conducted in an experiment for native speakers. The "Verb NP1 de NP2" formulation was examined online by Hsieh et al., (2009) utilizing eye-tracking technology and the stop-making-sense paradigm (Boland et al., 1995). According to their research, Chinese L1 speakers sustain a variety of options across uncertain locations, with the RC evaluation ranking top. If the disfavored interpretation is sufficiently activated early in the ambiguous region, the re-ranking of possibilities could be extremely affordable. In a nutshell, the garden path effect is avoided and the computational expense for changing an RC structure into a VO structure is quite cheap when a semantic clue (for example, an inanimate noun promoting the VO assessment) was present prior to syntactic disambiguation. Animacy is also used in Turkish studies. Dinçtopal (2010) proposed that the distinct pattern seen with Turkish L2 learners of English might not be caused by syntactic information, but rather by lexical-semantic information when it comes to RC attachment in online experiments.

There are many different ways that modifiers, like RC, may be associated with components that provide several potential attachment sites, according to present models of parsing. Some theories such as the tuning hypothesis assume that people's past contact with language influences how well they parse. Others (such as garden-path) downplay any potential contribution made by prior linguistic knowledge and place more emphasis on the various influences of the sentence's structural features. Various demands concerning cross-linguistic variance in parsing preference are welcomed by the two points of view. In order to better understand attachment preferences in Dutch (Brysbaert and Mitchell, 1996), a questionnaire survey and two online tests were conducted. The results obviously contradict several of the established hypotheses and provide an array of challenges for most of the currently used parsing models. The results, on the other hand, are consistent with theories that include parsing processes that are adjusted by language experience.

Another point of view is subject-verb agreement. Using English as a second language, Juffs (1998) investigated certain implications of native language verb-argument structure on second language cognition. In a self-paced reading test, the speakers of Chinese, Japanese, or Korean, three Romance languages, and English were reported word-by-word reading times and grammaticality

judgment data. According to the results, cross-linguistic verb-argument structural discrepancies are not the only situations when parsing differences are trustworthy.

Interestingly, the study of Aydin Yildiz (2018) intends to ascertain if L2 speakers and monolinguals of English behave significantly or identically when it comes to handling discourse information during online and offline RC attachment ambiguity. A unique characteristic of the IC (implicit causality) idea is inference through discourse connections. This notion is intended to overcome syntactic knowledge during the settlement of the RC attachment since IC verbs necessitate further justification of the "why" in their use. According to earlier research (Rohde et al., 2011), discourse inference can influence the syntactic process; IC verbs produce an expectation relating to high attachment (non-local attachment), whereas non-IC verbs indicate low attachment (local attachment). According to the results, L2 learners preferred NP1 significantly in IC or Non-IC conditions, in online and offline experiments contrary to monolinguals (L1 speakers attached to NP2 in the absence of IC condition and NP1 in IC condition), which supports the SSH.

Discussion and Conclusion

The conclusions drawn from the studies under examination provide preliminary, albeit inconclusive, understandings of the topics they sought to answer.

With regard to the research questions, a difference was found in most of the studies between L1 and L2 processing as a result for the first research question. Moreover, the studies tried to give the reasons for this. When it came to the question of whether L2 learners may develop ambiguity resolution patterns that are comparable to those of native speakers, the majority of research found that L2 learners had slower processing speeds and less confidence in their parsing judgments than native speakers. These findings demonstrate that L1 and L2 phrase processing differ from one another, indicating that L2 parsing may be slightly slower than L1 processing (Fernández, 2003).

