



**UiT** The Arctic University of Norway

Faculty of Humanities, Social Sciences and Education

**The Acquisition of Functional Morphology, Semantics-Morphology and Syntax by Persian Learners of English**

The Bottleneck Hypothesis in L2 Acquisition

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Master's thesis in English Linguistics, ENG-3991, May 2024



## **Dedication**

To all the heroes who dedicated their lives to “Women, Life, Freedom”

## **Abstract**

In the current thesis, I investigated the Bottleneck Hypothesis (Slabakova, 2006, 2008, 2013) concerning Persian L1 speakers' acquisition of English as their second language. The Bottleneck Hypothesis (BH) focuses on the aspects of learning a second language that are challenging and those that are simple. According to this hypothesis, acquiring functional morphology is the challenging part (or the bottleneck) of second language acquisition while acquiring syntax and semantics is more straightforward. In this thesis, I examined three linguistic conditions (Subject-Verb agreement, Verb-Object word order and Definiteness) as representative of three linguistic categories (Morphology, Syntax, Semantics-Morphology). 29 university students whose first language is Persian participated in the study through the administration of an acceptability judgment task with 48 questions, a background questionnaire, and a competency exam (Oxford proficiency test) with 20 multiple-choice test items to answer. The results indicated that the Bottleneck Hypothesis is supported. The participants struggled more with recognizing morphology than narrow syntax. Definiteness as a representative of semantics-morphology was the most challenging condition for participants. Subject-Verb agreement and Verb-Object word order were in the hierarchy of the difficulty respectively.

**Keywords:** Subject-Verb agreement, Verb-Object word order, Definiteness, The Bottleneck Hypothesis, Persian learners, Second language.

## **Acknowledgment**

First and foremost, I would like to acknowledge and give my warmest thanks to my supervisor Professor Yulia Rodina who made this investigation possible with her sincere support. Her guidance and valuable advice carried me through all the stages of writing my thesis.

I would also like to thank my husband and my mother for their inspiration, motivation, endless support, and understanding when undertaking my research and writing my project.

I would like to thank God, for letting me through all the difficulties.

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## **List of Abbreviations**

Adj-N: Adjective Noun  
AJT: Acceptability Judgement Task  
BH: Bottleneck Hypothesis  
CA: Contrastive Analysis  
CAH: Contrastive Analysis Hypothesis  
CLI: Cross Linguistic Influence  
DP: Determiner Phrase  
EFL: English as a Foreign Language  
FC: Functional Category  
FT/FA: Full Transfer Full Access Hypothesis  
GJT: Grammar Judgement Test  
IL: interlanguage  
L1: First language  
L2: Second language  
L2A: Second Language Acquisition  
NP: Noun Phrase  
RQ: Research question  
S0: Initial State  
SLA: Second Language Acquisition  
SOV: Subject- Object -Verb word order xi  
SVA: Subject-Verb-Agreement  
SVO: Subject-Verb-Object word order  
TL: Target Language  
UG: Universal Grammar  
V2: Verb second

## **1. Introduction**

The question of what makes learning a second language (L2) challenging or simple has drawn the attention of second language researchers in recent years. Several ideas have been proposed to explain the cognitive processes involved in second language acquisition. Although most individuals learn their native language (L1) approximately flawlessly, the majority of learners do not become as proficient in their L2 (White 2003; Slabakova 2008). According to Gass (2013:46), there are three primary topics that the research of L2 focuses on, how students who have little contact with the target language can develop a new language framework, what learners acquire from the L2, and what the learners do not learn.

Accordingly, this thesis aims to investigate the Bottleneck Hypothesis concerning Persian L1 speakers' acquisition of English as a second language. The Bottleneck Hypothesis (BH) accounts for the ease and difficulty of learning a second language (L2). According to the BH, the most challenging aspect of learning a second language is functional morphology, and narrow syntax, for example, is simpler to acquire. More specifically, the Bottleneck Hypothesis claims that functional morphemes and their characteristics represent the difficult part of the process of L2 acquisition. On the other hand, learning universal syntax, semantics, and pragmatics proceeds easily (Slabakova 2006, 2008, 2013). Since the BH is a relatively recent hypothesis, it has not been investigated in many studies. The first effort intended to directly test the BH is Jensen (2016). Besides, there are few studies investigating the BH in L1 Persian learners of English and the need for more research in this field is evident. There are two MA thesis investigations namely Gholami (2020) and Rajabi (2022) who tested the BH based on the data from L1 Persian L2 English learners. All these studies overall confirm that functional morphology is the bottleneck or the hardest part of L2 acquisition. At the same time, they highlight certain issues and identify some open questions.

As mentioned previously, the goal of the BH hypothesis is to determine what the challenging aspects of L2 acquisition are. My motivation for the current study is to gain more evidence in order to support or refute the BH. Investigating the various theories that are now being proposed on the subject of L2 acquisition in-depth is crucial. By doing this, one can discover data that supports or disproves the theories and get insight into how L2 acquisition is shaped. Furthermore, it is important to learn about the challenges associated with acquiring a second language in the context of an L2 classroom, i.e. from a language teaching perspective. I decided to investigate the BH with L1 Persian speakers learning English as a second language to see what the challenging part is of acquiring English as their second language.

My study is different from the previous ones in two ways. First, unlike Jensen (2016) and Rajabi (2022), I tested the BH with older learners who were university students. Second, I tested different linguistic properties. One of the trials under my study was definiteness which makes my study different from Jensen (2016), Gholami (2020), and Rajabi (2022). The previous studies by Jensen (2016), Gholami (2020), and Rajabi (2022) have focused on functional morphology and narrow syntax and tested Subject-Verb (SV) agreement, and Verb-Object (VO) word order. In none of the mentioned studies, semantics-morphology was investigated. It is a complex interface phenomenon because the notion of definiteness is universal across languages, but English uses a specific functional morpheme to mark definiteness, while Persian does not. In my study, I tested the BH with a complex interface phenomenon such as definiteness. Consequently, to look into which grammar aspects of L2 acquisition are harder I have selected three linguistic constructions.

The three linguistic categories that are the subject of this thesis are verb-object word order representing syntax, subject-verb agreement as a functional morphology, and definiteness to evaluate the semantics-morphology. Further details about these constructions are mentioned in section 2.4. The three linguistic constructions investigated in the current study are as follows:

(1) *Verb-object word order*

- a. Yesterday Jonny bought books.
- b. \*Yesterday Jonny books bought.

(2) *Definiteness*

- a. Nina's cat chased a mouse. The mouse ran very fast.
- b. Nina's cat chased a mouse. \*Mouse ran very fast.

(3) *Subject-verb agreement*

- a. Mark runs in the park every day.
- b. \*Mark run in the park every day.

In my study, I address the following *research questions*:

1. Is the acquisition of functional morphology more difficult than the narrow syntax for L1 Persian L2 English university students?
2. What is the hierarchy of the difficulty of linguistic conditions (morphology, semantics-morphology, and narrow syntax) for L1 Persian students when acquiring L2 English?

The research questions and predictions rely on the expectations made by the Bottleneck Hypothesis, which states that learning functional morphology is more challenging than learning narrow syntax. So, to investigate these phenomena and compare these three categories, the test is planned. The present thesis does not only confirm the BH's arguments, as will be explained in the following chapters but the differences in the results are also attributed to potential factors such as interpretability and uninterpretability and transfer from the L1.

In the present thesis, I used an acceptability judgment task (AJT) to investigate the BH with L1 Persian speakers learning English as a second language. Twenty-nine university students whose ages ranged from 18 to 37 years old participated in my study. The participants evaluated grammatical and ungrammatical sentences presented in (1)-(3) above.

My thesis is organized as follows. In Chapter 2, I present the background for the present study. I present the BH hypothesis and the research evidence from previous studies by Jensen (2016), Gholami (2020), and Rajabi (2022). In Chapter 3, I present my study including the research questions, prediction, methodology as well as the participants. In Chapter 4, the results of my study are presented in detail. In Chapter 5, I explain my findings in light of the BH and discuss how my findings compare and contrast with those of the previous research.

## **2. Literature**

In this chapter of my thesis, I delve into the fascinating field of Second Language Acquisition (SLA), based on generative linguistics. To provide a comprehensive understanding of the topic, I present various sub-chapters where I describe transfer, the Full Transfer/Full Access Theory, and the interpretable and uninterpretable features. Section 2.1 is an explanation of the acquisition of a second language. I address morphology and syntax in SLA in section 2.2 and go over the details about the Bottleneck Hypothesis (Slabakova 2008, 2013; 2016). I also examine how the acquisition of a second language is impeded by a bottleneck, which is caused by the interaction between syntax and morphology. Moving ahead, in section 2.3, I present previous studies on the BH. This will help me compare my results to the other researchers' findings. In addition, in section 2.3, I present previous studies that investigated the linguistic properties. This section informs of the findings of other researchers regarding the areas that can be problematic for L1 Persian learners of L2 English. The selected linguistics trials to be investigated in this thesis both in English and Persian are also explained and illuminated in section 2.4.

### **2.1. Second Language Acquisition**

According to Gass et al. (2013), second language acquisition (SLA) is a complex and fascinating field of study that examines how individuals develop a new language system with limited exposure to a second language. Essentially, SLA identifies what is simple and what is difficult in the process of L2 learning. Gass et al. (2013) stated that SLA investigates the reasons behind the discrepancy in proficiency levels between L1 and L2 learners. It also aims to understand why some individuals are able to attain native-like proficiency in multiple languages, while others are not. Gass et al. (2013) claimed that SLA is a study that looks at how our brains learn to use a second language. It is a part of the bigger field of linguistics and aims to understand how we learn and use language. Ultimately, Slabakova (2016) declared that the study of SLA provides valuable insights into how we learn and use language as well as how we can facilitate the language learning process for others.

The bottleneck hypothesis is a linguistic theory that is grounded in the generative linguistic framework, as proposed by Noam Chomsky (1957 and 1965). According to generative linguistics, the linguistic competence of speakers can be described as an abstract and unconscious grammatical system that enables them to produce and comprehend language with

ease. This system is known as Universal Grammar (UG) and consists of three primary components - syntax, phonology, and semantics - which are all interconnected.

Within the UG framework, some linguistic properties related to syntax, semantics, and pragmatics are universal and shared among all languages, while others are language-specific and vary from one language to the next. These unique properties are referred to as parameters and are set to specific values in each language. Additionally, the principles of UG are transferable from a speaker's first language (L1) to a second language (L2), while parameters that differ from the L1 need to be reset to the target value, which can create difficulties in the acquisition of a second language.

In summary, the bottleneck hypothesis suggests that the difficulty in acquiring a second language lies in the resetting of parameters in UG. This process can create a bottleneck that slows down the acquisition process and makes it more challenging for speakers to achieve native-like proficiency in their second language. Ever since Noam Chomsky introduced the concept of Universal Grammar (UG), there has been a great deal of debate and discussion surrounding its impact on second language acquisition. Chomsky's theory of "Principles and Parameters" applied UG in the study of SLA, to identify the fundamental principles and characteristics of human language. The Universal Grammar theory posits that there is a set of general grammar principles that underlie all human languages and that human languages can be interrelated. This theory seeks to solve the logical problem in language acquisition. According to Chomsky, UG is a unique feature of the human brain that allows people to learn language quickly. It is an unconscious and innate knowledge that exists within the human brain without the need for explicit learning, and it determines the fundamental structure of human language. Chomsky employs UG to account for first language acquisition (Hoque, 2020).

Slabakova (2008, 2013, 2016) argues that UG plays a crucial role in language acquisition and that the systems of the L1 and L2 have significant representational similarities. Thus, UG is considered to be a vital concept in the field of linguistics, particularly with regard to understanding how humans acquire language.

Chomsky (1995) claims that the concept of UG revolves around the theory of the initial state of the relevant component of the language faculty. This theory suggests that individuals possess innate linguistic knowledge about their first language (L1), which is referred to as the initial state or S0. According to White (2003), the term initial state can be used to describe the kind of unconscious linguistic knowledge that an individual has prior to being exposed to the second language (L2) input or to refer to the characteristics of the earliest grammar. White (2003) discusses the initial state and transfer of L1 in order to explain S0. She believes that we



can take either the grammar of L1 or UG as S0. She states that the initial state is a specific grammar, and the L2 learner begins with grammatical representations. White (2003) takes L1 as S0. Therefore, in this thesis, White's definition of S0 is used, which aligns with Chomsky's point of view. Chomsky suggested that native speakers' linguistic competence can be considered an abstract and unconscious linguistic system, and this system is constrained by the universal linguistic principles known as Universal Grammar (UG). Therefore, UG plays a crucial role in language acquisition, and it is a fundamental part of the language learning process.

In 1972, Selinker introduced the term "interlanguage" to refer to the linguistic system that non-native speakers develop when learning a second language. Corder (1983) believed that as learners continue to learn L2, their internal representation of the language, which is their interlanguage competence, changes and develops over time. In 2003, White offered a more detailed definition of interlanguage, stating that it is a complex system of grammar, vocabulary, and pronunciation that is influenced by the learner's first language as well as the target language. White also argued that interlanguage grammar is governed by the same principles and parameters of Universal Grammar (UG) that native speakers use. Therefore, interlanguage is not a simplified or incomplete version of the target language, but rather a unique system of language that is shaped by the learner's previous linguistic experience. As this thesis focuses on interlanguage, it adopts White's (2003) definition of interlanguage when discussing the non-native grammar that learners develop when acquiring a second language.

Generative linguistics postulates that Universal Grammar (UG) is an innate mental faculty that contains a pre-established set of rules governing the formation of all grammatically correct sentences in a language. According to Slabakova (2016), UG represents the genetic endowment that enables humans to learn and use language effectively, and it determines the range of possible grammatical structures that a language can have. In essence, UG plays a crucial role in first language acquisition, as it provides a blueprint for the acquisition of language by allowing speakers to generate and comprehend utterances that conform to the rules of their language.

Moreover, UG is also believed to play a significant role in second language acquisition (SLA). The process of SLA is said to be similar to the natural process of first language acquisition, with UG serving as a guiding force in language learning. Slabakova (2016) argues that the difficulties encountered in SLA can be overcome with exposure to diverse and rich input, and deliberate language practice. In summary, UG is a fundamental concept in linguistic

theory, as it provides a framework for understanding the process of language acquisition, and the formation of grammatical structures in languages.

In this thesis, I adopt the theoretical framework proposed by prominent linguists such as Chomsky, Slabakova, and White, who argue that second language acquisition (SLA) involves both the learner's first language (L1) and Universal Grammar (UG). Specifically, scholars like Gass and Slabakova have suggested that while some aspects of second language (L2) knowledge may be innate, other aspects are influenced by the learner's L1 and the frequency and nature of the L2 input. Therefore, the process of SLA is not only guided by UG, but also by the learner's L1, which can both facilitate or hinder the acquisition of L2 knowledge. In light of these arguments, this thesis posits that a comprehensive understanding of SLA should take into account both the role of UG and the influence of the learner's L1.

### **2.1.1. L1 Transfer**

Language transfer has been a topic of great importance, challenge, and controversy in the field of second language acquisition. As mentioned in the previous section, it is widely acknowledged that the role of L1 is indispensable in the acquisition of L2. L1 with its both positive and negative effects, has a significant impact on the L2 acquisition process. In fact, language acquisition is a creative process that involves an interaction between the grammar of L1 and L2.

Researchers such as Dulay and Burt (1973, 1974) analyzed errors produced by Spanish learners of English and considered errors and L1 transfer as two interrelated fields. They stated that learner errors were the result of either L1 transfer or creative construction (called also interlingual which is defined as the construction of unique rules like those which children form while acquiring their mother tongue).

Ellis (1994), defined L1 transfer as “the incorporation of features of the L1 into the knowledge systems of the L2 which the learner is trying to build.” Weintech (1953) and Odlin (2003) emphasized the influence that one language had on another in situations where two or three languages came into contact. They also mentioned the threat of negative transfer which is regarded as the way a language interferes with the acquisition of another which is the opposite of positive transfer. Positive transfer of the native-language pattern facilitates learning when the two languages are similar. Still, when they are different, learning difficulty arises and errors resulting from negative transfer are likely to occur.

In 1945, a structuralist linguist named Fries introduced Contrastive Analysis (CA) as a pedagogical technique that aimed to highlight the structural differences between a learner's first

language (L1) and second language (L2). Weintech expanded upon this notion in 1953 by introducing the concepts of transfer and interference in L2 acquisition. Transfer refers to the use of the L1 that leads to correct usage in the L2, while interference refers to the use of the L1 that leads to incorrect language use.

In 1957, Lado, further developed the concept of CA and extended the idea of learners' extension of the "properties of L1" to L2. Researchers then investigated the similarities and differences between L1 and L2 under the Contrastive Analysis Hypothesis (CAH). Studies revealed that if the properties of the L1 resemble those of the L2 (positive transfer), the acquisition of the L2 becomes easier, while the differences between the properties of the L1 and the L2 (negative transfer) make the L2 acquisition harder.

Westergaard (2021) discusses the focus of L2 (second language) acquisition research in the late 1990s, which was primarily on defining the initial state of second language acquisition. During this time, different models of transfer were developed, ranging from complete transfer to no transfer at all. One of the most notable models was the Full Transfer Full Access (FTFA) hypothesis proposed by Schwartz and Sprouse (1996), which suggested that complete transfer occurs during second language acquisition. Another model was the Minimal Trees theory developed by Vainikka and Young-Scholten (1996), which proposed that only lexical categories are transferred and not functional categories (partial transfer). Eubank (1993/1994) developed the Weak Transfer model, which suggests that transfer is not complete but is still present during second language acquisition. Platzack (1996) proposed the Initial Hypothesis of Syntax, which also suggests partial transfer during second language acquisition. In the current study, the focus is on the Full Transfer / Full Access Hypothesis, as it is assumed by the BH.

