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Cross-linguistic Influence in Third Language Acquisition

Acquisition of an artificial language by Arabic-English bilinguals

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Dedication

To my beloved husband and my lovely son,

Words cannot express the depth of my gratitude for all the sacrifices you have made throughout my years of study and research. Thank you from the bottom of my heart.

Acknowledgement:

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List of Abbreviations

AoO Age of onset (in learning English)

Adj-N adjective-noun word order

AJT Acceptability judgment task

AL Artificial language

Ar Arabic

CEM cumulative enhancement model

CLI cross-linguistic influence

DEF definite

Eng English

EPT English Proficiency Test

FEM feminine

INDF indefinite

L1 first language

L2 second language

L3 third language

L1A first language acquisition

L2A second language acquisition

L3A third language acquisition

L2SF second language status factor

LPM linguistic proximity model

MASC masculine

N-Adj noun-adjective word order

SG singular

SVO subject-verb-object

2L1 simultaneously acquired first languages

TPM typological primacy model

VSO verb-subject-object

UG universal grammar

Abstract

Aims and Objectives: This thesis investigates how previously acquired languages, Arabic and English, play a role in acquiring morphosyntax in an artificial language (AL) at the early stages of third language acquisition (L3A). Examining how lexical and syntactic similarities between L3 and previously learned languages affect cross-linguistic influence (CLI) during L3 acquisition is the main aim of this research.

Methodology: In this study, Arabic-English bilingual L3 learners were exposed to an artificial language with varying syntactic resemblance to their L1 and L2. Participants were evaluated using Subject-Verb-Object (SVO) and Verb-Subject-Object (VSO) sentence structures. The study also assessed them on the word order of Adjective-Noun (Adj-N) versus Noun-Adjective (N-Adj) to highlight differences between the two languages.

Data and analysis: Data were analyzed using RStudio with a mixed-effects binomial logistic regression model. The chosen word orders (N-Adj / Adj-N) served as response variables. Predictors included group assignment (Group A with syntax congruent to both English and Arabic, and Group B primarily aligned with Arabic), English Proficiency Test scores, and age of onset of English acquisition (AoO). Items and participant IDs were included as random intercepts.

Findings and conclusion: The findings supported the theoretical assumptions of the Linguistic Proximity Model (LPM). This model posits that both lexical and syntactic similarities significantly influence cross-linguistic influence (CLI). These results challenge theories that prioritize only lexical factors. Findings also reveal that participants who started learning English later were more likely to favor the Arabic word order (N-Adj). This highlights the influence of age of onset (AoO) on activating native language syntax and underscores the role of syntactic exposure in L3 acquisition.

Significance: This study's results enhance our understanding of artificial language acquisition and provide valuable insights into the complexities of multilingualism, particularly in terms of cross-linguistic influences.

Keywords: Artificial language learning, Cross-linguistic influence, Third language acquisition, Linguistic Proximity Model.

1 Introduction

Many studies have explored third language acquisition (TLA) across various language combinations in recent years (Bardel & Falk, 2007; Rothman, 2011; Westergaard et al., 2017; Mitrofanova et al., 2023). Despite significant progress in understanding bilingualism, questions still need to be answered regarding the intricate mechanisms involved in acquiring a third language or more, particularly during the initial stages of adult language learning. Migrant communities across the globe demonstrate that adults can achieve high proficiency in additional languages even later in life. This remarkable skill raises a central question within the realm of L3A: How does existing bilingualism impact early-stage L3 acquisition, particularly concerning cross-linguistic influence (CLI)?

In second language acquisition (L2A), CLI originates from the first language (L1). Nevertheless, in third language acquisition (TLA), there are two potential sources of CLI. This complexity leads to intriguing questions: Do both previously acquired languages influence the third language, or does only one source contribute? It is more challenging to determine the origin(s) of influence in learning a third language (L3) since they may come from either or both pre-existing grammars.

There has yet to be a consensus among L3 models on the sources of influence during language acquisition. Some models suggest that learners rely on either a primary or exclusive source, requiring them to inhibit pre-existing grammar temporarily. Others propose that learners use their previously learned languages as sources of influence. Furthermore, it needs to be clarified if linguistic similarities between learners' L3 and their prior languages impact their (unconscious) decisions. This raises the question of how learners decide which of their L1 and L2 is more similar to their L3.

This study aims to employ an AL to facilitate research on CLI among Arabic-English bilinguals at the early phases of L3A. All participants speak Arabic as their L1 and English as their L2. This research advances our knowledge of TLA and CLI by employing an AL to examine the beginning phase of L3A and how CLI interacts with acquiring morphosyntax. It sheds light on early-stage L3 acquisition processes within a less-explored bilingual population. The study also isolates the effects of CLI by assessing the learning of a linguistic representation that participants have never encountered before in their L3. Furthermore, to my knowledge, no

studies have examined the influence of CLI specifically on Arabic-English bilinguals. Therefore, this research fills a crucial gap in the literature and contributes to our understanding of language acquisition mechanisms in this community.

This thesis is structured as follows: Chapter 2 provides theoretical background, empirical evidence on L3A, and cross-linguistic differences between Arabic and English. Chapter 3 outlines the study's design, research questions, and hypotheses. Chapter 4 presents the results and statistical analysis. Subsequent discussions of these findings are presented in Chapter 5. Chapter 6 addresses limitations and offers recommendations for future research, and Chapter 7 concludes with a summary of the thesis. Finally, the appendices section contains a comprehensive list of all items used for data collection.

2 Background

2.1 Second Language Acquisition (SLA) versus Third Language Acquisition (TLA)

In recent times, some linguists, such as Mitchell and Myles (1998), have argued that there is little distinction between the acquisition of second (L2) and third (L3) or subsequent languages (Ln). They consider all languages beyond the native tongue as second languages. This viewpoint arises because research on Third Language Acquisition (TLA) has historically relied on Second Language Acquisition (SLA) studies. As a result, SLA theories and methodologies have often been applied to TLA investigations. TLA was commonly perceived as a subset of SLA within the academic discourse. However, in recent years, TLA and multilingualism have been recognized as distinct areas of study. Scholars like Leung (2007) have begun to explore the complexities of TLA and multilingualism as separate domains of inquiry, moving away from the traditional practice of grouping L3 under SLA.