The difference was reviewed in some of the studies and the explanation given was that, as opposed to native speakers, L2 learners preferred high attachment more frequently for the second research question. Fernandez (1999) stated that the L1 transfer of the participants was the cause of this. In parallel, the study of Frenck-Mestre (2002) identified Spanish L2 learners of French as having L1 transfer to L2 RC attachment ambiguity resolution. Strong scientific proof for L1 transfer in the formation of L2 grammar has been provided (Schwartz, 1998). Moreover, one finding was that when Korean L2 learners of English resolved ambiguous sentences that contained RCs, they transmitted the high attachment preference (Kim, 2010). According to her, the L1-L2 transfer is valid. Hemforth et al. (2015) demonstrated that significant higher attachment (NP1) readings were seen for long RCs than for short ones. These results imply that the greater prevalence of NP1 attachment among certain individuals was due to differences in implicit prosodic phrasing. Another approach by Miyao and Omaki (2006) showed that as the online tasks lessened the processing load on respondents' working memory capacity, L2 learners demonstrated low attachment preferences. Karimi, Samadi and Babaii (2021) claimed that the learners probably transferred their processing strategies from their L1 (Persian) to their second language (English) as a result of cross-linguistic variances and their low competence point, and that, by adhering to the precepts of predicate proximity, they attached the ambiguous RC to a non-local site. However, the findings are consistent with the idea that even L2 learners who are extremely proficient do not reach native level competency in the second language (Jiang, 2007). According to Traxler, Pickering and Clifton (1998), the interpreter uses various kinds of information while processing ambiguous phrases, including discourse relation involvement and semantic plausibility, and these can be explained by the constraint-based models as including multiple sources of activation.

On the other hand, some of the previous studies found no difference between the parsing strategies of L1 and L2 speakers. For instance, the findings indicated that participants digested ambiguous statements in both Persian and English similarly to native English speakers.

Although additional empirical investigation is required to determine if there is difference between L1 and L2 language processing, and if any transfer of L1 or L2 learning actually occurs in the development of L2 processing in light of such possible methodological drawbacks, it is clear that no matter how proficient they are, L2 learners' attachment preferences differ from those of native

speakers. The abovementioned theories and models help us to understand the reasons behind this difference; however, the variances may originate from the different sources of information activated with RC attachment ambiguity, the size of the participant group or their demographic background, the data collection tools and types of tasks (online or offline), working memory competence, etc. I maintain that if a definitive conclusion is desired, a controlled experiment should be conducted using the same materials, in the same manner, with comprehensive information of a single type, and that the experiment should include vastly different participants. Only when the results consistently yield the same outcome across these studies can one make a conclusive generalization.

Contribution of Researchers

Contribution of researcher for this study is 100%.

Conflict Interest

There is no conflict of interest.

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Genişletilmiş Özet

Giriş

Farklı cümle bağlama tercihlerine sahip çok dilli konuşanlar üzerinde yapılan araştırmaların bulguları, çok dilli kişilerde çapraz-dilsel iletim olgusunun anlaşılmasında kullanılabilir (Rah, 2010). Örneğin, Vainikka ve Young-Scholten (1996), yalnızca belirli sınıfların etkilendiğini göstererek, sözcüksel kategorilerin aktarımı önermektedir. Ancak başka bir bakış açısına göre, iliştirme tercih hareketliliğine ait özellikler dilden dile aktarılmayabilirken, hem sözcüksel hem de işlevsel kategoriler buna duyarlı olabilir (Eubank, 1994). Cümle işlemenin nasıl gerçekleştiğini yeterince açıklayan kesin bir model yoktur. Bilincimizin dışında, düşüncelerimiz ve duygularımız sözcüklere çevrilir veya dudaklarımızdan beyne gönderilir. Bu nedenle, dil üretimi ve yorumlamasının incelendiği alan "cümle işleme" olarak bilinir. Buna bağlı olarak, bu derlem çalışmasında, cümle işleme ile ilgili araştırmaların bulgularının açıkça ortaya konulmuştur. Diğer bir deyişle, derlemi yapılandırmak için herhangi bir kısıtlama bulunmamaktadır çünkü anadil (L1) ve ikinci dil (L2) öğrenenlerinin belirsiz yapıları nasıl işleme tabi tuttuklarını inceleyen çalışmaların tartışılması esas alınmıştır. Bu amaçla, araştırma soruları aşağıdaki gibidir:

1. L2 öğrenenleri, L1 konuşanlarıyla belirsizliği çözerken benzer ayrıştırma stratejileri uygularlar mı?

2. Eğer varsa, L1 ve L2 konuşanları arasındaki ayrıştırma stratejilerindeki fark nasıl açıklanır?

İlgi Tümceciği (RC) İliştirme Tercihi Belirsizliği

Cümle işleme araştırmalarının amaçlarından biri, sunulan verileri yorumlamak için pek çok türde dil verisini kullanan ayrıştırma sisteminin özelliklerini anlamaktır. Şaşırtıcı bir şekilde, belirli dillerin konuşmacılarının, RC bağlama belirsizliğinde (1) gösterilen, RC'nin ya birinci isime (NP1) (Yüksek Bağlama (HA) yorum: "Oyuncunun hizmetçisi balkonda idi") veya ikinci isime (NP2) (Düşük Bağlama (LA); yorum: "Oyuncu balkonda idi") bağlanabileceği durumda, HA veya LA eğilimi gösterdikleri keşfedilmiştir. Bu tür çapraz-dilsel farkların keşfi, çeşitli RC iliştirme tercihlerini etkileyen değişkenlere yönelik birçok araştırmanın başlamasına neden olmuştur (Mitchell and Brysbaert, 1998).

1. Balkonda [RC duran] [NP1 aktrisin HA] [NP2 hizmetçisini LA] vurdular.

Bu çapraz-dilsel farklılık nedeniyle, L2 öğrenenleri, L1 işlemleme ve L2 işlemlemenin birbirinden nasıl farklı olduğunu anlamak amacıyla bu tür belirsizlikleri nasıl ele aldıklarına bakmaya başlamışlardır. Dilbilgisel özelliklerin dönüşümünün L2 edinimi araştırmalarında yoğun bir şekilde gösterildiği gibi (Schwartz, 1998), L2 öğrenenlerinin L1 işleme stratejilerini L2 metinleri yorumlamak için aktarabileceği de mümkündür. Ayrıca, L2 öğrenenlerinin genellikle ana dil gibi dilbilgisel yetkinlik geliştirmediği söylense de (Hawkins ve Chan, 1997), L2 öğrenenlerinin farklılaştıklarında, taktikler geliştirip geliştiremeyecekleri de merak edilmektedir. Bu konuyu açıklamada birçok teori, hipotez ve model geliştirilmiştir. Bunlardan en belirgin olanları aşağıdaki gibidir:

Late Closure: En son işlemlenen terimlerin, başlangıçtaki terimlerden daha çok, işlem yapılması gereken en son öğe ile birleştirilme olasılığına sahip bir tekniktir. Temel ilkesi, yorumlamaya başlamak için sözdizimsel bilgiyi kullanmaktır. Frazier ve Dean Fodor daha sonra geliştirmişlerdir (1978); içsel ve evrensel olduğunu iddia etmişlerdir, bu da her dilin belirsiz cümleler için aynı yaklaşımı kullandığı anlamına gelir.

The Constraint-Satisfaction Modeli: Bates ve MacWhinney (1987) tarafından geliştirilmiştir. Belirsizlikler çözüldüğünde hem sözdizimsel hem de leksikal öğeler dikkate alınır ve bilgi kaynağı olarak leksikon kullanılır.

Unrestricted Race Modeli: Van Gompel, Pickering, ve Traxler (2000) tarafından ortaya konmuştur. Bu modelde, iki aşamalı yaklaşım ve kısıtlama tabanlı yaklaşım birleştirilir. Sonuç olarak, yorumlayıcı birden fazla kaynaktan yararlanır.

Tuning Hipotezi: Bu hipotez, Mitchell, Cuetos, Corley ve Brysbaert tarafından 1995 yılında geliştirilmiştir. Yorumlayıcı bir belirsizlikle karşılaştığında, önceden tecrübe ettiği yönteme göre bunu çözecektir.