Schwartz and Sprouse (1996) proposed a hypothesis known as the Full Transfer/ Full Access hypothesis (FT/FA). This hypothesis suggests that the initial state of second language (L2) acquisition is the final state of first language (L1) acquisition. According to this hypothesis, when individuals are exposed to L2 input, they start by making a copy of their L1 grammar and considering it as their L2 grammar. They will need to reorganize their L2 grammar with contact with L2 information, though, if the L2 input is different from the L1 grammar.

This restructuring process may require the use of inter-language, which is necessary for the L2 learners to access Universal Grammar (UG) to make their interlanguage more target-like.

Gass (2013) further explained that the L2 learner is expected to use the L1 grammar as a starting point but have full access to UG in cases where the L1 is insufficient for the learning

task at hand. For instance, English and Persian have different word orders in main clauses. English is an SVO language, whereas Persian is an SOV language. As a result, their underlying word order is not the same. This means that Persian learners of English should be exposed to the structures in which the differences in word order are evident to change their L2 grammar immediately after exposure to the structure.

In summary, the FT/FA hypothesis suggests that L2 learners use their L1 grammar as a starting point for L2 acquisition. However, when the L2 input differs from the L1, they have to restructure their L2 grammar with exposure to L2 input. In this process, inter-language may be required to restructure, and L2 learners may access UG to make their interlanguage more target-like.

In order to better understand the differences that exist in the word order of Persian and English, below are some examples that highlight these variations.

According to Prevost and White (2000), learners mistakenly regard two different grammars as the same if the differences between the first language (L1) and the second language (L2) grammar are not clearly evident in the surface representations. Consequently, this may prevent them from changing their interlanguage. In other words, it becomes difficult to identify when the restructuring happens. As a result, it is vital to expose the learners to the mismatch as early as possible so that they can acquire the English word order quickly. Therefore, it is crucial to provide learners with comprehensive and clear instructions about the differences between the two grammars to ensure that they can learn the target language effectively.

According to Slabakova's (2016) research in Second Language Acquisition (SLA), L1 transfer refers to the grammatical knowledge that can be reasonably attributed to the influence of the native language. This means that the first language (L1) has a significant impact on the process of acquiring a second language (L2). In addition, Slabakova (2016) stated that in the initial stage of L2 acquisition, principles transfer from Universal Grammar (UG) or L1, whereas parameter values transfer from the native language. This suggests that both UG and L1 play a role in forming the general principles of language acquisition, while the specific values of parameters are more influenced by the native language.

### **2.1.2. Interpretable vs uninterpretable features**

In her work, Slabakova (2013) discusses the concept of interpretable and uninterpretable features in sentences. According to her, interpretable features are integral to the interpretation of the sentences, and their exclusion from the sentence can alter the meaning conveyed by it.

On the other hand, uninterpretable features do not contribute to the meaning of the sentence and only indicate if the sentence is grammatically correct or not.

The features of [masculine], [3rd person], and [singular] are examples of interpretable features in a sentence, as they contribute to the semantic meaning of the sentence. In contrast, [subject-verb agreement] is an example of an uninterpretable feature that only determines if the sentence is grammatically correct.

Slabakova further explains that the verb "take-s" in the sentence "He often take-s the bus", has both interpretable and uninterpretable features. The interpretable feature is the present tense of the verb, which is critical to conveying information in the sentence. In contrast, the uninterpretable feature is the subject-verb agreement, which, if removed, would result in an ungrammatical sentence, but it would not change the meaning being conveyed.

It is important to note that interpretable and uninterpretable features vary across languages, which can pose challenges for second-language learners. Therefore, understanding these features is crucial for accurately interpreting and conveying the meaning of sentences in different languages.

In my thesis, I will be analyzing three crucial language features: subject-verb agreement, definiteness, and verb-object word order. Both subject-verb agreement and definiteness are uninterpretable, meaning that their absence does not necessarily change the intended meaning of the sentence. However, verb-object word order can significantly alter the sentence's meaning and is interpretable. It's important to note that even though the omission of subject-verb agreement or definiteness in L2 English may not change the intended meaning of the sentence, it will result in an ungrammatical sentence.

## **2.2. The Bottleneck Hypothesis**

Slabakova introduced the Bottleneck Hypothesis in 2008, which she further improved in 2013 and 2016. This hypothesis aims to explain which aspects of second language (L2) acquisition are easy and which are difficult to acquire. According to Slabakova (2013), syntax and semantics are universal and easy to acquire because they are processed using universal operations and are thus transferable. In contrast, functional morphology is language-specific and must be learned lexically, making it difficult to acquire. This means that functional morphology acts as a bottleneck in L2 acquisition, as it encodes all the grammar's non-transferable formal features, making it challenging to acquire.

Slabakova (2016) further explained her hypothesis by stating that functional morphology is the source of variation, where differences among languages are located. That is why this

language-specific linguistic feature must be lexically learned. However, both L2 learners and native speakers have difficulty processing functional morphology without enough experience and exposure to morphology. Meanwhile, narrow syntax and meaning calculation are believed to be universal and transferable.

Slabakova (2013) argued that accurate knowledge of functional morphology depends on prior knowledge of narrow syntax, which supports the idea of syntax before morphology and is one of the main predictions of the Bottleneck Hypothesis. Additionally, she claimed that functional morphology must be lexically learned for each language, while the acquisition of universal syntax, semantics, and pragmatics flows more smoothly.

In a recent publication by Jensen et al. (2020), the authors examine the relationship between functional morphology and syntax acquisition. They propose that recognizing and supplying the overt exponent of a functional category (FC) and understanding all the features reflected in that FC are two distinct processes. This leads to two possible views on which process precedes or triggers the other.

One view, called 'morphology-before-syntax,' suggests that learning functional morphology drives the acquisition of syntax. Several studies, including Clahsen and Hong (1995), Eubank (1994), and Vainikka and Young Scholten (1994) support this view.

The opposite view, known as 'syntax-before-morphology,' argues that syntactic knowledge is available in learner production much earlier than the correct suppliance of the overt functional morphology. This view is supported by Haznedar and Schwartz (1997), Lardiere (1998), and White (2003).

In conclusion, the Bottleneck Hypothesis considers functional morphemes and their features as the bottleneck of SLA. This is because narrow syntax features can be facilitated through positive transfer or access to Universal Grammar (UG) via previously acquired languages. However, functional morphology cannot be transferred in the same way, making it difficult to acquire. The acquisition of functional morphology is particularly challenging because it encodes all of the grammar's non-transferable formal features. As a result, learners must pay close attention to the specific forms and meanings of functional morphemes to develop accurate and natural language use.

### **2.3. Previous Studies on the Bottleneck Hypothesis**

In this section, I will review some previous studies related to the BH in SLA, especially the BH in SLA of the L1 Persian learners of L2 English, as well as the investigations that

studied the difficulty hierarchy of subject-verb agreement, definiteness, and verb-object word order for L1 Persian learners of L2 English.

### **2.3.1. Slabakova and Gajdos (2008)**

Slabakova and Gajdos conducted a research study in 2008 to investigate the acquisition process of functional morphology among L1 English learners acquiring L2 German. The study aimed to examine the strategies adopted and the challenges faced by beginner-level German learners, whose native language was English, when investigating the uninterpretable features of agreement. The researchers focused on analyzing the use of the copula verb "sein" (which means "to be") in the present tense, as it served as a reflection of the learners' understanding of agreement features. Overall, the study aimed to shed light on the process of functional morphology acquisition in L2 learners and to identify potential areas of difficulty that may need to be addressed in language instruction.

The study aimed to investigate the proficiency level of 42 L2 learners of German at a US university. The participants were classified into two groups according to how many hours in class students spent learning German.

The first group consisted of 24 beginners who had received around 40 hours of German classroom instruction, while the second group comprised 18 intermediate learners who had been exposed to 140 hours of instruction. The study also included 17 native German speakers in Germany who were tested alongside the L2 learners. The main test was a written pen-and-paper task that consisted of simple sentences with missing subjects. Participants were required to identify the appropriate subject that matched the provided sentences. This study provides valuable insights into the proficiency levels of L2 learners in German language instruction.

The researchers predicted that their attendees would have remarkable errors when they used the verb *sind*. The outcome validated their theory. As they discovered that, in contrast to beginners, intermediate learners performed worse on "*sind*" despite having greater exposure to German. Furthermore, when it came to combining a DP subject with the copula, the intermediate learners' accuracy was much worse than that of the beginners. Thus, there was little improvement in the understanding of subject-verb agreement with complete DPs.

### **2.3.2. Jensen (2017)**

Jensen (2017) investigated the functional morphology and narrow syntax as two comparable conditions. In Jensen's (2017) study, the Bottleneck Hypothesis (BH) was given some support. Jensen (2017) proposed the following research questions:

“RQ1: Is functional morphology more difficult to acquire than narrow syntax in L2 acquisition?

RQ2: Are the two morphological conditions equally difficult in L2 acquisition?”

The study conducted by Jensen (2017) aimed to investigate the acquisition of functional morphemes and syntax in second language (L2) acquisition. Specifically, two functional morphemes, subject-verb agreement, and Past tense -ed, and two syntax conditions, verb movement across an adverb in subject-initial clauses and verb movement across the subject in non-subject initial clauses, were examined. The participants of the study were Norwegian students who received English instructions from 1st grade. The participants were divided into two groups, 4th graders (9 and 10 years old) and 8th graders (12 and 13 years old). To collect data, the study utilized an acceptability judgment task (AJT) consisting of 45 test sentences, including 20 sentence pairs and five ungrammatical fillers. Four different types of sentences were used in the AJT, including subject-initial and non-subject-initial declarative clauses with lexical verbs, subject-initial declaratives with 3rd person singular subjects, and subject-initial declaratives with the Past tense marking -ed.

The results of the study revealed that functional morphology is more difficult to acquire than narrow syntax, which is consistent with the Bottleneck Hypothesis (BH). However, the two morphological conditions were found to be not equally difficult in L2 acquisition, and the acquisition of one of the morphological conditions was easier than one of the syntactic conditions. In particular, the study respondents found it more straightforward to learn the functional morpheme of the past tense, -ed, than verb movement in subject-initial phrases and subject-verb agreement.

This finding contradicts the BH, which suggests that Past tense should be more challenging than narrow syntax. However, the acquisition of the subject-verb agreement, which was found to be more difficult, supports the BH. According to Jensen (2017), there are two potential explanations for why learning the past tense is simpler than learning subject-verb agreement,

Firstly, the transfer from L1 may have played a role as the Norwegian and English languages share similarities in marking the Past tense by adding a suffix to regular verbs. Secondly, the interpretability of the conditions may have contributed to the easier acquisition of the Past tense marker -ed as an interpretable feature.

It is worth noting that both English and Norwegian languages have Past tense markers, whereas the agreement marker as an uninterpretable feature does not exist in the Norwegian language, making it more challenging to acquire. Consequently, it is a difficult assignment for students to learn and they must acquire it.



In conclusion, the findings of M. Jensen's (2017) study suggest that the acquisition of functional morphology and syntax in L2 acquisition is not equally difficult, and the acquisition of one of the morphological conditions was easier than one of the syntactic conditions. The results also suggest that the transfer from L1 and the interpretability of the conditions may play a significant role in the acquisition process.

### **2.3.3. Jensen, Slabakova, Westergaard, Lundquist (2020)**

In a recent study conducted by Jensen and colleagues (2020), the Bottleneck Hypothesis was put to the test about the acquisition of English as a second language by Norwegian native speakers. This publication is based on the results of Jensen (2017). It is presented separately because it provides a detailed discussion of the differences in the acquisition of morphological and semantic sub-conditions as well as proficiency effects.

The researchers aimed to answer three research questions in this study. The first question was to determine whether functional morphology or narrow syntax was more challenging for L2 learners. The second question examined whether morphology posed a more persistent challenge than narrow syntax. The third and final research question investigated which of the syntactic and morphological sub-conditions was more difficult to learn.

To address these research questions, the researchers examined two conditions that are different in English and Norwegian languages. The first condition was subject-verb agreement, which is obligatory in English but does not exist in Norwegian, making it a functional morphology challenge. The second condition was verb-second (V2) word order, which is obligatory in Norwegian but restricted to specific contexts in English, making it a narrow syntax challenge.

Consistent with earlier studies that demonstrated the impact of phrase structure on a condition's complexity, various structures of subject-verb agreement and verb movement were investigated by the researchers. They hypothesized that pupils should make more mistakes with subject-verb agreement if the findings show that functional morphology is the learning barrier. Furthermore, it ought to be simpler to recognize grammatically improper word order than improper agreement.

Additionally, the researchers hypothesized that participants would be able to recognize grammatically incorrect word order more quickly than grammatically incorrect word agreement.

Overall, this study sheds light on the challenges faced by L2 learners in acquiring English and suggests potential areas of focus for language instruction. Jensen et al. (2020) conducted a study to examine certain conditions, wherein they employed a range of tests to assess the participants' acceptability judgment, proficiency, and background information. The study had a total of 60 participants, whose ages ranged from 11-12 and 15-18. The participants were divided into four proficiency groups based on their level of proficiency in the language, which included low intermediate, intermediate, high intermediate, and advanced speakers. The study assessed the participants' performance both across and within each proficiency level to determine the impact of proficiency levels on performance. Overall, the study provides a comprehensive analysis of the relationship between proficiency levels and performance in language learning.

The first research question posed by Jensen et al. (2020) was based on their predictions regarding learnability, frequency, and instruction. The researchers asserted that as participants are provided with comprehensible input, they can accept more grammatical sentences. In order to test this assertion, the researchers conducted a study in which participants were asked to make judgments about sentences that were either grammatical or ungrammatical. The findings showed that participants made more errors with ungrammatical agreement than with ungrammatical word order. This suggests that subject-verb agreement is more difficult for all participants in all proficiency groups, as compared to core syntax.

The researchers also assessed participants' performance and found that there is a development with both word order and agreement conditions. However, they observed that the participants identified ungrammatical word order more accurately than ungrammatical agreement. This indicates that as the participants' level of proficiency increased, they made more correct judgments with grammatical sentences, which supports the Bottleneck hypothesis. This hypothesis suggests that L2 learners improve their accuracy for verb movement faster than for agreement. Overall, the study findings provide insights into the challenges faced by second language learners and the factors that influence their ability to understand and produce grammatical sentences.

While answering the second question which focused on the comparison between functional morphology and core syntax in terms of their persistence as problems in language acquisition, the researchers found that functional morphology, specifically subject-verb agreement, was a more persistent problem for language learners than core syntax, which involved verb movement. This suggests that language learners may struggle more with

mastering the intricacies of functional morphology, such as correctly matching subjects and verbs in a sentence, than with core syntax.

Moreover, the findings indicated that long-distance agreements with singular subjects and local agreements with plural subjects seemed to be developing in tandem. This means that learners found it equally challenging to match a singular subject with a singular verb in long-distance agreement and to match a plural subject with a plural verb in local agreement. However, long-distance agreement with plural subjects was deemed the hardest sub-condition, making plural subjects more problematic for learners than singular ones.

The study also found that learners struggled more with ignoring “an overt morpheme next to a singular noun (*e.g., The kids with the red bike plays in the garden*) than a null one next to a plural noun (*e.g., The teacher with black shoes walk to work every day*). This indicates that learners found it more difficult to spot ungrammatical constructions with singular subjects, where the verb form does not match the subject in number, than with plural subjects.

Furthermore, the research showed that learners preferred using –s in local agreement with plural subjects. Based on syntactic conditions, the study revealed that sentences with lexical verbs were less problematic than sentences with auxiliary verbs. This is because lexical verbs stay in the verb phrase, while auxiliaries move in specific contexts. Hence, in non-subject-initial declarative, learners will not pay more attention to ungrammatical auxiliary verb movement, which can provide conflicting information for learners.

In conclusion, the findings of Jensen et al. (2020) provide tentative support for the Bottleneck Hypothesis. The research sheds light on the challenges and preferences of Norwegian L2 learners of English in matching subjects with verbs.

#### **2.3.4. Gholami (2020)**

In a study conducted by Gholami in 2020, an attempt was made to test Slabakova's Bottleneck Hypothesis in L1 Persian L2 English learners. Gholami proposed the following research questions:

RQ1: Is functional morphology more difficult to acquire than narrow syntax in L2 acquisition?

RQ2: Are the two morphological conditions equally difficult in L2 acquisition?

RQ3: Which of the morphological and syntactic conditions is a more persistent problem in L2 acquisition?

She predicted that the acquisition of functional morphology, including past tense -ed and third-person singular –s, would be more problematic than the acquisition of word order in subject initial clauses and non-subject initial clauses by L1 Persian L2 English learners.

According to her prediction, functional morphology would be more difficult than narrow syntax, that is, -s and past tense -ed would be more difficult to acquire for L1 Persian learners of English. She also predicted that the problems in acquiring the functional morphology of English for L1 Persian speakers would be more permanent than syntactic conditions.

To answer the research questions, she tested 44 participants: 16-year-old school students (10<sup>th</sup> graders, n=11), 17-year-old school students (11<sup>th</sup> graders, n=20) and, year-old school students (10<sup>th</sup> graders, n=11) and 21-23-year-old university students (n=13). All the participants were L1 Persian learners of L2 English. The participants performed three tasks. These tasks included a Proficiency Test (The Standardized Oxford Proficiency test), a Grammar Judgment Test (GJT), and a Background questionnaire that the participants had to answer. She also performed a proficiency test because she believed that the relationship between the level of general English and their judgment in the main task was vital.

The main test, also known as the GJT, was conducted on two separate days. In order to accommodate the different high school groups, the main experiment was held in a single classroom, which was attended by two separate groups of students, namely the 10<sup>th</sup> and 11<sup>th</sup> graders. As there were insufficient computers for all students, the off-line method had to be implemented, wherein students were required to fill out an answer sheet to answer the questions. University students were tested separately as a group.