Marx and Hufeisen (2004) advocate recognizing TLA as distinct from SLA. They urged scholars to either develop specialized theoretical frameworks or broaden the existing SLA models to comprise the complexities of TLA. They argue that the term TLA encompasses the process of acquiring any language beyond the second, whether it be the third (L3), fourth (L4), or even seventh (L7). They emphasize that the differences between SLA and TLA go beyond mere quantity. These necessitate new theoretical frameworks or substantial extensions of existing SLA models to address TLA phenomena adequately.

Additionally, De Angelis (2007) highlights the limitations of viewing L3 or Ln acquisition merely as extensions of SLA. She contends that such a perspective overlooks valuable insights into language acquisition and the experiences of multilingual individuals. De Angelis emphasizes that acquiring multiple languages involves unique dynamics and interactions among those languages. The prevalent 'no difference' assumption among SLA scholars does not adequately address these.

2.2 Third Language Acquisition

Cross-linguistic influence (CLI) is characterized as one language system's effect over another within the cognitive realm. This influence can manifest at the lexical, structural, and

phonological levels. It affects how language is used and processed in the mind or brain (Sharwood Smith, 1983, 1989; Kellerman & Sharwood Smith, 1986). As the focus on the TLA increases, the importance of precise terminology becomes clear. Scholars have noted the need for a clear definition of TLA, with differing views on its scope and classification. Cenoz (2003) defines it as the process by which individuals who already know two languages—whether acquired simultaneously or consecutively—learn an additional non-native language. Alternatively, De Angelis (2007) introduces the term 'third or additional language acquisition,' which encompasses any language learned beyond the second one without giving preference to any specific language. Hammarberg (2010) challenges the traditional view of language progression (L1, L2, L3, Ln) as a chronological, uninterrupted sequence. He emphasizes the dynamic and discontinuous nature of multilingual acquisition. He defines L3 as a non-native language in use or acquired when the individual already knows one or more L2s alongside one or more L1s.

Moving beyond definitions, the initial state of language acquisition becomes a key focus of discussion. The central argument, often called the nature-nurture debate, centers on whether humans have inherent linguistic knowledge or if language is entirely acquired from the beginning. Advocates of the first viewpoint state that every individual has access to Universal Grammar (UG), an innate knowledge that influences language acquisition from the earliest stages. Chomsky (1981) defines UG as a combination of principles and parameters that act as constraints that facilitate the language acquisition process for both infants learning their first language (L1) and for the acquisition of second (L2) and third (L3) languages. The speaker's background influences how we analyze language acquisition, which leads to categorizing it into first language acquisition (L1A), second language acquisition (L2A), third language acquisition (L3A), and the acquisition of any languages beyond the third, often called Ln.

2.3 Cross-linguistic Influence

Grammar is defined as the set of linguistic rules stored in a speaker's mind, including the phonology, morphology, morphosyntax, and semantics that govern how a language is used. Whether or not a speaker is aware of these rules, together, they constitute what we call grammar.

Grammar has two main functions: comprehension and production. In comprehension, speakers filter and break down incoming input using their grammar to align it with their conceptual ideas. Conversely, in production, ideas are processed through grammar. This allows the speaker to express them in clear, understandable language, whether spoken or written.

Cross-linguistic influence (CLI) is the impact of one language system on another within the cognitive domain. This influence can appear at the lexical, structural, and phonological levels, which affects how a language is used and processed (Sharwood Smith, 1983, 1989; Kellerman & Sharwood Smith, 1986).

There are two ways that CLI might appear: facilitative (positive) CLI and non-facilitative (negative) CLI. When a property is supplied in one or both background languages and closely matches the corresponding structure in the target language, this is known as facilitative CLI. Consequently, the speaker can effectively interpret the input and produce grammatically accurate speech in the target language.

Conversely, non-facilitative CLI occurs when a structure in one or both of the previously acquired languages differs from the equivalent structure in the target language. In some situations, the speaker could interpret the information inaccurately, making understanding difficult. Another instance of non-facilitative CLI emerges when the speaker lacks sufficient input in the third language (L3), producing ungrammatical speech in the target language (see Westergaard, 2021b for additional details).

"Transfer" is frequently used in L3 literature to describe CLI. While it is a convenient metaphor, linguists such as Sharwood Smith (2020) have recognized its limitations. He argues that transferring grammatical properties from one location to another is hardly equivalent to switching them since it removes those properties from the host grammar. This simply means cloning or copying a property, which can be used independently without affecting the old grammar (Sharwood Smith, 2020, p. 2).

To address this issue, Sharwood Smith suggests that CLI is better understood as a shared resource that one grammar can access from another. This approach aligns with the concept of language as a dynamic and interconnected network rather than a static system.

In this research, we utilize the term "transfer" to maintain consistency with previous studies and models in the field. However, we acknowledge the transfer limitations described by Sharwood Smith and adopt a broader perspective on CLI as a complex phenomenon involving interaction between multiple linguistic systems.

2.4 L3 Models and Relevant Previous Research

In contrast to L2 acquisition, which only offers one source of influence, L1 and L3 acquisition offers the learner two potential sources of influence from previously acquired languages. Several models have been proposed for L3A in the past two decades (or so). Researchers have explored the primary sources of CLI in these models. They examine whether the L1, the L2, or both languages influence the CLI. The nature of this influence is also analyzed to determine if it is wholesale or occurs property by property. In addition, the influence of elements like typological similarity, structural similarity, and the language of communication on CLI is considered.

2.4.1 The Default L1 Effect

The Default L1 Effect, advocated by researchers like Hermas (2010, 2014), posits that the L1 is the primary source of influence in early L3 acquisition. Although there is no specific model that thoroughly explains the influence of a first language (L1) on third language (L3) acquisition, many studies have shown its significant impact (Jin, 2009; Ranong & Leung, 2009; Hermas, 2010, 2015). These findings suggest that the higher proficiency typically achieved in one's L1 may make it more accessible for transfer, making it the dominant source of influence in L3 acquisition.