Shallow Structure Hipotezi: Clahsen ve Felser (2006) (SSH) ortaya koymuştur. Bu hipotez, yetişkin öğrenenicilerin L1 ve L2 anlamalarının farklı olduğunu öne sürer, çünkü işlem yapmak için sözdizimsel sinyaller yerine ağırlıklı olarak leksikal-semantik boyutlara güvenirler. Bu bakış açısına göre, L1 ve L2 arasındaki farklı ayrıştırma prosedürleri, L2 öğrenenleri için işleme sürecinde daha az güvenle önemli bir rol oynar.

Literatür

Cümle işleme teorilerinin temeli, yorumlayıcıların belirsizlikle nasıl başa çıktığını açıklamaktır. Dil arasında işleme farklılıklarını açıkça iddia eden genel teorilere karşı çıkan literatür hızla genişlemektedir. Örneğin, özne ve nesne ikiliği, Hemforth vd., (2015) tarafından incelenen çalışmada ele alınmıştır. Sonuç olarak, Almanca'da göreceli cümle yapısının hem bir anafordan hem de sözdizimsel bir mekanizmadan oluştuğu sonucuna varılmıştır. Bergmann vd., (2008) tarafından yapılan çalışmada, İngilizce ve İspanyolca konuşanlarının sesli okudukları cümleler incelenmiş, ancak vurgusal biçimleme modeli ile iliştirme tercihi arasında bir ilişki bulunmamıştır. Carreiras ve Clifton (1999) araştırmalarında, İspanyolca ve İngilizce konuşan okuyucuların ana dillerinde aynı cümleleri okurken göz hareketlerini yan yana koymuştur. İngilizce cümlede ikinci isim öbeğini okumak için çalıştığında belirgin bir okuma süresi avantajına sahipken, İspanyolca'da böyle bir avantaja sahip değildir. Ancak, Papadopoulou ve Clahsen (2003) tarafından Yunanca anadile sahip, ileri düzeyde İspanyolca, Almanca ve Rusça konuşanlar ile sadece Yunanca ana dili konuşanların RC tercihleri incelendi ve bunun için çevrimdışı kabul edilebilirlik değerlendirme etkinliği ve çevrim içi kendinden ayarlı okuma araçları kullanılmıştır. Sonuç olarak, L2 öğrenenleri belirgin bir iliştirme tercihi gösteremedi. Benzer şekilde, Frenck-Mestre ve Pynte (2000) göz izleme testlerini kullanarak farklı RC iliştirme eğilimleri bulmuşlardır. Düşük düzeyde İngilizce-Fransızca L2 konuşmacılar, yüksek düzeyde İngilizce-Fransızca L2 konuşmacılar ve düşük düzeyde İspanyolca-Fransızca konuşmacılar üzerinde çalışmış ve Fransızca RC bağlamında öğrenme ve aktarım işaretleri keşfetmişlerdir. Bazı çalışmalar, L1 ve L2 arasında cümle işleme benzerliğinin olmadığını göstermiştir. Örneğin, Marefat ve Farzizadeh (2018), 62 Farsça anadil konuşmacısının ve İngilizce L2'leri üzerinde kendinden ayarlı okuma testi aracılığıyla kullandıkları anlama süreçlerini inceledi. Bulgular, L2 öğrencilerinin iki dilde de, anadil İngilizce konuşmacılarıyla aynı yöntemi kullandığını ve L1 işleme alışkanlığının azaldığını, bununla beraber hedef dili (L2'lerini) arttırdığını gösterdi. Yao'nun (2013) çalışmasında, Çince Mandarin L2 öğrencilerinin belirsizlik kararlarında ana dil konuşanlarından farklı tepkiler verdiği keşfedilmiştir. Aydin Yildiz (2018) çalışmasının ilginç bir özelliği, çevrim içi ve çevrim dışı RC iliştirme belirsizliği sırasında dilbilgisi bilgisini aşmaya yönelik olan anlam bağlantıları yoluyla sonuca varma (IC, örtülü nedensellik) fikridir. Bu örtülü nedensellik fikri, RC bağlamının yerleşimi sırasında IC fiillerinin kullanımında "neden" konusunda daha fazla açıklamayı gerektirir. Sonuçlara göre, L2 öğrenenleri, çevrim içi ve çevrim dışı deneylerde IC veya non-IC koşullarında anlamlı bir şekilde NP1'i tercih etmişlerdir, bu durum monolingualara (L1 konuşmacıları) ters düşmektedir (çünkü IC koşulu olmadığında NP2'ye bağlanmışlardır ve IC koşulu olduğunda NP1'e bağlanmışlardır), bu da SSH'yi desteklemektedir.