Each participant was given a total of 15 minutes to complete the main test, which comprised a total of 45 questions. Before the main test, all participants were required to undergo a proficiency test and fill out a background questionnaire form. The instructions for the main test were explained in detail to the students, and they were informed about the situation and the objectives of the experiment.

It is important to note that only students who were interested in participating in the experiment attended, as they didn't need to take the test. The questions in the main test were displayed on a screen via a projector, as opposed to the previous forms, i.e., proficiency and background questions, which were provided in written form.

Each question was displayed on a single slide, and students were given 20 seconds to decide whether the sentence was right or wrong and to put a checkmark on the answer sheet accordingly. Since the aim of the test was to investigate the judgment of the participants, each slide was played only once, and participants were not allowed to go back to previous questions or compare the sentences. To avoid repetition, the items of the study were pseudo-randomized, and two constructions of the same type did not follow each other.

The GJT tested morphology: subject-verb agreement and past tense *-ed*, as well as syntax: subject initial sentences ('Peter plays tennis.') and non-subject initial sentences (Every day Peter plays tennis'). Notably, Persian and English differ concerning these properties. First, the subject can be omitted in Persian and suffixes must be used to show agreement between the verb and the subject. Second, Persian is an SOV language, thus the sentence 'Peter plays tennis.' Has a different word order in Persian: Peter tennis played.

The proficiency test revealed the proficiency level of attendees. It indicated that participants' proficiency level was beginner (n=1), elementary (n=10), intermediate (n=23), upper intermediate (n=7), and advanced (n=3). The results of the study provided strong evidence supporting the BH. The judgment mean scores of all the groups that were tested showed the hierarchy of difficulty in the constructions being evaluated. The results of the study confirmed the prediction that functional morphology was one of the most challenging aspects of L2 acquisition. Furthermore, the results supported the Bottleneck Hypothesis, because the judgment mean scores of all the groups showed that both morphological conditions were more difficult than the two syntactic conditions. The accuracy rates for the ungrammatical SV agreement were 0.6272727, the accuracy rates for the ungrammatical Past tense *-ed* were 0.8545455, the accuracy rates for the ungrammatical non-subject initial were 0.9136364 and, the accuracy rates for the ungrammatical subject initial were 0.9272727. Although the results of the past tense *-ed* condition indicated that it was not as challenging as the agreement condition, the mean scores of correct judgments were relatively high. This result is similar to what was found in Jensen (2017).

With regard to the two morphological conditions, the agreement was more problematic than past tense *-ed* and it was evident that the agreement is the most challenging trial to acquire for L1 Persian learners of L2 English.

Regarding the two syntactic conditions, subject initial sentences were easier to judge, as the mean scores of judgments were higher than the mean scores in the non-subject initial sentences, even though both conditions had high mean scores. Overall, the results of the study provide valuable insights into the hierarchy of difficulties in L2 acquisition, which can be used to develop better teaching and learning strategies.

Moreover, the study revealed a significant correlation between language proficiency and the accuracy of judgment scores of the participants. Considering the educational grade of the participants (10th and 11th school graders and university students), It was observed that participants with low language proficiency made more errors, while those with a higher level of proficiency had higher correct judgment mean scores. The strongest correlation was observed

in the case of subject-verb agreement, where participants with a low level of proficiency had low mean scores and a low number of correct judgments. However, as the participants' language proficiency improved, their correct judgment mean scores also increased. Although the participants with higher proficiency scores were more successful, the results of the study indicated that even they made many mistakes in the agreement condition. These findings suggest that language proficiency plays a crucial role in the accuracy of judgment scores, particularly in the context of subject-verb agreement, and that even those with a higher level of proficiency need to be mindful of potential errors.

### **2.3.5. Rajabi (2022)**

In 2022, Rajabi conducted a study to explore four linguistic conditions essential for language proficiency - Subject-verb agreement, Past tense –ed, Adjective-Noun (Adj-N) word order, and Pronominal gender. She proposed the following research questions in her thesis:

1. Do Persian learners of English have more difficulty in acquiring functional morphology compared to syntax and semantics?
2. Is English functional morphology a more persistent problem than its syntax and semantics for L1 Persian speakers?
3. Are the two morphological conditions equally difficult in L2 acquisition for L1 Persian speakers?
4. Are the two syntax-semantics conditions in English equally difficult in L2 acquisition by L1 Persian?

Reminding that functional morphology is more difficult to acquire than narrow syntax, which is consistent with the Bottleneck Hypothesis Rajabi (2022) predicted that children tend to understand the correct order of adjectives and nouns, as well as the appropriate use of pronominal gender before they can grasp the correct subject-verb agreement and past tense -ed. Therefore, the two morphological conditions of subject-verb agreement and past tense -ed were expected to be more difficult for children to learn compared to the two syntax-semantics conditions of adjective-noun word order and pronominal gender. It was also predicted that the two morphological conditions are not equally difficult to acquire for Persian speakers learning English. Pronominal gender is challenging for Persian speakers to understand because their L1s do not have this grammatical trial.

To answer these questions, Rajabi grouped a total of 252 students in two different age groups (10 and 12 years old). The younger pupils in Iran's elementary schools were in the fourth

grade(n=129) and the elder pupils were in the sixth grade, their final year of school education (n=123).

English was the L2 language for those taking part, who were all native Persian speakers. The following table shows the demographic information of the participants in Rajabi (2022).

**Table 2.1. Demographic information of the participants in Rajabi (2022)**

	Age		Sex	
	10 years old	12 years old	Female	Male
Number	129 (51.2%)	123 (48.8%)	243 (96.4%)	9 (3.6%)
Total	252		252	

In this study, The Standardized Oxford Proficiency test was utilized to determine whether the participants' overall proficiency had any relationship with the conditions under examination. Additionally, the study aimed to determine whether the participants should be divided into age groups or not. The inferential statistics showed that less than 1% of the proficiency scores could be explained by the participants' age indicating that there was no significant correlation between proficiency scores and age. Then Rajabi (2022) conducted the acceptability judgment task to examine how accurate were the participants in identifying Adj-N word order, pronominal gender, past tense -ed, and subject-verb agreement. The AJT which was considered as the main experiment of Rajabi (2022) consisted of 20 sentence pairs. Each pair had a grammatical and an ungrammatical version of the same sentence. Every sentence was given a Likert scale, with each response ranging from very bad to very good, where very bad meant completely unacceptable, and very good meant completely acceptable.

Table 2.2 shows the accuracy of answers selected by the participants of Rajabi (2022) study for each research condition. In order to test the BH, Rajabi (2022) included four conditions: Subject-verb agreement, Past tense –ed, Adjective-N word order, and Pronominal gender. Subject-verb agreement and Past tense -ed tested knowledge about functional morphology, while Adjective –N word order and Pronominal gender tested knowledge about syntax and semantics respectively.

According to Table 2.2, accuracy in conditions Past tense (0.98), Adj-N (0.95), Subject-verb agreement (0.64), and Pronominal gender (0.57) was observed. These results demonstrated that Persian learners of English appear to have less difficulty with the past tense because they

judge sentences in this condition with a high degree of correctness. However, they appeared to have greater difficulty with pronominal gender, as seen by their lowest accuracy rate when evaluating the phrases under this circumstance.

**Table 2.2. The accuracy of answers selected by the participants in Rajabi’s (2022) thesis.**

Conditions	Mean	SE	Df	asympt.LCL	asympt.UCL
Adj-N	.958	.0813	Inf	.799	1.11
Pronominal gender	.570	.079	Inf	.414	.726
Past -ed	.986	.080	Inf	.827	1.114
Subj-verb agreement	.640	.079	Inf	.484	.795

To examine the accuracy of the participants by conditions together, Rajabi (2022) compared the marginal scores in logistic mixed-effect regression. The results indicated that there was a significant difference in accuracy between Adj-N word order and Pronominal gender ( $p < 0.05$ ), Adj-N word order and Subject-verb agreement ( $p < 0.05$ ), and Past tense and Subject-verb agreement ( $p < 0.05$ ).

Furthermore, Rajabi (2022) performed the pairwise comparison (Tukey’s test) and revealed that there was a statistically significant difference in accuracy between Past tense and Subject-verb agreement ( $p < 0.05$ ). This indicated that the participants were more accurate in judging Past tense compared to Subject-verb agreement. Therefore, Rajabi (2022) concluded that these two conditions are not equally difficult, and learning Subject-verb agreement is challenging for Persian learners of English.

Moreover, the results of the pairwise comparison (Tukey’s test) showed that there was a statistically significant difference in accuracy between Adj-N word order and Pronominal gender ( $p < 0.05$ ), i.e. the participants were more accurate in judging Adj-N word order than on Pronominal gender. Thus, according to Rajabi (2022) investigation, these two conditions were not equally difficult and learning Pronominal gender was more problematic for Persian learners of English.

Furthermore, there was a statistically significant difference in accuracy between Adj-N word order and Subject-verb agreement ( $p < 0.05$ ), while there was not a statistically significant difference between Adj-N word order and Past tense ( $p = 0.99$ ). Additionally, there was a statistically significant difference in accuracy between Past and Pronominal gender ( $p = 0.0001$ ),



while there was not a statistically significant difference in accuracy between Pronominal gender and Subject-verb agreement ( $p=0.86$ ).

In sum, the results of Rajabi (2022) did not completely support the BH. The findings showed that the learners' proficiency with functional morphology and syntax outperformed their competence with semantics. Furthermore, in light of the disparity in outcomes between the two morphological conditions, she proposed that the BH be adjusted to argue which functional morphology parameters would be more challenging to get.

## **2.4. Linguistic Properties Investigated in the Present Study**

In order to test the BH, I selected three different conditions: 1) subject-verb agreement, i.e. the morphological condition considered to be the bottleneck by the BH, this condition was investigated by both Gholami (2020) and Rajabi (2022); 2) definiteness representing the semantics-morphology condition, which was not investigated previously with L1 Persian L2 English learners; and 3) verb-object word order (SOV), selected to test narrow syntax. The narrow syntax was investigated by both Gholami (2020) and Rajabi (2022), but only Gholami tested the SVO/SOV word orders.

The three conditions tested in this thesis will be presented in detail in the following sections and their differences in Persian and English will be illuminated.

### **2.4.1. Subject-Verb Agreement**

In modern English grammar, the agreement is “the relationship between two grammatical units such that one of them displays a particular feature (e.g. plurality) that accords with a displayed feature on the other” (Quirk et al. 1972, p. 755). All it signifies is that a singular subject demands a singular verb, and if a subject is numerous, the verb must likewise be plural and express the link between two or more sentence elements.

An illustration of the subject-verb agreement, which is actually a connection between the subject and the verb, can help to clarify this. In the present tense in English, *-s* or *-es* morpheme is added to the end of the verb when the subject is in singular third person, for example, “She runs.” or “He goes”.

According to Mahootian and Gebhardt (1997), Persian is a pro-drop language with SOV word order. Also, Mahootian and Gebhardt (1997) mentions Persian as a nominative-accusative language. Persian does not require personal suffixes as much as English does because the verb's suffix ends agree with the subject and the subject itself can be deleted.

Since the subject is not obligatory, verb endings are crucial in both formal and informal language. Furthermore, because verb inflections in formal and informal language differ, formal language is covered in the study at hand.

Thus, based on the following criteria, Persian unlike English is a morphologically rich language with regular verb inflections:

1. Person: Verb conjugations are different depending on the subject, i.e., there are different conjugations for I, you, he (or she), etc.
2. Number: Singular (for one person) or plural (for more than one person) – thus conjugations differ depending on the number of the subject for example, conjugations are different for “u” – ‘he/she’ or “ānhā” – ‘they’.

In the present tense, every indicative verb is accompanied by the prepositional particle “mi”.

Table 2.5 shows the whole paradigm of sentences in English and Persian. In Persian the verbs in Present Simple have a prefix *mi-* as well as different suffixes or endings. In third person singular Persian verbs have the suffix *-ad*, e.g. *mi-ravad* ‘goes’. Since Persian is a pro-drop language, all the subjects in Table 2.3 are shown in parentheses. However, as English is a non-pro-drop language, subjects are always present.

**Table 2.3. Inflections in English and Persian (Adapted from [https://sites.la.utexas.edu/persian\\_online\\_resources/pronouns/pronouns-2/](https://sites.la.utexas.edu/persian_online_resources/pronouns/pronouns-2/))**

English	Persian	English inflection	Persian inflection
I run.	( <i>man</i> ) <i>mi-dav-am</i>	θ	-am
You run.	( <i>tó</i> ) <i>mi-davi</i>	θ	-i
<b>He/she/it runs.</b>	( <i>u</i> ) <b><i>mi-davad</i></b>	<b>-s/-es</b>	<b>-ad</b>
We run.	( <i>mā</i> ) <i>mi-davim</i>	θ	-im
You run.	( <i>šomā</i> ) <i>mi-david</i> (plural and euphemism singular)	θ	-id
They run.	( <i>ānhā</i> ) <i>mi-davand</i>	θ	-and

## 2.4.2. Definiteness

### 2.4.2.1. English

One of the most challenging properties for L2 English learners has been learning the English article system. English marks definiteness morphologically: the article *the* is [+definite]

and used with definite nouns. The example in (4) illustrates the definiteness context tested in my study where *the dog* is a definite noun phrase. In addition, English has the article *a* (and its allophone *an*) which is [-definite] and used with indefinite singular count nouns. Plural count nouns and mass nouns take no article (∅).

(4) Susan thought that her dog was lazy. **The dog** slept very much.

Articles are considered properties of the semantics-morphology interface (e.g., Hermas 2018), i.e. they represent two modules of grammar or the relationship between these modules and other aspects of cognition (Ramchand & Reiss, 2007). Definiteness is a universal semantic feature: “Definiteness presupposes the existence and uniqueness of the entity defined in a context or with respect to the shared knowledge of the speaker and hearer” (Herma 2018: 140).

#### 2.4.2.2. Persian

Ionin et al. (2004) and Agebjörne (2020) claimed that definiteness is difficult to acquire for learners whose L1 is article-less. As Persian is an article-less language, I decided to use the AJT test to find out if it is a bottleneck for Persian L1 learners of L2 English or not. Definiteness is a universal feature that is also expressed in Persian. However, Persian does not have articles and uses other means to express the concept of definiteness. For example, in the discourse, the context can make a noun definite or indefinite. For example, “*mashin*” would mean either “*car*” or “*the car*” depending on the context. There are also other ways to mark definiteness in Farsi rather than by articles, e.g. by the demonstratives ‘*in/an*’ (this/that) and the direct object marker ‘*ra*’.

It should be noted, that some researchers (e.g., Afzali, 2012) argue that while in written Farsi/Persian there is no overt definiteness marker, in spoken Farsi definiteness can be marked by the use of the suffix ‘*e*’ (i.e. post-positioned in contrast to English where *the* occurs pre-nominally), illustrated in (5). The example in (5) is the translation of the example in (4).

(5) Suzan tasavor mi-kard ke sag-ash tanbal ast. θ**Sag-e** kheili ziad mi-khabid.

‘Susan thought that her dog was lazy. **The dog** slept very much.’

According to Mace (2003, p. 37), a noun is definite in Persian when its identity is known, and indefinite when its identity is not known. Persian has no definite article corresponding to English “the”. A Persian noun in its basic form is either definite or indefinite, depending on the context. For example, in (6) both *ketab* ‘book’ and *miz* ‘table’ are used without any markers of definiteness:

(6) ketâb ru-ye miz    ast  
    θbook on    θtable is  
"The book is on the table."

There is limited research about definiteness in English acquired by L1 Persian speakers. Ansarian (2004) investigated the non-generic use of the definite article *the* by Persian learners of L2 English. He hypothesized that four uses of *the* (i.e., textual, structural, situational, and cultural) will be learned at different stages by Persian L1 learners of L2 English. He also hypothesized that these uses would impose different difficulties for Persian learners with various proficiency levels.

To test his hypothesis, he administered a Cambridge First Certificate test to 49 Iranian undergraduate and graduate students at the University of Tabriz and he grouped the participants based on their scores into four proficiency groups: Low (n=13), Intermediate (n=13), Upper-intermediate (n=11), and Advanced (n=12). He used an instrument consisting of 91 sentences to test the use of *the* by the participants. They were asked to put *the* wherever they felt it was required. The results showed that participants still made quite a lot of errors even at quite advanced proficiency level of English and the most typical errors are omission and errors of misuse.

Afzali (2012) researched marking definiteness in Persian and English by L1 Persian L2 English learners. To this end, 35 L1 Persian English as a foreign language (EFL) learners (15-30 years old) participated in her study. The proficiency level of the individuals taking part in her study was evaluated and was reported as intermediate. The instructor gave the pupils, whose first language is Farsi, a very brief silent animated film to view and the attendees had to compose the movie's narrative in three different ways: spoken Persian, written Persian, and English. The research findings suggested that students encountered challenges while attempting to select articles. The 'Fluctuation Hypothesis' could be used to clarify their selection of articles. The 'Fluctuation Hypothesis' states that L2 learners may alternate between the two parameter settings before settling on one that might not be suitable for the target language. The indicated NPs appear to have been selected after switching between specificity and definiteness.

Since the evidence from L1 Persian on the acquisition of definiteness in English is limited, in the next section I present evidence from other studies where the L1s were article-less languages.

### 2.4.2.3. Definiteness in SLA research

English articles are claimed to be one of the most challenging functional elements in English in SLA, especially for L2 learners whose L1 does not have articles (Ionin et al. 2004; Hawkins et al. 2006; Trenkic 2009; Chung 2011, among others). Two patterns of non-target-like behavior have been identified among L2 learners: errors of omission and errors of misuse or substitution. For example, not only low proficiency but also advanced proficiency L1 Turkish learners (a language without articles) of L2 English had problems with article use in production and could omit articles frequently (White 2003, Goad and White 2009).