Jin (2009) studied how advanced L2 English learners from China who were studying at the graduate level in Norway acquired overt objects in L3 Norwegian. This study provides a pertinent example of L1 impact. Participants were tasked with performing grammaticality judgments and sentence corrections on both English and Norwegian sentences. Each task included 20 randomized sentences, five of which featured null objects in English (e.g., 'I immediately recognized the students, and later Mary also recognized') and Norwegian (e.g., 'John liker den jenta, men jeg liker ikke').and 15 of which served as distractors.

Chinese, unlike Norwegian and English, is a topic-prominent language. It allows null objects. The grammaticality judgment and sentence correction task revealed distinct patterns in rejecting null objects in L2 and L3. While Chinese participants exhibited high accuracy in rejecting null objects in English (70%), this pattern was not observed in Norwegian. The results indicated that more than half of the participants had difficulty evaluating and correcting null object sentences in Norwegian, especially in the early stages of acquisition. As proficiency in L3 Norwegian increased, participants' ability to recognize null object structures improved.

The difficulties seen in rejecting sentences with null objects in Norwegian indicate that the L1 (Chinese) is not facilitating the process. The study concluded that L1 Chinese had a detrimental effect on acquiring L3 Norwegian, whereas L2 English had no noticeable impact.

Hermas (2014) examined subject-verb inversion in declarative sentences and null expletive subjects as two properties of the null subject parameter in L3 English. The study aimed to analyze the L1 effect further. Participants were native Arabic speakers who had advanced proficiency in French and were learning L3 English in a formal foreign language context. The experiment consists of Moroccan Arabic, French, and English versions.

A preference task and an acceptability judgment task were used to evaluate the acquisition of these properties. Each AJT contained 12 grammatical targets (six examples per sentence type), 12 ungrammatical variants (six examples per sentence type), and 48 fillers. According to the author, the pairs of sentences are all grammatical in the L1, but those with an asterisk are not grammatical in the L2 and L3.

Verb-subject inversion in declarative

(1) a. An Italian discovered America in 1492.

b. *Enjoys a neighbour Egyptian movies. (Hermas, 2014)

Expletive construction

(2) a. It is certain that smoking causes cancer.

b. *Is possible that the team wins the cup. (Hermas, 2014)

The PT included 12 pairs of grammatical and ungrammatical sentences (six pairs for each sentence type) and 54 pairs of filler sentences. In contrast to the French and English tasks, both target pairs were grammatical in Arabic.

Verb-subject inversion in declarative

(3) a. *Relaxes Mom in a room upstairs.

b. Mom relaxes in a room upstairs. (Hermas, 2014)

Expletive construction

(4) a. It appears that the boss is happy.

b. *Appears that the boss is happy. (Hermas, 2014)

All experiments except the Arabic were conducted on a computer using Lea (online software). The control groups in French and English were tested in Quebec. The researcher assessed the learners and the Arabic controls in Morocco. The learners took the L2 and L3 tests on two different days.

The results revealed a strong influence of the null subject parameter on the acquisition of null expletive subjects and subject-verb inversion in declarative sentences. Furthermore, L1 Arabic emerged as the primary determinant of transfer, surpassing the typological similarities between L2 French and L3 English. In the case of L2 French, it would be expected that L2 French facilitates the accuracy of L3 beginners (L2 = L3), resulting in them accepting the grammatical sentences and rejecting the ungrammatical sentences. Hermas (2014) concluded that L1 Arabic significantly influenced transfer during the initial stages of L3 English acquisition.

2.4.2 L2 Status Factor

Unlike the Default L1 Effect, The L2 Status Factor (L2SF) theory argues that L2 is the primary source of influence on L3 acquisition (Bardel & Falk, 2012). According to the model, the L2 is cognitively closer to the L3 than the L1. Following Paradis's (2009) Declarative/Procedural model, the L2SF theory states that native and non-native grammars are kept in distinct areas of the mind/brain: native grammars in declarative memory and non-native grammars in

procedural memory. L2 and L3 are kept in declarative memory due to their identical acquisition processes, making the transfer from L2 to L3 easier than from L1 to L3.

Providing support for the L2 Status Factor, Bardel and Falk (2007) conducted a study examining the placement of negation (whether it occurs before or after the verb) in learning Swedish and Dutch by two distinct groups of learners. One group had a native language (L1) following the Verb Second (V2) rule, while their second language (L2) did not follow this rule. The other group had an L1 that was not subject to V2, but their L2 adhered to this rule. In Data Collection A, five participants engaged in group Swedish lessons, receiving consistent input and engagement with the teacher. There were notable variations in the placement of negations between the L2 and L3 learners in the EN group, as English was their most robust second language (L2). Conversely, the D/G group's L2, either German or Dutch, had syntactic similarities with Swedish, which influenced their negation patterns. In Data Collection B, learners had four individual lessons where their use of negation was assessed.

In the first recording, the D/G group predominantly used post-verbal negation, as illustrated by the example 'I study English not.' (EN1, D/G Group). In contrast, the EN group mainly used pre-verbal negation, as exemplified by 'No, Anna isn't a teacher.' (EN1, EN Group).

The results of this study revealed that the L2 played a crucial role as a primary transfer source. Bardel and Falk (2007, p. 480) argued that "the L2 acts as a filter, making the L1 inaccessible in L3 acquisition."

In a similar line of research, a study by Ghezlou et al. (2018) examined the acquisition of English adjective placement by 90 Persian monolinguals and 90 Azeri-Persian bilinguals from Arak and Miyandoab in Iran. The instruments administered in the study were as follows: (a) a multi-section questionnaire, (b) a proficiency test, and (c) a translation test. Due to the structural similarity between bilingual learners' L1 and L3, namely the positioning of adjectives before nouns, bilingual learners were expected to perform better on the translation test. The results, however, were contrary. According to their study, Persian L2 had an effect independent of linguistic similarity between bilinguals' first and third languages. There was, indeed, a non-facilitative effect of Persian L2 on Azeri-Persian bilingual learners' acquisition of adjective placement.