Tartışma ve Sonuç

Çalışma sorularına ilişkin olarak, çoğu çalışmada L1 ve L2 işleme arasında fark bulunmuş ve bu farkın nedeni açıklanmaya çalışılmıştır. L2 öğrenenlerinin, L1 konuşmacılara göre işlem hızlarının daha yavaş olduğu ve ayrıştırma değerlendirmelerinde daha az güvene sahip oldukları bulunmuştur.

Bu bulgular, L1 ve L2 cümle işleme arasındaki farkları göstermektedir ve L2 ayrıştırmanın L1 işlemeye göre biraz daha yavaş olabileceğini göstermektedir (Fernández, 2003).

Fark, bazı çalışmalarda gözden geçirilmiş ve L2 öğrenenleri, anadil konuşanlara kıyasla daha sık olarak yüksek bağlama (HA) tercih etmektedir şeklinde açıklanmıştır. Fernandez (1999), katılımcıların L1 aktarımının buna neden olduğunu belirtmiştir. Aynı şekilde, Frenck-Mestre (2002) çalışmasında, Fransızca L2 öğrenenlerinin L1 aktarımına sahip olduğu gözlenmiştir. Ayrıca, Kim (2010) çalışmasında, İngilizce L2 öğrenenlerinin Korece anlamlı cümleleri çözerken yüksek bağlama tercihi aktardıkları belirlenmiştir. Buna göre, L1-L2 aktarımının geçerli olduğu düşünülmektedir. Bu sonuçlar, belirli bireyler arasında NP1 bağlama tercihinin daha yaygın olmasının, içsel vurgusal yapı farklılıklarından kaynaklandığını ima etmektedir.

Miyao ve Omaki (2006) tarafından sunulan başka bir yaklaşım, çevrim içi görevlerin katılımcıların çalışma belleği kapasitesine olan yükünü azalttığı, bu nedenle L2 öğrenenlerinin düşük bağlama tercihleri gösterdiğidir. Karimi, Samadi ve Babaii (2021), öğrenenlerin muhtemelen çapraz-dilsel farklılıklar ve düşük yetenek düzeyleri sonucunda L1'lerinden (Farsça) ikinci dillerine (İngilizce) işleme stratejilerini aktardıklarını ve yargı ölçütlerine bağlı kalarak belirsiz RC'yi yerel olmayan bir yere bağladıklarını iddia etmiştir. Ancak, sonuçlar, son derece yüksek düzey L2 öğrenenlerinin bile ikinci dillerinde anadil seviyesine ulaşmadığını gösteren Jiang (2007) düşüncesiyle uyumludur.

L1 ve L2 dil işleme arasında fark olup olmadığını, L1 veya L2 öğrenmenin gerçekleşip gerçekleşmediğini belirlemek için daha fazla deneysel araştırmaya ihtiyaç vardır. Bu olası metodolojik dezavantajlar ışığında, ne kadar iyi derecede ikinci dile sahip olunsa da, L2 öğrencilerinin bağlama tercihlerinin anadil konuşmacılardan farklı olduğu anlaşılmaktadır. Söz konusu teoriler ve modeller, bu farkın nedenlerini anlamamızda bize yardımcı olmaktadır. Ancak, farklı bilgi kaynaklarının RC bağlama belirsizliği ile etkinleştirilebileceği, katılımcı grup boyutu veya demografik özellikleri, veri toplama araçları ve görev tipleri (çevrim içi veya çevrim dışı), çalışma belleği yeteneği vb. gibi farklılıkların kaynaklarından dolayı farklılıklar oluşabilir.