### 2.4.3. Verb-object word order

Like Latin, Persian is an SOV language. “Subject” comes first, then “Object” and finally “Verb”. This is the preferred and basic word order. However, Dabir Moghadam (2013) believes that since Persian always marks direct and indirect objects and indicates grammatical cases, it has free word order. Therefore, words can appear in any order in a sentence depending on the emphasis or literary preferences. SOV is the most common word order in the Persian language. He states that old Persian uses inflection to indicate grammatical cases just like Sanskrit, Greek, and Latin. New Persian employs case markers to indicate grammatical cases and the relationship between words. Consider the sentence “the woman told the man” (SVO: “Subject Verb Object”). In languages that have grammatical cases, “the man” is typically in the dative case. English does not indicate the dative either by inflection or by marking. If we change the word order to OVS (Object Verb Subject), the meaning will entirely change: “The man told the woman”. This does not occur in Persian because “the man” is marked in the dative case and consequently, words can be arranged in OVS and all the other possible orders without causing any change in the basic meaning. All the sentences in the following table mean “the woman told the man” but with different orders and levels of emphasis.

**Table 2.4. Free word order of the Persian language (adapted from <https://www.jahanshiri.ir/fa/en/word-order>)**

Sentence	Word order
madar be dokhtar goft θmother to θgirl said	SOV
madar goft be dokhtar θmother said to θgirl	SVO
be dokhtar goft madar	OVS

to θgirl said θmother	
be dokhtar madar goft to θgirl θmother said	OSV
goft be dokhtar madar said to θgirl θmother	VOS
goft madar be dokhtar said θmother to θgirl	VSO

According to Izadi and Rahimi (2015), the word order of English and Persian shows several differences. The main difference is that Persian has a free word order while English is strictly an SVO language. These differences in the application of nouns and relative clauses, want and verb, content verbs and auxiliaries, question particles and sentences, adverbial subordinators, and clauses, etc. cause problems for Persian people to learn English or vice versa. They claimed that when Persian L1 learners of L2 English become aware of the differences between these two languages, they can make fewer mistakes. In my study, I tested knowledge of the SVO order in L1 Persian L2 English learners.

### **3. Research Questions and Methodology**

In this chapter of the thesis, I will focus on several key aspects, including the research questions, hypothesis, predictions, and methodology. To begin with, Section 3.1 will present the research questions that will guide my study. These questions are designed to provide a clear understanding of the problem I am seeking to address, as well as identify any gaps in existing research that will need to be filled. Moving on to Section 3.2, I will delve into the hypothesis and predictions of the current study. Specifically, I will be looking at these aspects concerning the Bottleneck Hypothesis, which suggests that certain aspects of language learning may be more difficult than others. By exploring this hypothesis in detail and making predictions about its applicability to my study, I hope to shed new light on the topic at hand. Finally, in Section 3.3, I will discuss the methodology that I will be using throughout the thesis. This will include a detailed explanation of the research design, data collection techniques, and statistical analysis methods that I will employ. By carefully outlining the methodology, I aim to ensure that my study is rigorous, transparent, and reliable.

#### **3.1 Research Questions**

This study investigates the following questions:

RQ1. Is the acquisition of functional morphology more difficult than the narrow syntax for L1 Persian L2 English university students?

RQ2. What is the hierarchy of the difficulty of linguistic conditions (morphology, semantics-morphology, and syntax) for L1 Persian students when acquiring L2 English?

According to the BH, the process of acquiring functional morphology in English as a second language (L2) is more challenging for Persian speakers than acquiring narrow syntax and semantics. In order to examine this claim, an acceptability judgment task was conducted to test learners' knowledge of subject-verb agreement, definiteness, and verb-object order in L2 English. Additionally, the research question 2 aims to determine the level of complexity involved in acquiring the hierarchy of morphology, semantics-morphology, and syntax, as these elements of the L2 acquisition process tend to exhibit distinct behavioral patterns.

My thesis is the follow-up on Gholami's (2020) and Rajabi's (2022) investigations. Both studies considered subject-verb agreement and word order properties (adjective-noun word order in Rajabi 2022, and subject-initial and non-subject-initial in Gholami 2020). In Rajabi (2022), the participants were younger and likely less proficient than the participants in my investigation. Rajabi's participants were 10-12-year-old children. In both studies, the BH was

partially supported since subject-verb agreement was more problematic than the word order for L1 Persian students. In my study, I decided to investigate whether functional morphology vs. syntax asymmetry also takes place in older learners. Therefore, I tested university students' knowledge of subject-verb agreement and verb-object word order. Another novelty of the present study is that it tests a new semantics-morphology property of English which is not found in L1 Persian, namely definiteness.

### **3.2 Hypothesis and Predictions**

The Bottleneck Hypothesis states that while learning a second language, functional morphology is more difficult to learn than syntax.

Prediction 1: In line with the BH, I predict that the learners in my study will have problems with SV agreement, but the verb-object word order will be unproblematic. However, given that my participants are university students, I can also predict that their problems with SV agreement will be less severe than the problems of younger learners in Rajabi (2022).

Prediction 2: With regards to the definiteness or the semantics-morphology property, I predict that it will also be more problematic than word order. However, it is unclear whether definiteness will be more problematic than SV agreement. While there are no articles in Persian, SV is marked systematically in Persian by different suffixes, also in the third person singular. Additionally, we know that SV agreement is exercised in L2 English classrooms (e.g. Jensen et al. 2020), but articles are complex and are likely to receive less attention in the classroom and at later stages compared to SV agreement. Thus, I can expect that definiteness will be more problematic than SV agreement in my study. Furthermore, the participants in my study are rather experienced L2 English learners because they are university students with many years of English instruction and exposure, thus, it can still be predicted that they will have certain knowledge about articles and that the definiteness is marked by *the* in English. However, as Persian is a language that lacks articles specifically corresponding to definiteness, I predict that my participants will still have problems with comprehension. Since L2 learners are known to omit articles frequently (White 2009, Afzali 2012, Kupisch et al., 2013), it may be particularly difficult for them to judge sentences without articles.

### **3.3 Methodology**

The present study draws inspiration from the works of Jensen (2017), Gholami (2020), and Rajabi (2022), who have researched the acquisition of morphology and syntax in English



as a second/foreign language learner. However, this study is distinct from Jensen's (2017) research because the focus is on adult Persian L1 speakers as opposed to adolescent Norwegian L1 speakers. Additionally, the present study differs from Gholami's (2020) research as it examines different conditions to evaluate. Furthermore, this study differs from Rajabi's (2022) research in terms of the selected population, as adult university students were chosen for this study, whereas Rajabi (2022) conducted her research on middle-school students. Moreover, the conditions investigated in Rajabi's (2022) research were different from the syntactic and semantics-morphology constructions selected for this study.

The research study at hand utilized an Acceptability Judgment Task (AJT) as its primary data collection instrument. Similar to other studies conducted by Jensen in 2017, Gholami in 2020, and Rajabi, the data collected for this study comprises the judgments made by the study participants regarding the grammaticality of various sentences.

Before commencing the main test, a pilot study was conducted, which is discussed in detail in Section 3.4. This pilot study was conducted to ensure the validity and reliability of the AJT used in the primary research study at hand. Section 3.5 provides a comprehensive outline and discussion of the study participants in the present research. The experiment is described in detail in Sections 3.6.1, 3.6.2, and 3.6.3, which cover the various methodologies and techniques utilized in the study. Finally, the procedure for the study is presented in Section 3.7, which provides a step-by-step description of the process followed to collect and analyze the data.

### **3.4 The Participants**

Thirty-six participants participated in this study. However, seven of them were excluded from this study. The average time set to complete this test was 1284 seconds. Therefore, the outliers who used much shorter (200 seconds) or longer (more than 2000 seconds) time were excluded from the study. One participant who answered too fast was excluded because I believed that s/he did not take enough time to read the questions and answer them carefully. Two participants who took longer than usual to answer were also excluded because I believed they could ask others for help. Furthermore, three participants were excluded due to insufficient proficiency in identifying incorrect items on the test. Moreover, one participant was a Turkish L1 speaker who was also excluded from this study. Therefore, the data gathered from 29 Persian students who were learning English as their second language in Iran were analyzed (n=29). Ten participants were male and 19 participants were female. The participants were in the range of 18-38 years old and their mean age was 27 years old. All of them were university students

(undergraduate, graduate, and Ph.D. students) and they were studying different fields of study (namely: English translation, Microbiology, Genetics, Geography, etc.).

### **3.5 The experiment**

The Question Pro Platform was used to design the test. The test was designed in three sections as follows:

Section 1 was the Acceptability Judgement Task (AJT). A total of 48 questions that were grammatically correct or incorrect were shown to the participants. The options (correct, incorrect) were shown to the participants to choose from below each question. These questions were randomized to obtain a more reliable result.

Section 2 consisted of 6 background questions in Farsi to ensure that all participants were Persian L1 speakers, and they could understand the task. Moreover, this part was designed to see that all participants were students, and they were learning English as a foreign language.

Section 3 consisted of 20 proficiency questions adopted from the first part of the Oxford Proficiency Test to ensure that the participants were proficient enough to participate in this study. Only one question appeared on the screen each time and the participants couldn't go back and change the selected answers. The Standardized Oxford Proficiency Test was used to investigate any potential relationships between the participants' overall competency and the circumstances I wished to test.

#### **3.5.1 The Acceptability Judgement Task:**

The Acceptability Judgement Task (AJT) is a quantitative research method to gather data about participants' judgment on the amount of acceptability in terms of English morphology, semantics-morphology, and syntax.

The questions of the AJT were randomized online on [www.random.org](http://www.random.org) which is a credited website to randomize questions because I considered that randomized questions are more reliable and optimal.

The stimuli used in this study are partially derived from the AJT stimuli used in a research study conducted by Jensen, Mitrofanova, Anderssen, Rodina, Slabakova, and Westergaard in the year 2023. Their study served as a basis for the development of the stimuli used in this research.

The design of the AJT is shown in Table 3.1. I included 12 sentences in each condition (6 grammatical & 6 ungrammatical). Additionally, the test had 12 grammatically incorrect fillers.

**Table 3.1. The structure of the AJT**

Type of question	Number of questions
Morphology (subject-verb agreement)	12 (6 grammatical & 6 ungrammatical)
Semantics-morphology (definiteness)	12 (6 grammatical & 6 ungrammatical)
Narrow syntax (verb-object word order)	12 (6 grammatical & 6 ungrammatical)
Ungrammatical fillers	12
Total	48

The question pairs (Morphology, Semantics-morphology, and Narrow syntax) were designed to evaluate different conditions consisting of one grammatical and one ungrammatical sentence. There were two sentences in the Definiteness condition, the first one provided the context, as shown in (6).

- (6) a. Nina's cat chased a mouse. **The mouse ran very fast.**  
b. Nina's cat chased a mouse. **\*Mouse ran very fast.**

During the test, the sentence pairs were presented to the participants in a randomized order. This approach was taken to prevent any priming effect from one sentence structure to another, which could have influenced the participants' comparison of the two varieties of sentences. By presenting the sentence pairs in a randomized order throughout the test, the participants were able to make their judgments based on the merits of each sentence without being influenced by prior exposure to similar structures.

Three types of ungrammatical sentences were provided for the participants. In some sentences, the subject-verb agreement was violated. For instance, the subject was third person singular while the verb did not agree with it. These sentences aimed to evaluate the morphological knowledge of the participants.

- (7) \*Mark run in the park every day.

In some ungrammatical sentences, definiteness was violated so that the participants could identify incorrect deletion of article *the*. These sentences aimed to evaluate the semantics-morphology knowledge of the participants.

- (8) Thomas could not hear his teacher. **\*Teacher spoke quietly.**

Finally, some sentences violated the SVO word order rule and presented the object before the verb. These questions aimed to evaluate the syntax knowledge of the participants.

(9) \*Yesterday Jonny books bought.

In fact, in this experiment, the main section is the acceptability judgment task (AJT). Cowart (1997) was the first one who made a distinction between grammaticality and acceptability. He argued that although it is hard to evaluate judgment on grammaticality as it is abstract, the judgment on acceptability can be easily evaluated using the available instruments and tests. He believed that even native speakers do not agree on the grammaticality of a sentence. Therefore, he proposed that it is better to evaluate judgment on acceptability instead of judgment on grammaticality. Based on this belief and the same attitudes proposed by other researchers (e.g., Dabrowska 2010, Ionin and Zyzik 2014), I decided to follow Jensen (2017), Gholami (2020), and Rajabi (2022) in evaluating judgment on acceptability instead of judgment on grammaticality.

### **3.5.2 The background questionnaire**

During the study, the background questionnaire played a crucial role in verifying the participant's language acquisition. Not only did it reveal that the participants acquired Persian as their first language and English as their second, but it also helped gather essential information concerning their exposure to the English language and their educational background. The questionnaire aimed to give a detailed insight into the participants' demographic information and their familiarity with the English language. It also gathers information to demonstrate that all participants were university students. The information collected through the questionnaire helped me analyze the results of the study and draw informed conclusions.

This section consisted of 6 questions in Persian. In question 1, they presented some information about their age, gender, and level of education. In question 2 they informed me of the age they started learning English as a foreign language. In question 3, I became aware of the place where they started learning English (kindergarten, school, language classes, private teacher, home). In question 4 they revealed what language they used to talk with their family members. In question 5, I learned how often they speak English (less than 7 hours a week, about 7-14 hours a week, more than 14 hours a week). Question 6 showed me their purpose for using English (conversation with professors, students, or friends, watching movies and series, listening to music, job, and other issues).

### **3.5.3 The Proficiency Test**

During the course of a language experiment, it is important to assess the proficiency level of participants in order to determine their mastery of the language. To achieve this, a Proficiency Test was administered to the participants. The test comprised of a diverse range of questions that evaluated the participants' comprehension and usage of the English language. The items selected for the test were carefully chosen from the first part of the Oxford Proficiency Test, which is a globally recognized and trusted language assessment tool. Notable is that only 20 out of 40 questions were used to reduce the overall length of the experiment and to minimize the drop-out rate.

Numerous researchers (e.g., Slabakova & Garcia Mayo, 2015; Jensen, 2016; M. Jensen, 2017) have commonly used this test. The multiple-choice Oxford Proficiency Test is a standardized assessment consisting of sentences with a blank in between and three alternatives to select from. Every blank needed to be completed. To make the statement acceptable, the participants must select one of the three options, and for every correct response, they receive one point. The proficiency examination consists of two parts. In the second part of the test, the phrases come from an ongoing storyline.

### **3.6. The procedure**

The research experiment was conducted using the QuestionPro Platform. This platform is ideal for creating questionnaires for academic studies, and it is offered as a free service. The platform ensures that the data is collected anonymously, which guarantees the participants' privacy. The system is designed to display only a single question per page, ensuring that the participants focus on the current question without any distractions. Moreover, the test is designed in such a way that once the participant answers a question, they cannot go back and change their answer. This constraint ensures that the participants' responses are authentic and unbiased. To proceed to the next question, the participant must answer the current question satisfactorily. The experiment included three different questionnaires, namely AJT, background questionnaire, and proficiency questionnaire. These questionnaires were presented to the participants in the same order as mentioned above.

Before the main experiment, I conducted a pilot study to test the eligibility and comprehensibility of the main test and also to evaluate the difficulty of the test (I did not wish the main test to be either very easy or very difficult).

The initial step of the research process involved sharing the link to the pilot study with three participants who were in the age range of 22 to 27 years. All three participants were studying English translation at Azad University, Marvdasht Branch in Iran. They were acquiring English as their L2 and their mother tongue was Persian. After the pilot test was completed, I interviewed the participants and elicited their opinions of the experiment. The participants were of the unanimous opinion that the test procedure was straightforward to follow. They also noted that the instructions were unambiguous, which made it easier for them to answer the questions within the stipulated time frame. Overall, the participants found the test to be comprehensible and were able to provide their feedback without any difficulty.

After obtaining consent from 36 university students who are native speakers of Persian, I proceeded to send them the link to the main experiment. An instruction was shown to the participant. Through this instruction, I introduced myself as the researcher of this thesis, thanked the participants' cooperation, and assured them no personal information would be taken from them during this experiment. Then I explained the purpose of this experiment to the participants and informed them that the data would be used to complete an M.A. thesis investigation.

Then I explained that they should complete all three questionnaires which may take long 15-20 minutes. Next, I explained that the first questionnaire presents a series of correct and incorrect sentences, and they must distinguish which one is grammatical and which one is ungrammatical. The second questionnaire which is in Persian asks you about the extent of your familiarity with English as L2. Finally, the third questionnaire is a proficiency test.

Then I explained that in Questionnaire 1, a sentence is displayed on each page, and you have to choose whether that sentence is correct or incorrect in English. They were informed that in some cases they would see two sentences and they had to only judge the sentence in bold as true or false. The last explanation was illuminated through an example:

(10) Example: Tom lives in a big house. **The house is very beautiful.**

Then I showed two exercises to them to prepare them for the experiment.

(11) Exercise 1: Watching Sara is TV home at. (Incorrect)

(12) Exercise 2: Tom was very tired last night (Correct)

Then the first questionnaire was presented to them, one question each time. After they judged whether the 48 questions presented to them were correct or incorrect a message appeared on the screen to inform them the first section was finished.

Then the instructions for the second questionnaire appeared on the screen in Persian and informed them this section is in Persian and asked them about the extent they are familiar with the English language. The background questionnaire is fully introduced in 3.6.2.