2.4.3 Cumulative Enhancement Model

The Cumulative Enhancement Model (CEM) proposes that a selective process influences L3 acquisition. This process draws on any previously acquired language that provides facilitative support. Contrary to the widespread belief that the first language (L1) predominantly influences learning, the CEM illustrates that L1 and L2 positively impact L3 acquisition. Furthermore, learners can also draw upon any additional languages they have learned. In the CEM, learners evaluate specific properties in their background languages and transfer those with equivalents to one of the target languages. Without an equivalent, learners must acquire the property from the beginning. As evidence for the Cumulative Enhancement Model (CEM), Flynn et al. (2004) investigated the role of the first (L1) and second languages (L2) in the acquisition of restricted relative clauses in English.

They employed an elicited imitation task with three groups of participants: L1 Kazakh-L2 Russian learners of L3 English, L1 Spanish learners, and L1 Japanese learners of L2 English. English, Spanish, and Russian are head-initial languages, while Kazakh and Japanese are head-final languages.

Regarding performance, the bilingual group (L1 Kazakh-L2 Russian) and the L1 Spanish group had comparable performance levels, but the L1 Japanese group demonstrated distinct conduct. Because the bilingual and L1 Spanish groups have already mastered a language (L1 or L2) with the head-initial characteristic, they likely performed better than the L1 Japanese group. The CEM was proposed by researchers when they discovered that all previously acquired languages might have a positive effect on the acquisition of a third language.

2.4.4 Typological Primacy Model

The Typological Primacy Model (TPM) states that transfer is always wholesale and may occur during the initial stages of L3A from either the L1 or the L2 (Rothman, 2011).

According to TPM, learners develop the initial grammar, or L3, by adopting the entire linguistic system of the language that is typologically closest to the target language. The typological closeness of the target language to one of the previously acquired languages identifies the source of impact. Unlike the default L1 effect or L2SF, which are primarily influenced by the

order of acquisition, this model determines the source of influence by overall typological similarity. This occurs regardless of whether it is facilitative or non-facilitative.

Rothman (2011) conducted a study supporting the TPM. In this research, Rothman (2011) examined how L3 learners of Brazilian Portuguese and Spanish acquire adjective positioning and its semantic nuances. The study included two participant groups. One comprised L1 English learners of L2 Spanish with low to intermediate proficiency in L3 Brazilian Portuguese, and the other consisted of L1 Italian / L2 English learners acquiring L3 Spanish. The findings indicated that irrespective of acquisition order, both groups accurately placed adjectives according to their meanings, suggesting successful transfer from L2 Spanish and L1 Italian and emphasizing typological proximity's impact on multilingual transfer.

In another study, Cabrelli, Amaro, and Rothman (2015) investigated the dynamics of Subject-to-Subject raising with an intervening dative experiencer during the early phases of L3 Brazilian Portuguese. They employed a mirror image methodology, assessing L1 English / L2 Spanish and L1 Spanish / L2 English learners. Results from a grammaticality acceptability task revealed that Spanish was the primary transfer source, regardless of whether it was the L1 or L2. Therefore, the findings supported the TPM.

From the perspective of the cognitive economy, Rothman (2015) explores the notion of wholesale transfer and highlights its applicability. With this approach, linguistic properties are transferred all at once. It avoids the need to compare them against two highly activated languages separately. Rothman emphasizes the role of inhibition, an essential executive control system for bilinguals to suppress other languages. He argues that wholesale transfer, which relies on the overall typological similarity between the target language and other grammatical systems, could enhance efficiency (Rothman, 2015, p. 184).

Recent studies supporting the TPM indicate that property-by-property transfers can occur before and after wholesale transfers. This dynamic understanding challenges the notion that full transfer is the only viable option. Rothman et al. (2019, p. 157) argue that experiences in L3, characterized by non-facilitation, might lead to disregarding full transfer when the mind becomes more experienced in multilingualism. Consequently, structural similarity emerges as a significant factor in evaluating typological similarity.

Rothman (2013, p. 238) introduces a hierarchical framework for determining typological similarity. The parser utilizes this framework to evaluate structural likeness. It consists of four distinct levels of influence: Lexicon, Phonology/Phonotactics, Functional Morphology, and Syntactic Structure.

Each level is prioritized based on how it affects language processing. First, the most significant properties are evaluated. Following this procedure, the parser can accurately determine which linguistic property most closely resembles those of previously acquired languages. Consequently, it helps determine the primary source of influence. When similarity is lacking at one level, the parser proceeds to the subsequent level in the hierarchy.

2.4.5 Linguistic Proximity Model

The Linguistic Proximity Model (LPM) was proposed by Westergaard et al. (2017). This model views transfer as a property-by-property phenomenon. It involves both facilitative and non-facilitative influences. These influences can originate from either or both of a speaker's previously acquired languages. According to this theory, Cross-linguistic Influence (CLI) occurs when a linguistic property in the target language shares an abstract structural resemblance with a property in the background language. Unlike the TPM and other discussed models, the LPM does not support complete transfer. A similar perspective is shared by the Scalpel Model[1].

Westergaard (2021b) suggests that overall typological/lexical similarity may prevail over structural similarity in the early stages. Nevertheless, similarity in typology/lexicon between the third language (L3) and previously acquired languages leads to deeper activation of syntactic structures in the L3. Facilitative influence arises from structural similarity, whereas improper processing of L3 input produces non-target-like structures as a result of a non-facilitative effect. Property-by-property transfer, according to Westergaard et al. (2017, p. 670),

[1] The assumption behind both the LPM and the Scalpel Model, proposed by Slabakova (2017), is that L3 acquisition is a cumulative process involving property-by-property transfer. Structure similarity serves as a fundamental factor in CLI within both models. Due to these similarities, this study does not address the Scalpel Model.

reduces the effort needed to unlearn incorrectly transferred properties. Westergaard (2019, p. 393) discusses the complexity of comparing cognitive efficiency in language transfer. She states that it is not possible to definitively determine whether it is more cognitively efficient to transfer an entire grammar system all at once or to transfer smaller portions of grammar repeatedly.

Westergaard et al. (2017) provide evidence supporting the LPM. Their study examines word order and subject-auxiliary inversion acquisition in L3 English by Norwegian-Russian speakers. It highlights word-order differences in adverb-verb combinations between English and Russian, with Norwegian differing in this regard. Subject-auxiliary inversion is shared between English and Norwegian but not Russian. While differences exist between L1 Russian speakers, Norwegian-Russian bilinguals, and L1 Norwegian speakers in adverb-verb combinations, none of these differences reach statistical significance.

According to LPM, CLI occurs when learners co-activate previously acquired grammars to varying degrees based on structural similarity while parsing L3 input (Westergaard, 2019; 2021a; 2021b; Kolb et al., 2022; Jensen et al., 2021; Jensen & Westergaard, 2023). This suggests that the parser accesses all previously learned grammatical structures during this process). Full Transfer Potential, as asserted by Westergaard (2019, p. 389), suggests "everything may transfer," emphasizing property-by-property transfer over "everything does transfer" (Schwartz & Sprouse, 1996, p.41). The parser evaluates L3 input by concurrently using features from previously acquired languages. This initially results in a weak and unstable representation of the language. As more input is processed and parsing continues, this representation becomes stronger and more stable. Further evidence for property-by-property impacts in L3A is provided by Dahl et al. (2021, 2022) and Stadt et al. (2016, 2018, and 2020), which is consistent with the LPM and Scalpel models.

Stadt et al. (2020) examine the effects of language combination on L2 to L3 language transfer. The researchers concentrate on L3 German and L3 French while maintaining a consistent L1 (Dutch) and L2 (English) throughout their study. They examine the placement of verbs from V to T and V to C in declarative root causes. Previous studies by Stadt et al. (2016, 2018) reveal a significant supportive effect of L2 English on L3 French with another L3 language, L3

German. L3 learners transfer a significant amount from L1 Dutch to L3 French in the first year of study. However, this transfer decreases over time.

L2 English activation is lower in early L3 learning stages but increases and remains consistent later. The study involved third-year bilingual stream students who are at the intermediate L3 learning stage. They used gap-filling and grammaticality judgment tasks to assess their language skills. The V-to-T movement, absent in English but present in Dutch, French, and German, indicates English influence. The study explored if the role of L2 English in L3 German mirrors its role in L3 French. Intermediate L3 German learners show less influence from L2 English. The apparent typological and structural similarity between L1 Dutch and L3 German diminishes this effect. In early L3 French stages, Dutch heavily influences, while later stages increasingly reflect English influence.

Dahl et al. (2021, 2022) studied how L1 speakers of Norwegian who use English as their second language learn verb movement in L3 French or L3 German. A group of upper secondary school students (n = 112) and university students (n = 12) with a mean age of 21 were evaluated in the first research (Dahl et al., 2021), and the student's years of study in French varied from first to fifth. They finished activities involving acceptability judgment in both L2 and L3. Neither language was found to have any particular status. Conversely, both previous languages may have influenced acquiring French as a third language. The authors suggested non-target transfer to L3 can occur via surface word order similarities between the previous languages and French. Furthermore, better proficiency in L2 was associated with reduced evidence of L2 transfer to L3.

The second study (Dahl et al., 2022) involved upper secondary school students aged 16-17. These students were in their first and second year of upper secondary school, corresponding to years 11 and 12. The participants were in their first (n=18), second (n=15), fourth (n=70), or fifth (n=51) year of learning German. All of them were native Norwegian speakers, with English as their L2. Tasks were performed in their third language (L3), German and L2 English, to evaluate the acceptability judgments. Researchers found that early learners did not prefer V2 or non-V2 in German. With more language development, however, their intuitions tended to become more native-like. Finding native-like judgments in L2 English did not seem to be associated with increased transfer from L2 to L3 for a particular structure. The researchers

concluded that wholesale transfers from L1 or L2 were not observed during the early phases of L3 acquisition. Moreover, they discovered that more significant transfer from L2 to L3 was not always correlated with more robust L2 proficiency.

Kolb et al. (2022) examined the English language proficiency of 10-12-year-old children. The participants spoke Russian and German as 2L1 and were learning English as their third language. This group was compared to two other groups of children who spoke German or Russian as their L1 while learning English as their L2. There were six grammatically correct and six grammatically incorrect items for each condition in the English AJT for 48 items. Four conditions were considered; two are structurally comparable to German (subject-auxiliary inversion in wh-questions and determiner use), while the other two are similar to Russian (word order in non-subject-initial declarative and adverb placement in subject-initial declarative). These conditions, illustrated below, highlight specific linguistic structures or phenomena in Russian, German, and English:

(5) Adverb Placement:

a. Russian: Adv-V

Example: Susan často jest konfety.

b. German: V-Adv

Example: Susan isst oft Süssigkeiten.

c. English: Adv-V

Example: Susan often eats sweets. (Kolb et al., 2022)

(6) Non-subject-initial Declarative:

a. Russian: –V2

Example: Prošloj nočju koški spali na divane.

b. German: +V2

Example: Letzte Nacht haben die Katzen auf dem Sofa geschlafen.

c. English: –V2

Example: Last night the cats slept on the sofa. (Kolb et al., 2022)

(7) Subject-auxiliary Inversion in Wh-questions:

a. Russian: Subject-auxiliary

Example: Čto eta malenjkaja devočka budet čitatj?

b. German: Auxiliary-subject

Example: Was wird das kleine Mädchen lesen?

c. English: Auxiliary-subject

Example: What will the little girl read? (Kolb et al., 2022)

(8) Determiner Use:

a. Russian: –determiner

Example: Novyj učenik rad.

b. German: +determiner

Example: Der neue Schüler ist glücklich.

c. English: +determiner

Example: The new student is happy. (Kolb et al., 2022)

The comparison between the L2 and L3 English groups revealed that the L3ers outperformed the L2 learner groups, L2ers (L1GER) in the adverb placement condition, and L2ers (L1RUS) in the determiner usage condition. In terms of adverb placement, the L2ers (L1RUS) who had Russian facilitation performed better than the L3ers who had both facilitation from Russian

and non-facilitation from German, and both groups that had Russian facilitation performed better than the L2ers (L1GER) who just had German non-facilitative impact. In determiner usage, L2 German speakers with facilitation from German surpassed L3 learners who received both German facilitation and Russian non-facilitation and also exceeded L2 Russian speakers with only Russian non-facilitation. Similarly, both groups with German facilitation outperformed L2ers (L1RUS), who only had Russian non-facilitation. The non-subject-initial declarative condition also showed a similar trend, but the groups had no significant differences. Study findings revealed simultaneous facilitative and non-facilitative cross-linguistic influences on L3 English from both the more lexically comparable language (German) and the distant language (Russian). As a result, the authors concluded that fine-grained structural similarities in the L3 input significantly impact CLI more than overall structural similarity between L3 and pre-existing grammars.