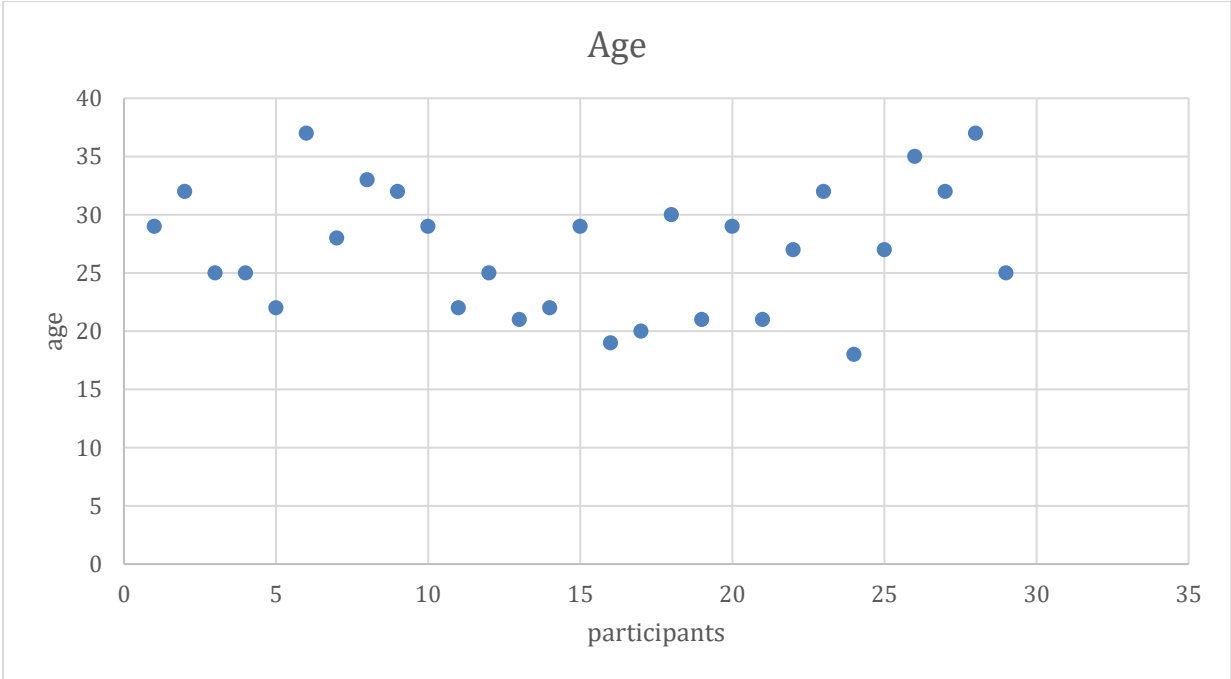
After they answered the background questionnaire, a message appeared on the screen and informed them the third section of the experiment had started. They were informed that they had to answer some multiple-choice questions in this section, and they were asked to choose only one option. Then twenty multiple-choice questions appeared on the screen and the participants selected the options that they considered correct. Only one question was shown to them on each page throughout the whole experiment and they were not able to go back and change their answers.

**4. Results**

As discussed in the previous chapter, the QuestionPro Platform was used to collect the data. Participants first answered the main test (the Acceptability Judgment Test), then they answered the background questions, and finally, they completed the proficiency test (20 items), a short version of the Standardized Oxford Proficiency Test. Section 4.1 presents the information related to the participants' background, Section 4.2 presents the results of the proficiency test, and Section 4.3 provides the results of the AJT.

**4.1. Participants' background: Age and gender**

Twenty-nine participants in this study were aged between 18 and 37 years. Their mean age was 27 years. Figure 4.1 displays the distribution of the participants in the sample. According to the data presented in Figure 4.1. it can be observed that most participants fall within the age range of 20 to 30 years old. This age group has the highest number of participants compared to other age ranges.



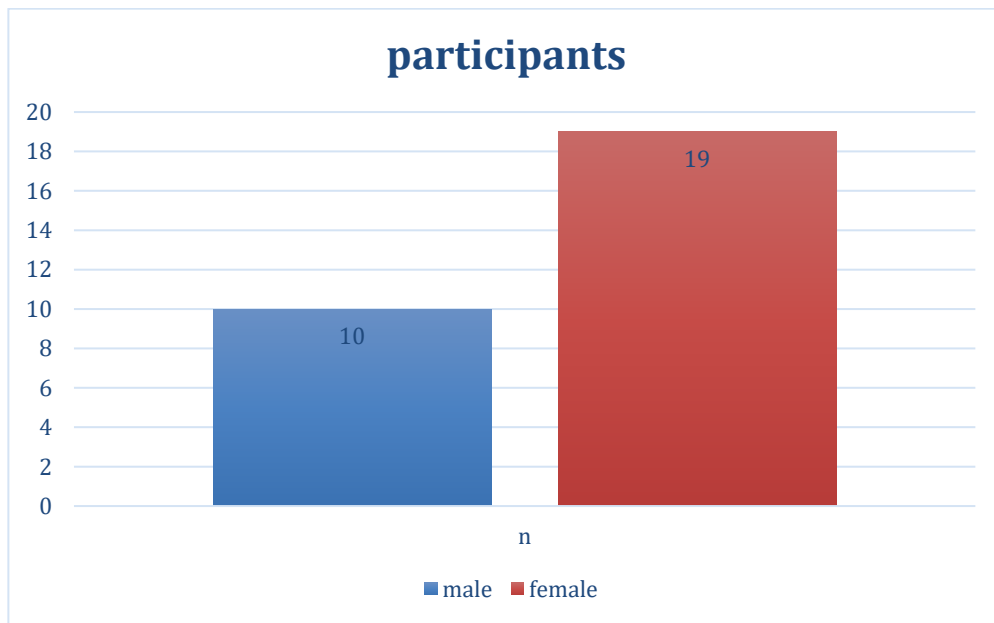
**Figure 4.1. The scatter chart of the participants' age**

Table 4.1 and Figure 4.2 display information regarding the gender of the participants of this study. According to Table 4.1 and Figure 4.2, the number of females who participated in this study was almost twice the number of males.



**Table 4.1. The participants' gender**

participants	n
male	10
female	19
total	29



**Figure 4.2. The bar chart of the participants' gender**

#### **4.2. The results of the proficiency test**

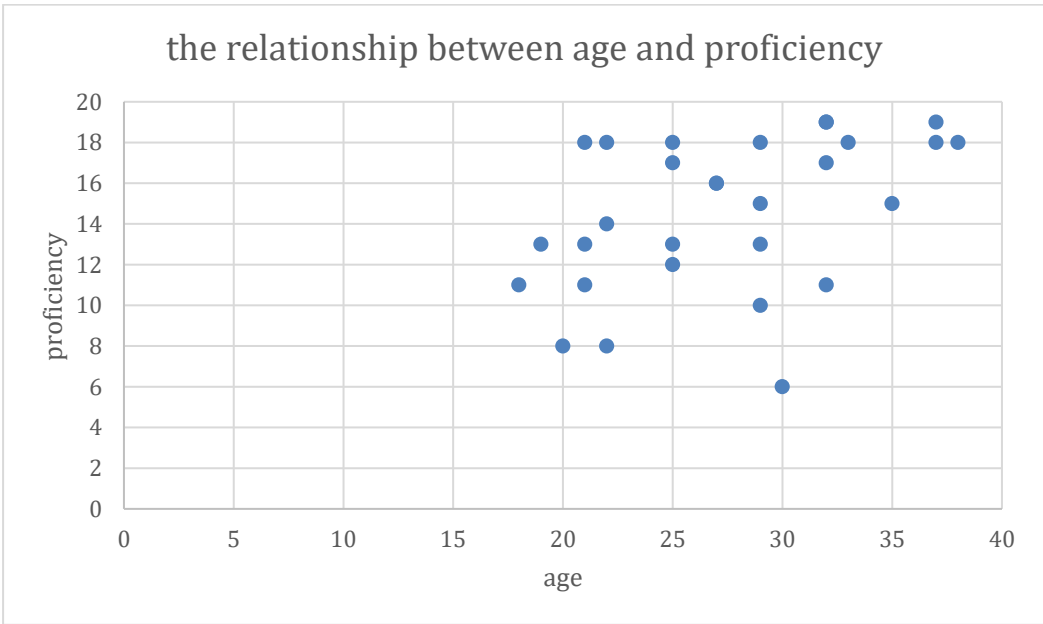
The 29 participants who were included in the analysis answered 20 multiple-choice questions from the Standardized Oxford Proficiency Test. Their scores ranged from 6 to 19. Table 4.2 shows the mean proficiency score, and Figure 4.3 presents more information regarding the relationship between the participants' scores and their age.

It is important to note that in Figure 4.3, the horizontal axis displays the age of each participant, and the vertical axis displays the proficiency score of each participant. The average proficiency score equals 14.55172 according to Table 4.2. Even though the mean is quite high, some participants have quite low proficiency levels. Specifically, Figure 4.3 shows that four participants performed remarkably below 50%: one scored 6, two scored 8, and one scored 10. According to Figure 4.3 there is considerable variation, but most participants of all ages scored above 50%. Top scores (between 15 and 19, i.e. above average) were obtained by 14

participants. Three participants obtained 19 (the maximum score), 7 participants obtained 18 (the most frequent score), 2 participants obtained 17, 2 participants obtained 16, 2 participants obtained 15, 1 participant obtained 14, 4 participants obtained 13, 1 participant obtained 12, 3 participants obtained 11, 1 participant obtained 10, 2 participants obtained 8, and 1 participant obtained 6.

**Table 4.2. The participants’ proficiency scores**

Mean score	SD	SE
14.55172	3.747249	0.991391



**Figure 4.3. The scatter chart displays the participants’ proficiency scores and their ages.**

Given that there is considerable variation in proficiency and that some participants have very low proficiency in English, it will be interesting to consider individual results in the AJT. Therefore, in section 4.3 I first present the overall results and then the individual results.

**4.3. The results of the Acceptability Judgement Test (AJT)**

This section consists of several subsections where I present the results of the AJT. First, I report participants’ performance with fillers. This is followed by the results obtained in three experimental conditions. The first condition consisted of 6 grammatical and 6 ungrammatical questions and evaluated knowledge of functional morphology, i.e. Subject-Verb agreement. The second condition consisted of 6 grammatical and 6 ungrammatical questions assessing the semantics- morphology or definiteness (i.e., the use of article *the*). The third condition consisted

of 6 grammatical and 6 ungrammatical questions assessing the narrow syntax condition or Verb-Object word order.

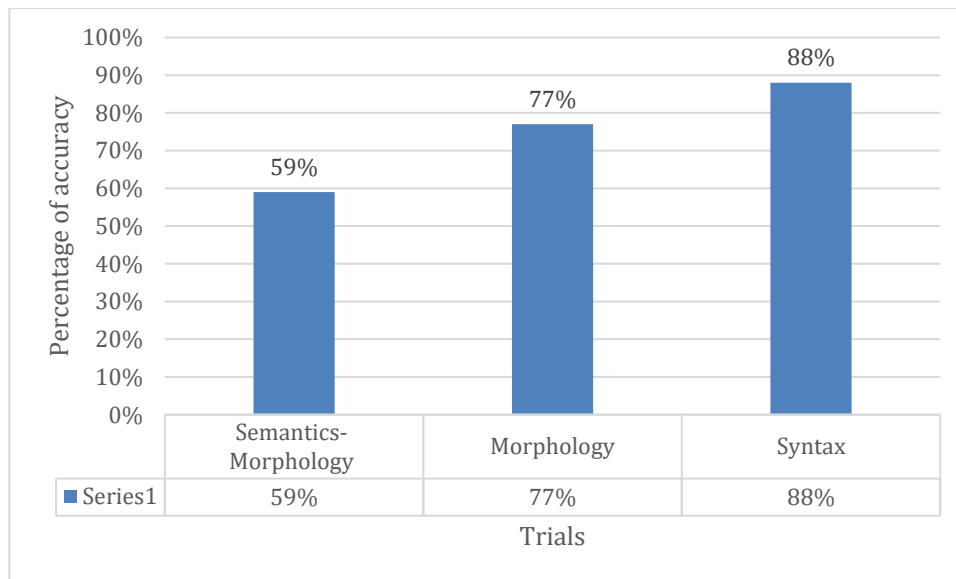
#### **4.3.1. Fillers**

As part of my study, all participants were asked to answer a total of 12 filler questions. Out of the 29 participants, 23 individuals were able to answer all the filler questions correctly, indicating a high level of understanding and attentiveness. Four participants made one mistake each, while two participants made two mistakes each, which indicates that they may have misunderstood or misinterpreted the questions to some extent. Keeping in mind that three of the participants were excluded because of their poor performance with fillers, the rest of the participants included in the analysis scored 342 (98%) out of 348 in total, which is high and near 100%.

#### **4.3.2. Overall results for the experimental conditions**

This subsection presents the data collected from 29 participants for the experimental conditions of this study which were functional morphology (Subject-Verb agreement), semantics- morphology (definiteness), and narrow syntax (Verb-Object word order). The overall results per condition are illustrated in Figure 4.4. The participants scored highest and target-like in the syntax condition (88% accuracy). They scored high and near-target-like in the morphology condition (77%). Finally, they score lowest and just above chance in the semantics-morphology condition (59% accuracy). Thus, when looking at semantics-morphology accuracy scores, the accuracy decreases dramatically. Participants made 38% of errors in this condition. Although it is above 50% accuracy, still it is far from the target level. Consequently, such a large number of errors shows that semantics-morphology is problematic and not acquired by the participants.

This data shows that the participants faced the most severe difficulty when they judged L2 English semantics-morphology. However, narrow syntax was the least problematic condition for them to judge. Interestingly, the morphology condition seems to be almost unproblematic



**Figure 4.4. The overall results in the three experimental conditions.**

The individual results are presented in Table 4.3. Considering syntax, 17 participants were able to judge this condition with an accuracy of 100% (i.e. 12 correct out of 12), 4 participants judged it with an accuracy of 91%, and 3 participants judged it with an accuracy of 83%. Only 5 participants scored low. Interestingly, only one of them was the participant with a low proficiency score, i.e. Participant 28. The other 3 participants with low proficiency scores scored high in the syntax condition, i.e. Participants 26, 27, and 29. Three participants scored high in the proficiency test but low in the syntax condition, i.e. Participants 5, 14, and 18.

In the morphology condition, all four participants with low proficiency scores performed low, i.e. Participants 26, 27, 28, and 29. There were also five participants with high proficiency who scored low, i.e. Participants 9, 10, 13, 15.

In the semantics-morphology condition, only 5 out of 29 participants received high scores (above 80% accuracy). All these 5 participants are among those who are quite proficient, i.e. Participants 1, 3, 4, 6, and 8. The rest of the proficient participants and all participants with low proficiency scores performed poorly in the semantics-morphology condition. Specifically, 3 participants were able to judge this condition with an accuracy of 100%, 1 participant judged it with an accuracy of 91%, 1 participant judged it with an accuracy of 83%, 3 participants judged it with an accuracy of 66%, 5 participants judged it with an accuracy of 58%, 14 participants judged it with an accuracy of 50%, 1 participant judged it with an accuracy of 41%, and finally, 1 participant judged it with an accuracy of 16%. Thus, according to Table 4.3, this condition is the most difficult one to acquire.

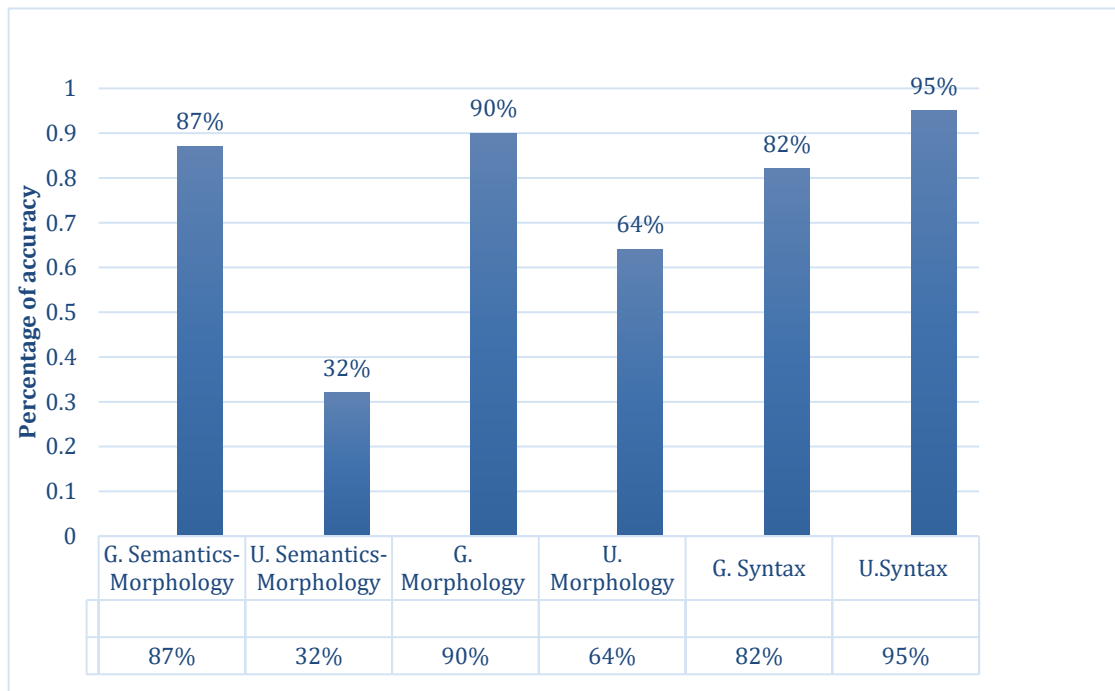
**Table 4.3. Individual results for the experimental conditions**

Participant	Semantics-morphology (accuracy score out of 12)	Morphology (accuracy score out of 12)	Syntax (accuracy score out of 12)	Proficiency score (max 20)
1	12	12	12	19
2	7	12	11	19
3	12	11	11	19
4	11	12	12	18
5	6	12	6	18
6	10	11	12	18
7	6	12	12	18
8	12	12	12	18
9	6	6	12	18
10	6	6	11	18
11	7	12	12	17
12	7	12	12	17
13	6	6	12	16
14	6	12	6	16
15	6	5	12	15
16	6	12	12	15
17	6	10	12	14
18	8	11	6	13
19	8	11	12	13
20	6	7	11	13
21	6	9	6	13
22	7	8	10	12
23	6	6	12	11
24	2	7	12	11
25	6	12	12	11
26	7	6	12	10
27	5	3	10	8
28	6	6	5	8

29	8	8	10	6
Total	207	269	307	342
Percentage	59%	77%	88%	98%

### 4.3.3. The results for grammatical/ungrammatical trials

This subsection presents the data collected from 29 participants for grammatical/ungrammatical trials in three experimental conditions. The results are displayed in Table 4.4 where G stands for grammatical, and U stands for ungrammatical. Each participant judged 6 grammatical and 6 ungrammatical structures in each condition. The proficiency scores are out of 20. Besides, Figure 4.5 displays a comparison between the results for grammatical/ungrammatical trials. In Figure 4.5, the X axis displays the grammatical/ungrammatical trials, and the Y axis indicates the percentage of accuracy for the total scores of the attendees. Concerning Figure 4.5, it is evident that the syntax both grammatical and ungrammatical, they are very different from the other two conditions. Because the participants are doing very well and near target-like with both grammatical and ungrammatical trials in the syntax condition. The participants' accuracy percentage for grammatical syntax is 82% and it is 95% for ungrammatical syntax. In other words, they had no problems with word order in English with SVO. However, we clearly see a very different picture in the other two conditions. Because my participants are target-like with grammatical trials in the semantics-morphology condition and morphology condition at the rate of 87% and 90% respectively. They performed very poorly in non-target-like at the 32% rate with the ungrammatical trials in the semantics-morphology, and they were better but still not target-like at a 64% rate with the ungrammatical morphology condition.