2.5 The Impact of Lexical and Syntactic Similarities in L3 Acquisition: Insights from Jensen and Westergaard (2023)

The research by Jensen and Westergaard (2023) investigated how lexical and syntactic similarities between a third language (L3) and previously acquired languages impact cross-linguistic influence (CLI) at the early stages of L3 acquisition. This thesis similarly investigates how previously acquired languages, namely English and Arabic, influence the morphosyntactic learning of an artificial language at early L3 stages. Jensen and Westergaard's research is highlighted for its methodological approach and relevance to this thesis's main questions.

Jensen and Westergaard's (2023) research investigated how lexical and syntactic similarities between a third language (L3) and previously acquired languages impact cross-linguistic influence (CLI) at the early stages of L3 acquisition. This thesis similarly investigates how previously acquired languages, namely English and Arabic, influence the morphosyntactic learning of an artificial language at early L3 stages. Jensen and Westergaard's research is highlighted for its methodological approach and relevance to this thesis's central questions.

Jensen and Westergaard (2023) explored how lexical and syntactic similarities between an artificial third language (L3) and pre-existing grammar influence very early learners. While maintaining the participants' pre-existing languages unchanged, the researchers studied four groups of L3 learners. These learners had different target artificial languages (AL) with varying

lexical and syntactic similarities to their L1 Norwegian and L2 English. The researchers explored the impact of input variation by using this modification. They conducted within-group experiments on four groups of L1 Norwegian-L2 English sequential bilinguals (N = 120) aged 16 to 72 (M = 25.73, SD = 13.70). Participants had little or no knowledge of languages other than Norwegian and English, and the age of onset (AoO) of L2 varied from 5 to 12. Participants were randomly assigned to one of four Languages A-D groups. Norwegian and English had lexical parallels in languages A and B, respectively. However, there were no differences in syntactic input due to both languages having Subject-Verb-Object (SVO) word order. To illustrate the Subject-Verb-Object (SVO) word order, examples 9 and 10 are provided below.

(9) a. Emma **elsker lingvistikk**.

Emma loves linguistics.

"Emma loves linguistics." (Jensen & Westergaard, 2023)

In examples 10a and 10b, Norwegian and English lexical items were used in the input for SVO sentences, respectively.

(10) a. Ej **hettir Manene.**

I called Manene.

"My name is Manene." (Jensen & Westergaard, 2023)

b. I **eaf wesh** ons Daytue.

I eat orange on Tuesday.

"I eat oranges on Tuesdays." (Jensen & Westergaard, 2023)

To be more specific, language C learners were exposed to do-support, as demonstrated in (11a). It occurs in English, but not in Norwegian. An example of do-support in artificial language is shown in Example (11b). Language C learners were exposed to incongruent cues, as the syntax was similar to English, and the lexicon was similar to Norwegian.

(11) a. Jeg **liker ikke** druer.

I like not grapes.

“I do not like grapes.” (Jensen & Westergaard, 2023)

b. Ej **do neit beudro** knurk.

I do not like grapes.

“I do not like grapes.” (Jensen & Westergaard, 2023)

As shown in (12a), post-nominal possessives were provided for Language D learners. Example 3b illustrates that Norwegian also accepts prenominal possessives, as 12b shows, whereas English only accepts prenominal possessives. There was an incompatibility between the L3 (Language D) and English. The syntax was based on English, while the lexicon was based on Norwegian, which caused incongruence between the cues. An example of a post-nominal possessive in artificial language is illustrated in Example 12c.

(12) a. **Navnet mitt** er Kari.

Name.def my is Kari.

“My name is Kari.” (Jensen & Westergaard, 2023)

b. **Mitt navn** er Kari.

My name is Kari.

“My name is Kari.” (Jensen & Westergaard, 2023)

c. **Thamey miz** ef Manene.

Name.def my is Manene.

“My name is Manene.” (Jensen & Westergaard, 2023)

Table 1 provides a comprehensive overview of how the researchers designed the artificial Languages A, B, C, and D with varying degrees of lexical and syntactic congruency to the Norwegian and English languages.

Table 1-*Summary of Linguistic Crossover in the Norwegian–English–Third Language (L3) Triads (Adapted from Westergaard and Jensen, 2023)*

Language	Lexicon Source	Syntax Source	Congruency
A	Norwegian-based	Norwegian- & English-based (neutral)	Congruent
B	English-based	Norwegian- & English-based (neutral)	Congruent
C	Norwegian-based	English-based	Incongruent
D	English-based	Norwegian-based	Incongruent

Following exposure to one of the artificial languages, the researchers tested the participants' preferences for word order in the L3 in a forced-choice AJT. As exemplified in (13), participants had to choose between two non-subject-initial declarative clauses: Adverbial-Verb-Subject and Adverbial-Subject-Verb word order. The participants were not exposed to non-subject-initial declarative in the L3 before the AJT. Examples 13a and 13b demonstrate XVS and XSV structures in Languages A and C. Examples 13c and 13d demonstrate XVS and XSV structures in Languages B and D, respectively.

(13) a. Pån dagman **knetter ej** aporo. [XVS]

On Monday eat I apples

“On Mondays I eat apples.” (Jensen & Westergaard, 2023)

b. Pån dagman **ej knetter** aporo. [XSV]

On Monday I eat apples

“On Mondays I eat apples.” (Jensen & Westergaard, 2023)

c. Ons Daymon **eaf I** aporo. [XVS]

On Monday eat I apples.

“On Mondays I eat apples.” (Jensen & Westergaard, 2023)

d. Ons Daymon **I eaf** aporo. [XSV]

On Monday I eat apples.

“On Mondays I eat apples.” (Jensen & Westergaard, 2023)

According to the authors, English and Norwegian have different word orders in non-subject-initial declaratives, with the verb moving to the second position in Norwegian main declarative clauses. The example in (14a) illustrates this. However, in English, the verb remains in the verb phrase, resulting in XSV word order. An example of this can be found in (14b). Due to the mismatch, the authors could identify the sources of the cross-linguistic effects of the subjects.