**Figure 4.5. The results for grammatical (G.) and ungrammatical (U.) trials across the three conditions.**

According to the individual results presented in Table 4.4, the participants behaved very well in Syntax. They showed 95% accuracy with ungrammatical trials and 82% accuracy with grammatical trials. Most of the participants scored high when responding to the grammatical and ungrammatical syntax trials. Nevertheless, 5 participants scored low and 4 of them had high proficiency scores, i.e. Participants 5, 14, 18, 21. Only one of the participants whose proficiency level was low had low scores with both grammatical and ungrammatical syntax trials.

Concerning the performance of the participants in the morphology condition, they obtained higher scores with grammatical than with the ungrammatical trials. Only 4 participants had some problems with grammatical trials, i.e. Participants 15, 20, 24, and 27. However, as many as 11 participants had problems with ungrammatical trials. It is also worthwhile to note that there were individuals both from high proficiency and low proficiency groups who could not detect incorrect morphological sentences and received 0 scores in this condition. When comparing the results for grammatical vs. ungrammatical semantics-morphology, a very different outcome is evident. Surprisingly, the grammatical semantics-morphology trials were easy to judge for all participants, except for Participants 24 and 27. However, nearly all participants made errors with ungrammatical trials. Specifically, 11 of 16 individuals with high

proficiency levels made numerous errors when responding to the ungrammatical semantics-morphology. It is interesting to note that several highly proficient individuals received 0 scores. Only 6 participants had high scores (4 and 6) with ungrammatical semantics-morphology trials, and one of them had a low proficiency score, i.e. Participant 29.

**Table 4.4. The results for grammatical/ungrammatical trials (accuracy scores)**

Participant	Semantics-morphology		Morphology		Syntax		Proficiency score
	G	U	G	U	G	U	
1	6	6	6	6	6	6	19
2	5	2	6	6	5	6	19
3	6	6	5	6	5	6	19
4	5	6	6	6	6	6	18
5	6	0	6	5	1	6	18
6	4	6	6	5	6	6	18
7	5	1	6	6	6	6	18
8	6	6	6	6	6	6	18
9	6	0	6	0	6	6	18
10	6	0	6	0	5	6	18
11	5	2	6	6	6	6	17
12	5	2	6	6	6	6	17
13	6	0	6	0	6	6	16
14	6	0	6	6	0	6	16
15	6	0	3	2	6	6	15
16	6	0	6	6	6	6	15
17	5	1	6	4	6	6	14
18	6	2	6	5	0	6	13
19	6	2	5	6	6	6	13
20	4	2	1	6	5	6	13
21	5	1	6	3	0	6	13
22	6	1	5	3	4	6	12
23	6	0	6	0	6	6	11
24	2	0	3	4	6	6	11



25	6	0	6	6	6	6	11
26	6	1	6	0	6	6	10
27	3	3	3	0	6	4	8
28	4	2	6	0	3	2	8
29	4	4	6	2	6	4	6
Total	152	56	157	111	142	166	
Percentage	87%	32%	90%	64%	82%	95%	

#### 4.3.4. Individual results

Table 4.4 shows that one of the participants with a proficiency score of 19 made no error in judging all three conditions. However, another one, who was equally proficient as the first mentioned made 4 errors in judging ungrammatical definiteness and was not able to detect a lack of article *the* as ungrammatical. This shows that this condition is very problematic for even proficient Persian EFL learners. As Table 4.4 indicates, 24 participants behaved very poorly in detecting the lack of article *the* as ungrammatical, and most of these participants were highly proficient EFL learners. Participant 29 with a proficiency score of 6 (minimum) could detect the lack of article *the* as ungrammatical fairly well. This shows that low-proficient Persian EFL learners can successfully judge ungrammatical definiteness, while high-proficient ones fail to do so. In fact, detecting ungrammatical morphology was the only problematic condition for the weakest participant in my study. However, a participant with a proficiency score of 18 failed to detect grammatical syntax indicating that even participants with high proficiency may fail to detect grammatical syntax.

Table 4.4 reveals that ungrammatical morphology was detectable for proficient Persian EFL learners and Persian EFL learners with low or even medium proficiency had difficulty in detecting ungrammatical morphology. Among proficient participants, only two of them failed to detect ungrammatical morphology. Therefore, the results show that the more proficient Persian EFL learners, the more successful they are in detecting ungrammatical morphology. Ungrammatical syntax was the easiest condition for the participants to detect. In this case, only low-proficient participants had difficulty. Table 4.4 shows that the only participants who obtained a low score in this condition were Participant 27 with a proficiency score of 8, Participant 28 with a proficiency score of 8, who obtained the lowest score (i.e., 2 out of 6) in

this part, and Participant 29 with proficiency score of 6. Therefore, the results show that only the weakest Persian EFL learners fail to detect ungrammatical syntax.

## 5. Discussion

This part is devoted to discussing the results presented in Chapter 4. I took into consideration both the questions and predictions from chapter 3 as well as the outcomes of the test and investigation that was presented in chapter 4 to discuss the questions and predictions from chapter 3. Because the goal of the current thesis was to explore the Bottleneck Hypothesis, the main focus of the discussion is on the “Results and Predictions” of the hypothesis, which centers on identifying whether functional morphology serves as the bottleneck in L2 acquisition of English by L1 Persian. The trials used in this investigation are a subject-verb agreement to test the functional morphology, definiteness to investigate semantics-morphology, and verb-object word order as representative of narrow syntax. For the sake of convenience, the research questions and predictions are duplicated here for perusal.

RQ1. Is acquiring functional morphology more difficult than the narrow syntax for L1 Persian L2 English university students?

RQ2. What is the hierarchy of the difficulty of linguistic conditions (morphology, semantics-morphology, and syntax) for L1 Persian students when acquiring L2 English?

Prediction 1: In line with the BH, I predicted that the learners in my study would have problems with SV agreement, but the verb-object word order would be unproblematic. However, given that my participants are university students, I also predicted that their problems with SV agreement would be less severe than the problems of younger learners in Rajabi (2022).

Prediction 2: With regards to the definiteness or the semantics-morphology property, I predicted that it would also be more problematic than word order. However, it was unclear whether definiteness would be more problematic than SV agreement. While there are no articles in Persian, SV is marked systematically in Persian by different suffixes, also in the third person singular. Additionally, we know that SV agreement is exercised in L2 English classrooms (e.g. Jensen et al. 2020), but articles are complex and are likely to receive less attention in the classroom and at later stages compared to SV agreement. Thus, I expected that definiteness would be more problematic than SV agreement in my study.

Furthermore, the participants in my study are rather experienced L2 English learners because they are university students with many years of English instruction and exposure, thus, it could still be predicted that they would have certain knowledge about articles and that the

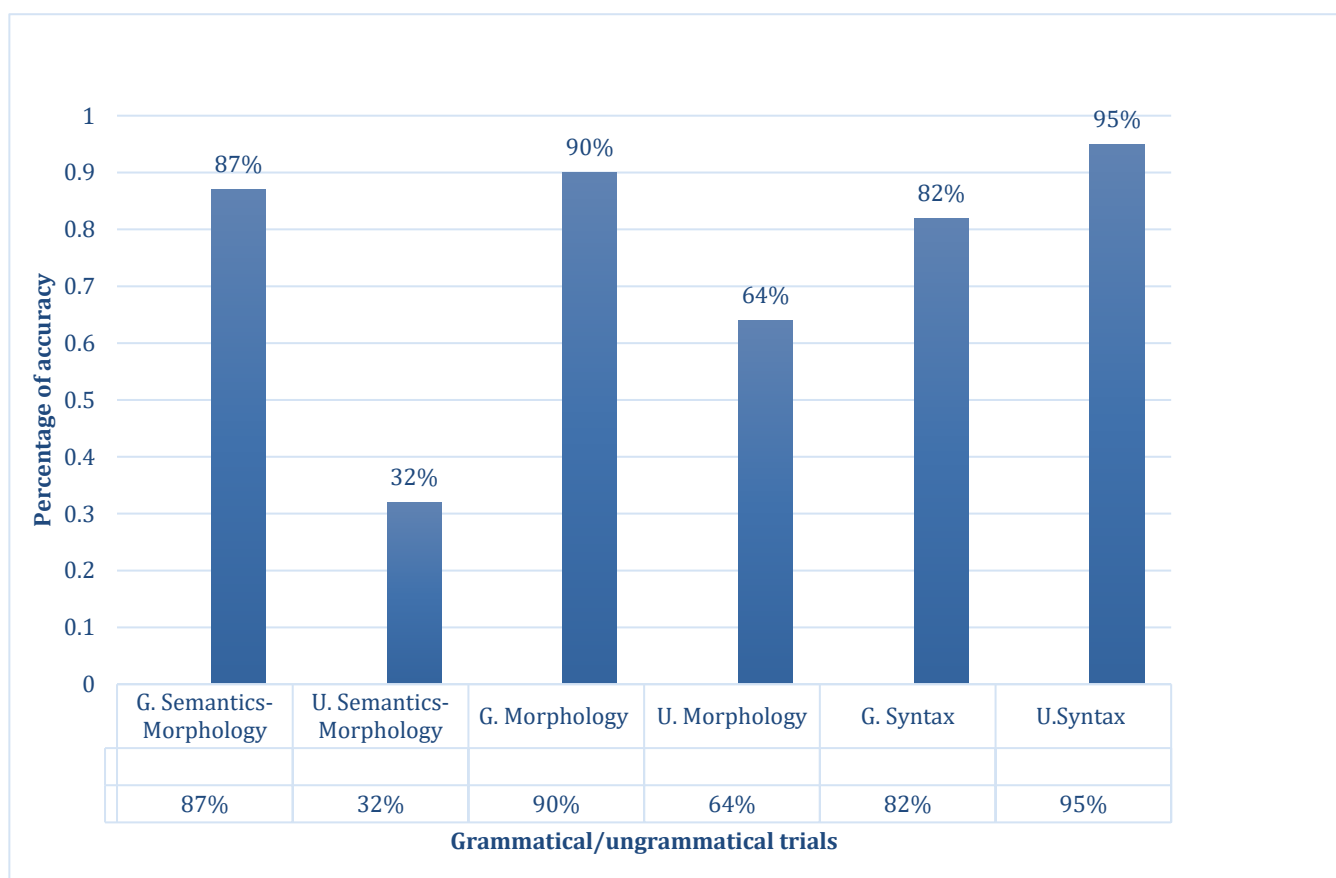
definiteness is marked by *the* in English. However, as Persian is a language that lacks articles specifically corresponding to definiteness, I predicted that my participants would still have problems with comprehension. Since L2 learners are known to omit articles frequently (White 2009, Afzali 2012, Kupisch et al., 2013), it may be particularly difficult for them to judge sentences without articles.

To summarize the key ideas, it must be noted that functional morphology is a component of language that learners should be aware of and intentionally study. Semantics, syntax, and phonology are examples of language features that are UG components that can be transferred, as demonstrated in Chapter 2. Though functional categories are still a part of UG, they are not transferable. Given that this thesis emphasizes the acquisition of functional morphology, semantics-morphology, and syntax and relies on a generative approach, I expected that Persian L1 learners of English would have similar difficulties as other second-language English learners when acquiring functional morphology. On the other hand, as fundamental syntax and semantic functions are universal, Persian L1 learners would encounter less difficulty when acquiring syntax and semantics of English as their second language. Jensen et al. (2020) state that both narrow syntax and semantic processes are carried out identically and follow the same principles in all the recognized languages worldwide.

In this section, I will go over each of the suggested predictions as well as the results of my study presented in the previous chapter.

### **5.1. Is the acquisition of functional morphology more difficult than the narrow syntax for L1 Persian L2 English university students?**

For this study question, it was predicted that learning functional morphology is more challenging than learning semantics and or syntax. This suggests that learning subject-verb agreement is more challenging than learning syntax or verb-object word order. Reviewing the findings of this investigation in Chapter 4 is required to talk about this prediction. Figure 4.5 compares the acceptability judgment test findings where the overall scores and judgment accuracy percentages for both grammatically correct and incorrect sentences are displayed.



**Figure 4.6. The result for the total score for grammatical/ungrammatical trials**

According to the participants' overall score for syntax condition (88%), the participants performed well in recognizing verb-object word order. Moreover, when judging grammatical and ungrammatical syntactic sentences, they performed near target-like for the ungrammatical syntax (95%) and also received a high percentage when judging grammatical syntax (82%). So, regarding the overall scores for the syntactic condition displayed in Figure 4.4, the BH is supported since it is acquired by the learners and the results of the verb-object word order are remarkably high and target-like.

According to the results of my study, acquiring the SV agreement is not straightforward. Figure 4.4. shows that the overall accuracy for the SV agreement was rather high (77%) and not much lower than that in the syntax condition (88%). So the overall scores for both morphological and syntactic conditions were rather high. On the other hand, as Figure 4.5 shows the accuracy in the SV agreement with grammatical trials was very high 90%, and target-like which suggests that the SV agreement may already be fully mastered by L1 Persian students. However, their performance in the ungrammatical trials and their individual results

suggest that my participants still have problems with SV agreement since they received lower scores when judging grammatical sentences (82%) compared to recognizing ungrammatical ones (95%).

In addition, table 4.4 presented the individual results categorized by proficiency level. These results indicate that not only individuals who possessed low proficiency levels but also those who had high proficiency still had problems with SV agreement in the ungrammatical trials. To conclude, the difference between the conditions (morphology and syntax) becomes clearer when we compare the performance with the ungrammatical trials: 94% accuracy for word order (syntax) and only 64% accuracy for SV agreement (morphology). These results give support to the BH.

The results of the semantics-morphology condition were most interesting. The overall results in Figure 4.4. showed that this condition was the most problematic one for university students: 59% accuracy only. The results for the grammatical-ungrammatical trials show a similar tendency that we observed in the SV-agreement condition, i.e. the participants' overall scores for grammatical sentences were greatly higher than their overall scores for ungrammatical sentences: 87% vs. 32% respectively. As is evident in Figure 4.5 participants' performance in judging ungrammatical sentences in the semantics-morphology condition is the lowest. Thus, in my study, the most challenging condition for L1 Persian L2 English was judging the errors in the ungrammatical semantics-morphology sentences where the definite articles were missing. In other words, the participants' seem to know that definiteness is marked by the article *the* in English, but since there are no definite articles in Persian they are still unsure when the definite article is needed in English.

According to previous studies, what seems problematic in cases where the languages do not have definite articles (namely Persian) is acquiring “*the*”, this overt functional morpheme that marks definiteness in English. Learners of English whose L1s do not have articles are known to omit articles in L2 English (Goad and White 2004, Zdorenko and Paradis 2012). Just like *-s* marks third person singular, *the* is also a functional morpheme. It expresses definiteness in English but there is no such functional morpheme that expresses definiteness in Persian. The learners do not know when to use the articles because they are functional morphemes and not because of the semantic role.

To conclude, in terms of the BH, if I look at the overall results (figure 4.4), it is evident that both syntax and morphology seem to be quite good. Thus, according to the overall results displayed in Figure 4.4, the BH is not clearly supported. Both syntax and functional morphology seem to be acquired. On the other hand, concerning Figure 4.5, we suddenly see that with

grammatical trials, when the learners see *-s* (subject-verb agreement) in a sentence, they know it should be there and judge the sentence as grammatically correct. However, when there is no *-s*, many of the participants do not see that *-s* must be there. In other words, what can be expected in production, i.e. if we ask the learners to produce those sentences, we can expect that many of the learners would omit the *-s* due to the influence from their L1 where there is no such morpheme marking SV agreement. According to the overall results and in terms of the Bottleneck Hypothesis, the subject-verb agreement seems to be quite good. To conclude, the BH is supported based on the evidence from the ungrammatical trials in the syntax and morphology conditions.

The semantics-morphology condition tells us a similar story. The learners are unsure when the definite article should be used in English because they do not have this article in their L1. The grammatical trials suggest that the adults at this stage of acquisition have had quite a lot of instruction in English and they know that English has a definite article that expresses definiteness. Therefore their performance is near target like with grammatical trials (87%), but since Persian does not have definite articles, these learners still experience problems with expressing this functional morpheme. This also suggests that in production, i.e. if we ask the participants to produce the sentences, they would omit *the*. These results support the BH since the participants in my study had encountered difficulty with acquiring the article system in English specifically when judging the ungrammatical sentences.

## **5.2 RQ2. What is the hierarchy of the difficulty of linguistic conditions (morphology, semantics-morphology, and syntax) for L1 Persian students when acquiring L2 English?**

Based on the BH, the prediction was that morphological conditions must be a challenging part to acquire, and syntactic conditions could be acquired more straightforwardly. The results of the current study showed that participants had more difficulty when judging semantics-morphology condition compared to morphology and or narrow syntax trials. A glance at Figure 4.4 reveals that the overall accuracy score of semantics-morphology sentences (59%) was totally low and far from the target. Such a low accuracy score indicates that the participants in my study had great difficulty with recognizing definiteness as a representative of the semantics-morphology trial. As the participants got the lowest overall score for definiteness, semantics-morphology was the most challenging trial for them. As the participants' overall score for morphology was 77%, it is obvious that the individuals performed better when evaluating sentences related to SV agreement as a representative of morphological condition. As a result,

morphology is the second challenging trial for L1 Persian individuals in my study. Regarding the overall scores for the syntactic condition, the participants' performance was well, so their overall score was 88% which was a high percentage of accuracy. Obviously, the syntactic trial is the less difficult condition for participants to recognize. In sum and with regard to the overall scores displayed in Figure 4.4, the hierarchy of difficulty of linguistic conditions is semantics-morphology as the most difficult one to acquire, morphology, and syntax respectively.

When turning to Figure 4.5, a rather similar outcome to Figure 4.4 is evident. Ungrammatical semantics-morphology was the most difficult trial for my participants to judge as nearly all participants made errors with ungrammatical trials. They just got 32% accuracy when evaluating this trial. Such a low accuracy score indicates that the most challenging part of the acquisition of English as a second language for my participants was semantics-morphology. The next most difficult condition to judge was ungrammatical morphology as only a 64% accuracy percentage was obtained by the participants. So it can be concluded that ungrammatical SV agreement sentences as the representative of ungrammatical morphology trial is the second challenging condition for participants to acquire. As the participants got an 82% accuracy score when evaluating grammatical syntactic sentences, it can be stated that grammatical word order is the next difficult trial to evaluate. Although the percentages indicate that this trial is the third challenging condition for individuals to judge, rather well performance of participants in this trial is evident. Consequently acquiring syntax was not as challenging as acquiring semantics-morphology or morphology. In other words, ungrammatical syntax stands in less complicated constructions to recognize due to the good performance of the participants. By the way of conclusion, ungrammatical semantics-morphology (32%), ungrammatical morphology(64%), and grammatical syntax (82%) are the hierarchy of difficulty.

What is interesting is that when the participants in my study judged the accuracy of the functional morphemes (-s and *the*) they had major problems with recognizing the errors in the ungrammatical trials. At the same time, they evaluated the grammatical sentences representing morphology and semantics-morphology with less difficulty. They could recognize the existence of functional morphemes (-s and *the*) and considered the sentences including these functional morphemes as grammatically correct. However, they encountered problems with ungrammatical sentences representing semantics-morphology and morphology. When these functional morphemes were not present in the related sentences, the participants could not perceive the absence of these morphemes. So they made errors and considered ungrammatical sentences as correct sentences.



In sum, Participants can learn syntactic conditions more easily than morphological trials. Compared to subject-verb agreement, the definiteness is more sophisticated to acquire. Stated differently, for Persian learners, the most challenging condition for learning is semantics-morphology.

It must be noted that according to the results of my study, the two conditions (morphology and semantics-morphology) under investigation are not equally difficult. That could be because the subject-verb agreement is taught in the classroom in the early stages of English acquisition, but articles are not taught early on. Moreover, articles are a difficult part of grammar to teach, and consequently, it is a more complex problem for learners to master.

### **The comparison of the results of the present study to previous investigations:**

In this section, I will compare the results of my investigation with three other studies by Jensen (2017) who studied L1 Norwegian L2 English learners as well as Gholami (2020) and Rajabi (2022) who also investigated the BH in L1 Persian L2 English learners. This is important because my study considered a later stage of acquisition – the university students, while Jensen investigated 4<sup>th</sup> and 8<sup>th</sup> graders Norwegian students (9-10 and 12-13 years old respectively), Rajabi studied 10-12-year-old children, and Gholami studied 10<sup>th</sup> (16 years old) and 11<sup>th</sup> (17 years old) school grades as well as one group of university students (21-23 years old). The participants' proficiency level in Gholami (2020) varied from beginner level to advanced level of proficiency in English.

Rajabi (2022) investigated four linguistic trials within three linguistic modules (morphology, syntax, and semantics): Subject-verb agreement, Past tense *-ed*, Adjective-Noun (Adj-N) word order, and Pronominal gender. According to her findings, 10-12-year-old children learning English in Iran have more difficulties with both determining pronominal gender and subject-verb agreement and that pronominal gender is the most problematic property. At the same time, the children had no problem with word order in English. If I compare the results of Rajabi to the results of my study for the SV agreement, I observe that my participants are better with the subject-verb agreement morphology than those in Rajabi (2022). The participants in my study obtained 77% accuracy overall which is near target-like, but the participants in Rajabi (2022) received 64%. These differences can be explained by the fact that the participants in my study are adult individuals and have been in contact with English instruction for a longer period than those in the Rajabi's investigation. The findings in my study are also in line with Jensen (2017) and Gholami (2020) since these investigations found

that subject-verb agreement morphology was more difficult to acquire than the narrow syntax. This finding supports the idea of *syntax-before-morphology* and is in contrast with the *morphology-before-syntax* view (White, 2003). The former perspective, according to Slabakova (2013), contends that an adequate understanding of functional morphology comes after having an understanding of narrow syntax and the latter contends that the acquisition of syntax is driven by the development of functional morphology.

Gholami (2020) investigated the Bottleneck Hypothesis. To this end, two declarative phrases, one with a subject initial and the other without one (non-subject initial), were chosen to test the word order; Subject-verb agreement and the past tense with the suffix "ed" were chosen to evaluate functional morphology. The findings of her study revealed that subject-verb agreement is a persistent problem for the participants since they obtained 78% accuracy when judging grammatical sentences and 62% accuracy when judging ungrammatical sentences. According to the results of her study, even participants with high proficiency made errors when judging the agreement. Gholami (2020) believed that, as Slabakova (2013) pointed out, mastering in SV agreement as a morphological trial requires lexical learning and requires additional exposure and practice to be obtained. Moreover, Gholami proposed that as the verb inflection in Persian is richer than English, acquiring agreement is problematic for L1 Persian L2 English learners.

Considering the syntactic trials, the participants in Gholami (2020) performed well and received high scores when evaluating grammatical and ungrammatical sentences. According to her results, the overall score for grammatical syntactic condition was 82% and the ungrammatical one was 92%. Both these percentages are high and showed that narrow syntax was not problematic to Persian L1.

The findings of my study are in line with that of Gholami (2020). When evaluating the grammatical SV agreement, my participants received 90% accuracy which is higher than the overall results of Gholami (2020), i.e. 78%. However, regarding the percentage of ungrammatical SV agreement, my participants were quite similar to her participants (62% and 64% respectively). Moreover, in both studies, the narrow syntax was easy to recognize by participants and was not the bottleneck. Interestingly, in both studies, when looking at the percentages in narrow syntax, judging ungrammatical sentences was easier than grammatical sentences and participants made more errors when judging grammatical sentences. Participants of my study received 82% and those in Gholami (2020) received 76% (non-subject initial) and 82% (subject initial). Besides, the participants in my study received 95% when judging ungrammatical syntactic sentences and Gholami's participants received 91% (non-subject

initial) and 92% (subject initial) in recognizing ungrammatical syntax. All in all, in the syntax condition, the participants of both studies were target-like when judging the ungrammatical word order sentences. Regarding the SV agreement, the participants in both studies performed similarly and obtained low percentages when judging ungrammatical SV agreement sentences. However, when evaluating grammatical SV agreement, the participants in my study performed better (near target) than the participants in Gholami (2020).

Finally, I will compare the results of my study to Jensen's (2017) who considered young learners. The individuals who participated in her study were 4th graders (9 and 10 years old) and 8th graders (12 and 13 years old). My result is similar to the results of Jensen (2017) as she also found that word order was unproblematic already in younger groups of children at the early stage of acquisition. When it comes to morphology (which was also subject-verb agreement), the older participants (8<sup>th</sup> graders and university students) encountered problems in judging the agreement and performed poorly in recognizing ungrammatical morphological trials.

It is important to note that Norwegian is different from Persian because Norwegian is morphologically poor and it does not mark or does not use any morpheme to mark third person singular, while Persian does. Persian L1 compared to L1 Norwegian learners of English may have an advantage because Persian uses various morphemes, and different suffixes to mark agreement between the subject and the verb, however, Norwegian does not use any morpheme as a marker of agreement. accordingly, morphology is a problematic condition for L1 Norwegian learners. It must be mentioned that although the difficulty in acquiring morphology is much more severe at the younger acquisition stage, it is still problematic in older participants.

Regarding the participants of my study, the overall score of morphology is near target-like, but when I look at the ungrammatical judgment of trials, I see that they are not target-like yet. In principle, it is evident that for subject-verb agreement there is very similar performance between L1 Persian learners compared to Jensen's L1 Norwegian learners. Although the participants in my study are older than those in Jensen (2017), my participants still experience problems with SV agreement even at the university level. Thus it is not clear that L1 Persian learners who mark SV agreement in their L1 have an advantage in the acquisition of SV agreement in English compared to L1 Norwegian learners who do not mark SV agreement in the L1. I must note that it is hard to make a direct comparison between my study and Jensen's (2017) since the participants of each study are different in terms of age and maybe proficiency.

According to the results of my study, the most interesting contrast is between SV agreement and definiteness. The first one is the focus of instruction from the very early stages of acquiring English as L2. The individuals who participated in my study were University

students and received many years of instruction. Therefore their knowledge of SV agreement appears to be near-target-like at the University level. However, definite articles are still very problematic for them because the article system of English is very complex. Furthermore, the article system is typically not included early in classroom instruction and it does not receive as much attention in the classroom as the SV agreement does (Slabakova 2016).

In Persian definiteness exists like any other language but there is no specific morpheme to show definiteness. Accordingly, L1 and L2 are not similar in the means used to express definiteness. According to Afzali (2012) in languages such as Japanese or Persian which lack articles for definiteness, students often encounter difficulties while utilizing articles in English. Considering these results from previous studies, the individuals in my study had more difficulty in judging the absence of a definite article than the existence of it. Since in their L1, they don't have such an article system this results in making errors while answering ungrammatical semantic-morphology questions.

Narrow syntax (verb-object word order) was the easiest one to recognize. The L1 Persian L2 English learners would have good competence in recognizing the orders of words in an English sentence. On the other hand, definiteness was the most problematic trial for the university students attending my investigation since In the English language, definiteness is encoded morphologically. As a result, it seems likely that learning the semantic morphology and morphological criteria will not be equally challenging, with L1 Persian speakers potentially finding Subject-verb agreement easier to acquire than definiteness.

It is a typical observation in the classroom that students learning English as a second language or as a foreign language struggle with the article system and depending on whether or not their L1s have articles, the level of difficulty changes (Master, 2002). When it comes to learning a second language (L2), English articles are said to be the most difficult functional components. Research has indicated that second language learners (L2s) from backgrounds where articles are present in the language exhibit differences in how they pick up the English article system (Ionin et al. 2004; Hawkins et al. 2006; Avery and Radišić 2007; Trenkic 2009; Chung 2011). Goad and White (2009) conducted a study involving L1-Turkish L2-English speakers. There were eighteen respondents in the investigation, with English proficiency levels ranging from low intermediate to high intermediate and advanced. A series of photographs were used to tell a tale in an expressed production assignment. It must be noted that there isn't a single definite or indefinite article in Turkish that directly matches the articles in English. The results revealed that low-intermediate learners typically removed articles. To explain why

omissions occur or non-target-like (stressed) articles are created, Goad & White (2009) propose a prosodic transfer account.

The results of my study are in line with Goad & White (2009) since both studies revealed article omission by L2 English learners. However, in my study both proficient and low-proficient students encountered problems with the English definiteness system, but only the low-intermediate participants in the study done by Goad & White (2009) had difficulty with the article system.

## 6. Conclusion

In the current study, the Bottleneck Hypothesis (Slabakova 2008, 2013, 2016) has been tested. According to BH, functional morphology is the bottleneck or the most challenging part of acquiring a second language. Moreover, it argues that the acquisition of narrow syntax is easier than the acquisition of functional morphology. In order to investigate the BH, I tested two morphological conditions namely definiteness and subject-verb agreement, and a syntactic condition that is SVO word order (cf. section 2.4). These constructions were tested with 29 Iranian university students whose L1 is Persian and they were acquiring English as their L2. The participants are discussed in detail in section 3.4. The Acceptability Judgement Task (cf. section 3.5.1) was used to recognize the participants' performance on the morphological and syntactic structures.

My results show that syntax is not problematic for university-level students. I can still see some remaining problems with SV agreement in the ungrammatical trials but overall the knowledge of SV agreement is near target-like in my participants who were University students. However, L1 Persian University students still have problems with the definite article *the* in English, in particular problems with the ungrammatical sentences where learners do not see errors.

### **Does the current investigation support the BH?**

In sum and as previous chapters indicate, definiteness is a semantics-morphology property, and subject-verb agreement is a morphological property. Both of these properties are more challenging to acquire than SVO word order as a syntactic property in my study. Thus, the Bottleneck Hypothesis which holds that functional morphology is the bottleneck of L2 acquisition is supported by the findings of this study as well as those of earlier investigations (Jensen 2017, Gholami 2020, Rajabi 2022). Even though testing the subject-verb agreement revealed that it is not as challenging as the semantics-morphological feature (definiteness) assessed in this thesis, the outcome of the present thesis maintains the validity of the Bottleneck Hypothesis. Thus, the current thesis supports the claim proposed by BH as it concludes that acquiring functional morphology is more difficult than narrow syntax.

## 7. References

- Afzali, P. (2012). Marking definiteness in Farsi and English by Farsi speaking EFL learners.
- Agebjörn, A. (2020). Explicit and implicit knowledge of article semantics in Belarusian learners of English: Implications for teaching. *Formal linguistics and language education: New empirical perspectives*, 179-201.
- Ansarin, AA (2004). Nongeneric use of the definite article the by Persian learners.
- Avery, P., & Radišić, M. (2007). Accounting for variability in the acquisition of English articles. In *Proceedings of the 2nd Conference on Generative Approaches to Language Acquisition North America (GALANA)* (pp. 1-11). Cascadilla Proceedings Project, Somerville, MA.
- Chomsky, N. (1957). *Syntactic Structures*. The Hague: Mouton.
- Chomsky, N. (1965). *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Chomsky, Noam (1995): *The minimalist program*. Massachusetts: The MIT Press.
- Chung, T. (2011). Variability in the L2 Acquisition of English Articles. *English teaching*, 66(2).
- Clahsen, H., Hong, U., & Sonnenstuhl-Henning, I. (1995). Grammatical constraints in syntactic processing: sentence-matching experiments on German.
- Corder, P. S. (1983). *A role for the mother tongue*. Chicago Linguistic Society.
- Dabir-Moghaddam, M. (2013). Typology of Iranian languages. *Tehran: As well as* .
- Dabrowska, E. (2010). Naïve v. expert intuitions: An empirical study of acceptability judgments. *The Linguist Review* 27, 1-23.
- Dulay, H. C., & Burt, M. K. (1974). Natural sequences in child second language acquisition. *Language learning*, 24(1), 37-53.
- Dulay, HC, & Burt, MK (1973). Should we teach children syntax? *Language learning* , 23 (2), 245-258.
- Ellis, R. (1994). The study of second language acquisition. Oxford: Oxford University Press. [PDF] Retrieved from: <https://pt.scribd.com/doc/169111563/Rod-Ellis-The-Study-ofSecond-Language-Acquisition>
- Eubank, L. (1993/94). On the transfer of parametric values in L2 development. *Language Acquisition* , 3 (3), 183-208.
- Faghih, E. (1997). A Contractive Analysis of the Persian and English Definite Articles. *IRAL: International Review of Applied Linguistics in Language Teaching*, 35(2), 127.
- Fries, C. C. (1945). Teaching and learning English as a foreign language.

- Gass, S.M., Behney, J., & Plonsky, L. (2013). *Second Language Acquisition: An Introductory Course* (4th ed.). Routledge. <https://doi.org/10.4324/9780203137093>
- Gholami, M. (2020). *STUDY OF THE BOTTLENECK HYPOTHESIS IN L2 ACQUISITION: The acquisition of functional morphology and syntax by Persian L2 learners of English* (Master's thesis, UiT Norwegian Arctic University).
- Goad, H., & White, L. (2004). Ultimate attainment of L2 inflection: Effects of L1 prosodic structure. *EUROSLA yearbook*, 4(1), 119-145.
- Goad, H., & White, L. (2009). Articles in Turkish/English interlanguage revisited. *Second language acquisition of articles: Empirical findings and theoretical implications*. John Benjamins Publishing, 49, 201-232.
- Hawkins, R., Al-Eid, S., Almahboob, I., Athanasopoulos, P., Chaengchenkit, R., Hu, J., ... & Velasco-Zárate, K. (2006). Accounting for English article interpretation by L2 speakers. *EUROSLA yearbook*, 6(1), 7-25.
- Haznedar, B., & Schwartz, B. (1997). 1997: Are there optional infinitives in child L2 acquisition? In Hughes, E., Hughes, M. and Greenhill, A., editors, *Proceedings of the 21st Annual Boston University Conference on Language Development*. Somerville, MA: Cascadilla Press, 257-268.
- Hermas, A. (2018). Sources of article semantics in L3 English: Definiteness and specificity. *Linguistics Journal*, 12(1).
- Hoque, M. E. (2020). Noam Chomsky's Contribution to Second Language Acquisition: A Reflection on the Universal Grammar Theory. *The EDRC Journal of Learning and Teaching*, 6(3).
- Ionin, T., & Zyzik, E. (2014). Judgment and interpretation tasks in second language research. *Annual Review of Applied Linguistics*, 34, 37-64.
- Ionin, T., Ko, H., & Wexler, K. (2004). Article semantics in L2 acquisition: The role of specificity. *Language acquisition*, 12(1), 3-69.
- Izadi, M., & Rahimi, M. (2015). Word order of Persian and English: A processing-based analysis. *Education Journal*, 4(1), 37-43.
- Jensen, I. N., Slabakova, R., Westergaard, M., & Lundquist, B. (2020). The Bottleneck Hypothesis in L2 acquisition: L1 Norwegian learners' knowledge of syntax and morphology in L2 English. *Second Language Research*, 36(1), 3-29.
- Jensen, IN (2016). *The Bottleneck Hypothesis in L2 acquisition: Norwegian L1 speakers' knowledge of syntax and morphology in English L2* (Master's thesis, UiT Norwegian Arctic University).