(14) a.På mandager spiser jeg appelsiner.

On Mondays eat I oranges.

“On Mondays I eat oranges.”

b. On Mondays I eat oranges. (Jensen & Westergaard, 2023)

In this study, the researchers analyzed forced-choice data using RStudio (Team, 2021) version 1.2.5033 (2019-12-04). The authors employed the lme4 R package (Bates et al., 2015) to build a mixed-effects binomial logistic regression model for the data. This model was constructed using a stepwise step-up forward elimination procedure to arrive at a minimally adequate model. Study objectives included understanding the factors influencing forced choices (XVS or XSV) by using predictor variables such as Lexicon (Norwegian or English) and Congruency of lexical and syntactic cues in the L3 input (congruent or incongruent). Participants and Items were randomly introduced in the analysis.

Jensen and Westergaard (2023) observed that when lexical items were based on English rather than Norwegian, there was a significant decrease in XVS word order selections, which resemble Norwegian syntax. Furthermore, they identified a noteworthy interaction between

two key factors: Lexicon (Norwegian-based or English-based) and Congruency between the lexical and syntactic cues in the L3 input (incongruent or congruent). This interaction indicated that participants tended to select more V3 word orders (where the verb appears in the third position) when the syntactic input resembled English, specifically involving do-support, instead of a neutral syntactic input, meaning that participants did not strongly prefer transferring features from English despite its substantial lexical similarities, which would have been expected if wholesale transfer occurred during testing or if the L2 were automatically chosen as the primary source of influence. These findings align with the perspective presented by property-by-property models of L3 acquisition, emphasizing that the pattern of the L3 input plays a crucial role in shaping cross-linguistic influence (CLI) and that both lexical and syntactic signals in the input contribute to this phenomenon.

Moreover, when the syntactic input featured Norwegian characteristics such as post-nominal possessives, Jensen and Westergaard (2023) did not observe a comparable increase in the selection of V2 word orders as they did when the input included do-support. This intriguing finding suggests that exposure to Norwegian-like syntax may have a limited or negligible impact on the influence of other languages. Several possible explanations exist, including the idea that lexical signals carry more weight than syntactic cues, the presence of a foreign or L2 status effect, or the learners' general preference for unmarked English word order. However, none of these hypotheses fully explain the participants' behavior. In simpler terms, if cross-linguistic influence (CLI) were solely determined by lexical cues, the influence of do-support would not be as apparent, leading to the absence of an interaction effect. Additionally, if the source of influence was primarily driven by a foreign or L2 status effect or a general preference for unmarked word order, then the strong impact of exposure to a Norwegian-based lexicon when only the lexicon indicated an L1/L2-L3 match would not be observed.

In a recent study, Nazari (2023) investigated the effect of cross-linguistic influence (CLI) on word order preferences during the early stages of third-language acquisition (L3A). This study serves as a replication of the pivotal work by Jensen and Westergaard (2023). The study examined how lexical and syntactic similarities between the newly acquired L3 and previously known languages influence participants' word order choices. Participants were Persian-English bilinguals. They were exposed to two artificial languages designed to share phonological and lexical similarities with English. Artificial languages differ in syntactic structure. Notably,

English and Persian differ in their word order preferences for adjective placement. The study included 80 participants aged 15 to 58. They were bilingual in L1 Persian and L2 English. The researcher utilized the Oxford proficiency test to assess language proficiency and collected background information through questionnaires. Half of the participants were exposed to non-subject-initial declaratives (XSV), while the other half encountered subject-object-verb (SOV) word order in L3. Language A participants were exposed to the same word order in English and Persian, as shown in (15a). In contrast, language B participants were exposed to a word order exclusive to Persian, as shown in (15b).

(15) a. Ons Daymon Pari eafs.

On Tuesdays Pari eats.

"On Mondays Pari eats." (Nazari, 2023)

b. Ons Daymon Pari freeto eafs.

On Mondays Pari fruits eats.

"On Mondays Pari eats fruits." (Nazari, 2023)

Participants were randomly assigned to Language A or B groups. They first viewed an animated video in a third language (L3) context, and then the researcher used a forced-choice acceptability judgment task (AJT) to assess word order preferences. Results revealed a preference for the adjective-noun (Adj-N) structure. However, participants exposed to the object-verb (OV) structure showed a stronger preference for noun-adjective (N-Adj) word order than those in the other group, supporting the linguistic proximity model (LPM) and indicating the influence of syntactic similarity. A positive correlation was also found between English proficiency levels and preference in selecting N-Adj structures. Results showed that critical item scores increase as English proficiency levels rise, indicating a strong preference for the Persian structure.

Furthermore, in Group B, there was a positive correlation between learners' tendency to choose the Persian (N-Adj) structure and their Age of Onset (AoO) in English. To put it differently, as learners learned English later, their Persian word order was more likely to be activated. Based

on the findings, the AoO appears to influence the learners' ability to use their native language structures, especially when dealing with structures that differ from those in English. However, the AoO had no apparent impact on Group A, perhaps due to its members' lack of exposure to Persian-related syntax.

2.6 Cross-linguistic Differences in Arabic and English

2.6.1 Arabic vs. English Word Order

English belongs to the Germanic language family, while Arabic is classified as a Semitic language with a distinct script and writing system. Arabic and English differ structurally in arranging subjects, verbs, and objects.

In English, the word order is rigidly structured as Subject-Verb-Object (SVO), as exemplified in (16):

(16). **Emily reads** books.

S V O

In contrast, Arabic exhibits a more flexible word order while allowing for variation. The selection between the two most common Arabic sentence structures – Verb-Subject-Object (VSO) and Subject-Verb-Object (SVO) – is influenced by a combination of syntactic, pragmatic, discourse, and semantic factors in the given context (Al-Jarf, 2007). For example, in a declarative sentence where the speaker wants to highlight the subject, the subject will typically come first. This is the sentence case (17), where the subject "Maryam" is placed at the beginning of the sentence to emphasize her role as the one who is reading.

(17). **Maryam-u Taqrā'u** kutuban.

S V O

Maryam reads books. 3SG

“Maryam reads books.”