- Jensen, MG (2017). *Investigating the Bottleneck Hypothesis in Second Language Acquisition The acquisition of narrow syntax and functional morphology among Norwegian L2 learners of English* (Master's thesis, UiT Norwegian Arctic University).
- John, M. (2003). *Persian Grammar*. London New York .
- Kupisch, T., Snape, N., & Stangen, I. (2013). Foreign language acquisition in heritage speakers. *Linguistic superdiversity in urban areas: Research approaches*, 2, 99.
- Lado, R. (1957). *Linguistics Across Cultures*. Ann Arbor: University of Michigan Press.
- Lardiere, D. (1998). Case and tense in the 'fossilized' steady state. *Second language research* , 14 (1), 1-26.
- Mahootian, S., & Gebhardt, L. (1997). *Persian (descriptive grammars)*. London: Routledge. doi, 10, 9780203192887.
- Master, P. (2002). Information structure and English article pedagogy. *System*, 30(3), 331-348.
- Moghaddam, M. D., Sahraei, R. M., & Mulham, A. L. The Effect of Persian and Arabic Word Order Typological Features on Arabic Learners Learning Persian.
- Odlin, T. (2003). Cross-linguistic influence. *The handbook of second language acquisition* , 436-486.
- Platzack, C. (1996). The initial hypothesis of syntax. *Generative perspectives on language acquisition*, 369-414.
- Prévost, P., & White, L. (2000). Missing surface inflection or impairment in second language acquisition? Evidence from tense and agreement. *Second language research* , 16 (2), 103-133.
- Quirk, RGS, Leech, G., & Svartvik, J. (1972). *A grammar of contemporary English* .
- Rajabi, M. (2022). *L2 Acquisition of English by Persian L1 Speakers. Comparing Morphology, Syntax and Semantics The Bottleneck Hypothesis in L2 acquisition* (Master's thesis, UiT Norwegian Arctic University).
- Ramchand, G., & Reiss, C. (Eds.). (2007). *The Oxford handbook of linguistic interfaces*. Oxford University Press.
- Schwartz, BD, & Sprouse, RA (1996). L2 cognitive states and the full transfer/full access model. *Second language research* , 12 (1), 40-72.
- Selinker, L. (1972). *Interlanguage*. International Review of Applied Linguistics in Language Teaching.
- Slabakova, R. (2006). What is easy and what is hard to acquire in a second language.
- Slabakova, R. (2008). *Meaning in the second language* . Mouton de Gruyter.

- Slabakova, R. (2016). *Second language acquisition*. Oxford University Press.
- Slabakova, R., & Mayo, MDPG (2015). The L3 syntax–discourse interface. *Bilingualism: Language and Cognition* , 18 (2), 208-226.
- Slabakova, Roumyana (2013): "What is easy and what is hard to acquire in a second language: A generative perspective". In: María del Pilar García Mayo, María Junkal Gutierrez Mangado and María Martínez Adrián (ed.): *Contemporary approaches to second language acquisition*. Amsterdam/Philadelphia: John Benjamins Publishing Company.
- Slabakova, Roumyana and Johnathan Gajdos (2008): "The Combinatorial Variability Hypothesis in the Second Language". *Selected Proceedings of the 2007 Second Language Research Forum*. Somerville, MA: Cascadilla Proceedings Project
- Trenkic, D. (2009). Accounting for patterns of article omissions and substitutions in second language production. *Second language acquisition of articles: Empirical findings and theoretical implications*, 49, 115-143.
- Vainikka, A., & Young-Scholten, M. (1994). Direct access to X'-theory: Evidence from Korean and Turkish adults learning German. In: Hoekstra T and Schwartz BD (eds) *Language acquisition studies in generative grammar*. Amsterdam: John Benjamins, pp. 265–316.
- Vainikka, A., & Young-Scholten, M. (1996). Partial transfer, not partial access. *Behavioral and Brain Sciences* , 19 (4), 744-745.
- Weinteich, U. (1953). Languages in contact: Findings and problems. *Publications of the Linguistic Circle of New York, No. 1*. New York .
- Westergaard, M. (2021). Microvariation in multilingual situations: The importance of property-by-property acquisition. *Second Language Research*, 37(3), 379-407.
- White, B. (2009). Accounting for L2-English learners' article choices.
- White, L. (2003). *Second language acquisition and universal grammar*. Cambridge University Press.
- Zdorenko, T., & Paradis, J. (2012). Articles in child L2 English: When L1 and L2 acquisition meet at the interface. *First language* , 32 (1-2), 38-62.

## 8. Appendices

### Appendix 1: An introduction and instruction of the whole test (and its English translation)

سلام. وقت بخیر. من ثریا هستم دانشجوی کارشناسی ارشد زبان انگلیسی. به تحقیق من خوش اومدی. از اینکه پذیرفتی توی این مطالعه شرکت کنی صمیمانه از تو ممنوم. توی این مطالعه هیچ اطلاعات خصوصی و یا محرمانه ای از شما پرسیده نمیشود. این تحقیق برای پایان نامه کارشناسی ارشد من در رشته زبانشناسی ( English Linguistics - Masters in English Acquisition and Multilingualism) طراحی شده.

(Hello. Have a good time. I am Soraya, a master's student in English. Welcome to my research. I sincerely thank you for agreeing to participate in this study. In this study, you will not be asked for any private or confidential information. This research is designed for my master's thesis in English Linguistics - Masters in English Acquisition and Multilingualism.)

تحقیق من شامل سه تا پرسشنامه هست که تکمیلشون حدودا 15-20 دقیقه زمان نیاز داره.  
پرسشنامه اول: انتخاب درست یا نادرست بودن جمله انگلیسی  
پرسشنامه دوم: به فارسیه و در مورد پیشینه و میزان آشنایی شما با زبان انگلیسی هست  
پرسشنامه سوم: آزمون زبان انگلیسی

(My research consists of three questionnaires, which take about 15-20 minutes to complete.  
The first questionnaire: choosing whether the English sentence is correct or incorrect  
The second questionnaire: is in Farsi and it is about your background and level of familiarity with the English language  
The third questionnaire: English language test)

پرسشنامه اول: توی هر صفحه یک جمله نمایش داده میشه و شما میبایست از بین گزینه های پایین جمله انتخاب کنید که اون جمله توی زبان انگلیسی صحیح هست یا غلط. در برخی موارد دو جمله خواهید دید. فقط جمله ای که به صورت پررنگ است باید به عنوان صحیح یا غلط قضاوت شود. مثال:

Questionnaire 1: A sentence is displayed on each page and you have to choose whether that sentence is correct or incorrect in English. In some cases you will see two sentences. Only the sentence in bold should be judged as true or false. Example:

Tom lives in a big house. **The house is very beautiful .**

با هم یکی دو جمله تمرین میکنیم

(Lets practice one or two sentences together)

تمرین اول:

The first exercise:

Watching Sara is TV home at. (Incorrect)

تمرین دوم

The second exercise:

Tom was very tired last night (Correct)

خب حاضری؟

Ok. Are you ready to start?

## Appendix 2: Acceptability Judgement Task

1. Nina's cat chased a mouse. **The mouse ran very fast.**

- Correct
- Incorrect

2. Steve and Mark run in the park every day.

- Correct
- Incorrect

3. Yesterday Danny friends met.

- Correct
- Incorrect

4. Ruth walk to church every Sunday.

- Correct
- Incorrect

5. You morning at arrived work in the.

- Correct
- Incorrect

6. Danny saw a girl who bought ten pizzas. **Girl ate a lot.**

- Correct
- Incorrect

7. Yesterday Peter letters wrote.

- Correct
- Incorrect

8. Weekend Sarah went and John to the same party last.

- Correct
- Incorrect

9. Nina's cat chased a mouse. **Mouse ran very fast.**
- Correct
  - Incorrect
10. Yesterday Emma ate sweets.
- Correct
  - Incorrect
11. Thomas could not hear his teacher. **Teacher spoke quietly.**
- Correct
  - Incorrect
12. Yesterday Jonny books bought.
- Correct
  - Incorrect
13. Norway five years lived Jack for in.
- Correct
  - Incorrect
14. Mark run in the park every day.
- Correct
  - Incorrect
15. Susan thought that her dog was lazy. **The dog slept very much.**
- Correct
  - Incorrect
16. Steve and Mark runs in the park every day.
- Correct
  - Incorrect
17. Was a it really holiday for memorable me.
- Correct

- Incorrect
18. Jonny's classmate had forgotten his homework. **Student felt bad.**
- Correct
  - Incorrect
19. Emma's son liked to sing in the shower. **The boy sang beautifully.**
- Correct
  - Incorrect
20. Jack and Ruth walks to church every Sunday.
- Correct
  - Incorrect
21. Big the was very house and quiet.
- Correct
  - Incorrect
22. Susan thought that her dog was lazy. **Dog slept very much.**
- Correct
  - Incorrect
23. I to soon eat need something.
- Correct
  - Incorrect
24. Yesterday Emma sweetes ate.
- Correct
  - Incorrect
25. Yesterday Susan milk drank.
- Correct
  - Incorrect

26. John and Jane drive to work every day.
- Correct
  - Incorrect
27. Mark runs in the park every day.
- Correct
  - Incorrect
28. Three we Tennis played about hours for.
- Correct
  - Incorrect
29. Yesterday Peter wrote letters.
- Correct
  - Incorrect
30. John drive to work every day.
- Correct
  - Incorrect
31. Ruth walks to church every Sunday.
- Correct
  - Incorrect
32. To yesterday eat I my something friends offered.
- Correct
  - Incorrect
33. Jonny's classmate had forgotten his homework. **The student felt bad.**
- Correct
  - Incorrect
34. Very yesterday cold was It.
- Correct



Incorrect

35. John and Jane drives to work every day.

Correct

Incorrect

36. Yesterday Nina sang songs.

Correct

Incorrect

37. Jack and Ruth walk to church every Sunday.

Correct

Incorrect

38. Yesterday Susan drank milk.

Correct

Incorrect

39. Ago I years London went a to few.

Correct

Incorrect

40. Went they to recently back their home country five after years.

Correct

Incorrect

41. Yesterday Danny met friends.

Correct

Incorrect

42. Emma's son liked to sing in the shower. **Boy sang beautifully.**

Correct

Incorrect

43. Yesterday Nina songs sang.
- Correct
  - Incorrect
44. Very Julie tea often drink.
- Correct
  - Incorrect
45. Thomas could not hear his teacher. **The teacher spoke quietly.**
- Correct
  - Incorrect
46. Yesterday Jonny bought books.
- Correct
  - Incorrect
47. Danny saw a girl who bought ten pizzas. **The girl ate a lot.**
- Correct
  - Incorrect
48. John drives to work every day.
- Correct
  - Incorrect

قسمت اول تمام شد. ممنونم

The first part is over. thank you

### Appendix 3: Background Questionnaire

خب. قسمت دوم میخوام در مورد میزان آشناییت با زبان انگلیسی بدونم. این قسمت به فارسی هست. لطفاً به همه سوالات پاسخ بده.

سن و جنسیت و مقطع تحصیلی

یادگیری زبان انگلیسی را از چه سنی آغاز کرده اید؟

اولین بار در کجا شروع کردید به یادگیری زبان انگلیسی؟

مهد کودک

مدرسه

کلاس زبان

معلم خصوصی

در خانه

در خانه به چه زبانی با اعضای خانواده خود صحبت می کنید؟

در هفته چند ساعت به زبان انگلیسی صحبت می کنید؟

کمتر از 7 ساعت

حدود 7-14 ساعت

بیشتر از 14 ساعت

بیشترین استفاده شما از زبان انگلیسی برای چه منظوری است؟

محاوره با اساتید دانش آموزان یا دوستان

- تماشای فیلم و سریال
- گوش دادن به موسیقی
- شغل
- دیگر موارد

OK. In the second part, I want to know about your level of familiarity with the English language. This part is in Farsi. Please answer all the questions.

Age, gender, and level of education:

At what age did you start learning English?

Where did you first start learning English?

- Kindergarten
- School
- Language class
- private teacher
- at home

What language do you speak with your family members at home?

How many hours per week do you speak English?

- Less than 7 hours
- About 7-14 hours
- More than 14 hours

For what purpose do you use English the most?

- Conversation with professors, students, or friends
- Watching movies and series
- Listening to music
- Job
- other issues

#### Appendix 4: Oxford Proficiency Test

قسمت سوم پاسخ دادن به تعدادی سوال انگلیسی چند گزینه ای هست فقط یک گزینه باید انتخاب شود.

(The third part is to answer a number of multiple choice English questions and only one option should be selected.)

- 1) Water \_\_\_\_\_ at a temperature of 100° C.
  - is to boil
  - is boiling
  - boils
- 2) In some countries \_\_\_\_\_ very hot all the time.
  - there is
  - is
  - it is
- 3) In cold countries people wear thick clothes \_\_\_\_\_ warm.
  - for keeping
  - to keep
  - for to keep
- 4) In England people are always talking about \_\_\_\_\_.
  - a weather
  - the weather
  - weather
- 5) In some places \_\_\_\_\_ almost every day.
  - it rains
  - there rains
  - it raining
- 6) In deserts there isn't \_\_\_\_\_ grass.
  - the
  - some
  - any
- 7) Places near the Equator have \_\_\_\_\_ weather even in the cold season.
  - a warm

- the warm
  - warm
- 8) In Iran \_\_\_\_\_ time of year is usually from December to February.
- coldest
  - the coldest
  - colder
- 9) \_\_\_\_\_ people don't know what it's like in other countries.
- the most
  - most of
  - most
- 10) Very \_\_\_\_\_ people can travel abroad.
- less
  - little
  - few
- 11) Mohammed Ali \_\_\_\_\_ his first world title fight in 1960.
- has won
  - won
  - is winning
- 12) After he \_\_\_\_\_ an Olympic gold medal, he became a professional boxer.
- had won
  - have won
  - was winning
- 13) His religious beliefs \_\_\_\_\_ change his name when he became a champion.
- have made him
  - made him to
  - made him
- 14) If he \_\_\_\_\_ lost his first fight with Sonny Liston, no one would have been surprised.
- has
  - would have
  - had
- 15) He has traveled a lot \_\_\_\_\_ as a boxer and as a world-famous personality.
- both
  - and
  - or

16) He is very well known \_\_\_\_\_ the world.

- all in
- all over
- in all

17) Many people \_\_\_\_\_ he was the greatest boxer of all time.

- is believing
- are believing
- believe

18) To be the best \_\_\_\_\_ the world is not easy.

- from
- in
- of

19) Like any top sportsman, Ali \_\_\_\_\_ train very hard.

- had to
- must
- should

20) Even though he has now lost his title, people \_\_\_\_\_ always remember him as a champion.

- would
- will
- did

## Appendix 5: Sentences

<b>Conditins</b>	<b>Grammatical</b>	<b>Ungrammatical</b>
<b>Subject-Verb agreement</b>	John drives to work every day.	John drive to work every day.
<b>Subject-Verb agreement</b>	John and Jane drive to work every day.	John and Jane drives to work every day.
<b>Subject-Verb agreement</b>	Ruth walks to church every Sunday.	Ruth walk to church every Sunday.
<b>Subject-Verb agreement</b>	Jack and Ruth walk to church every Sunday.	Jack and Ruth walks to church every Sunday.
<b>Subject-Verb agreement</b>	Mark runs in the park every day.	Mark run in the park every day.
<b>Subject-Verb agreement</b>	Steve and Mark run in the park every day.	Steve and Mark runs in the park every day.
<b>Definiteness</b>	The dog slept very much.	Dog slept very much.
<b>Definiteness</b>	The boy sang beautifully.	Boy sang beautifully.
<b>Definiteness</b>	The mouse ran very fast.	Mouse ran very fast.
<b>Definiteness</b>	The girl ate a lot.	Girl ate a lot.
<b>Definiteness</b>	The teacher spoke quietly.	Teacher spoke quietly.
<b>Definiteness</b>	The student felt bad.	Student felt bad.
<b>Verb-Object word order</b>	Yesterday Emma ate sweets.	Yesterday Emma sweets ate.
<b>Verb-Object word order</b>	Yesterday Susan drank milk.	Yesterday Susan milk drank.
<b>Verb-Object word order</b>	Yesterday Nina sang songs.	Yesterday Nina songs sang.
<b>Verb-Object word order</b>	Yesterday Johnny bought books.	Yesterday Johnny books bought.
<b>Verb-Object word order</b>	Yesterday Danny met friends.	Yesterday Danny friends met.
<b>Verb-Object word order</b>	Yesterday Peter wrote letters.	Yesterday Peter letters wrote.
<b>Ungrammatical Fillers</b>		I to soon eat need something.



		very Julie tea often drink.
		very yesterday cold was It.
		Norway five years lived Jack for in.
		was a It really holiday for memorable me.
		weekend Sarah went and John to the same party last.
		went they to recently back their home country five after years.
		to yesterday eat I my something friends offered.
		You morning at arrived work in the.
		big the was very house and quiet.
		ago I years London went a to few.
		three we Tennis played about hours for.