On the other hand, in a sentence where the speaker wants to focus on the action, the verb will often come first. This is the sentence case (18), where the verb "taqrā'u" (reads) is placed at the beginning of the sentence to emphasize the action of reading.

(18). **Taqrā'u Maryam-u** kutuban.

V S O

Reads Maryam books. 3SG

“Maryam reads books.”

2.6.2 Adjective Placement

The typical word order in English is Adjective-Noun, where adjectives come before nouns. Additionally, adjectives in English maintain the same form regardless of whether they modify definite or indefinite nouns or singular or plural nouns. This consistency can be observed in examples (19a-d). English:

(19) a. A **new** car
b. **New** cars
c. The **new** car
d. The **new** cars

In contrast to English, Arabic adopts a distinct approach where adjectives follow nouns, leading to a Noun-Adjective word order. In Arabic, adjectives consistently appear after nouns and are never positioned before them. Adjectives in Arabic also agree in gender, number, and case with the nouns they modify (Al-Hassaani & Ja'ashan, 2016), meaning that the form of the adjective can change depending on whether the noun is masculine or feminine, singular, or plural, and whether it is in the nominative, accusative, or genitive case, as can be seen in examples (20a-e):

(20) a. al-kitab-u **al-jadid-u**
DEF book- MASC new
“The new book”
b. sayarat-un **jadidatun**

Car- FEM- INDF new

"A new car"

c. Al-sayara **al-jadida**

DEF car- FEM new

"The new car"

d. al-kutub **al-jadida**

DEF books-MASC new

"The new books"

e. al-sayaarat **al-jadida**

DEF cars- FEM new

"The new cars"

This property has also been selected because it is considered problematic and may present challenges to Arabic L2 learners of English (Diab, 1997; Al-Jarf, 2007; Sabbah, 2015; Alghamdi, 2019). Therefore, since this property differs between English and Arabic, it was chosen for the present study.

2.7 Chapter Summary

The chapter first introduced the debate between SLA and TLA. While some scholars traditionally view TLA as an extension of SLA, recent perspectives advocate for TLA as a distinct field. This perspective suggests that unique theoretical frameworks are needed to address its complexities. Studies by researchers like Marx and Hufeisen (2004) and De Angelis (2007) emphasized the necessity of reconsidering TLA as a distinct field from SLA because acquiring languages beyond the second presents unique challenges.

The chapter focused on cross-linguistic influence (CLI), a phenomenon wherein one language's grammar impacts another. It then outlined various models addressing the sources of CLI in TLA. These models concentrated on the factors that may be used to identify the source of CLI. The Default L1 Effect proposes L1 as the dominant influence in early L3 acquisition stages. The L2SF suggests L2 as the primary source of influence due to cognitive proximity. The CEM argues that any previously acquired language can influence L3 acquisition positively. The TPM emphasizes typological similarity's role in determining the transfer source. The LPM highlights property-by-property transfer based on structural similarities between the target and previously

acquired languages. According to TPM and LPM, the order of acquisition is less important than other factors. Based on TPM's introduction of a hierarchy of features, the parser selects a language (L1 or L2) that is typologically more similar to the target language as the exclusive source of CLI. The LPM states that CLI results from the co-activation of prior grammars, and the source of CLI is selected based on the similarity between language features in the previous grammars and language features in the target language.

Then, the article by Jensen and Westergaard (2023) was reviewed. The study examined how lexical and syntactic similarities impact early L3 learners. It demonstrated that input characteristics significantly influence cross-linguistic transfer and that lexical and syntactic cues play crucial roles in shaping CLI. In addition, the chapter briefly mentioned another study by Nazari (2023) that investigated a similar study but with a different language combination (Persian-English bilinguals learning artificial languages). The findings support the influence of syntactic similarity on word order preference in L3 acquisition.

The final section compared Arabic and English. It focused on word order and adjective placement to illustrate the challenges Arabic L2 learners might face in acquiring English due to structural differences. Particularly, Arabic exhibits more flexibility in word order (SVO and VSO) compared to the stricter SVO structure in English. Additionally, adjective placement differs, with English using the Adj-N order and Arabic following the N-Adj order. This distinction makes this property appropriate for testing and has been chosen for the current study.

3 Research Questions and Methodology

3.1 Research Questions and Predictions

In this study, the following main research question is addressed:

How does the similarity between the lexical and syntactic aspects of L3 input and previously acquired languages affect CLI during the initial stages of L3 acquisition?

This study will examine the relative influence of lexical and syntactic similarities between an L3 and pre-existing grammar on very early learners of an artificial L3.

I build the study based on the following three hypotheses (Hs) inspired by Jensen & Westergaard (2023, p.381):

- H0: There is no relationship between L3 and L1/L2 similarities and word order preferences.
- H1: Word order preferences and **lexical similarity** between the L3 and the L1/L2 are related.
- H2: Word order preferences and **syntactic similarity** between the L3 and the L1/L2 are related.

Based on these hypotheses, participants will be tested on Adjective-Noun (Adj-N) versus Noun-Adjective (N-Adj), to which they have not been previously exposed. According to the LPM and the CEM, participants' behavior is expected to vary depending on the type of L3 they have been exposed to. In contrast, the TPM model predicts that early-stage CLI derives only from lexical cues. Consequently, all three models suggest the rejection of H0. The expected behavior would align with H1 if the wholesale transfer occurs based on lexical input. The LPM and the TPM would differ on H2 - the LPM predicts that lexical similarity will play a prominent role at an early stage and certainly more substantial than syntactic similarity. Still, that syntactic similarity should also be detectable at this stage. Conversely, the TPM would reject H2. Furthermore, behavior consistent with H2 would also support a property-by-property explanation of L3 acquisition.

Following the LPM, it is anticipated that, during the initial phases of L3A, learners' word order preferences will be influenced by the co-activation and competition for CLI from both previously acquired languages. The LPM proposes that when the L3 is still unstable, both prior languages actively compete for influence. As explained by Westergaard (2021b), even though all preceding grammars remain active and available to the learner in L3A, the typological and lexical similarity between the L3 and one of the previously acquired languages is expected to result in a more robust activation of the syntactic structure of that language (Westergaard, 2021b, p.6). The LPM further predicts a slight difference between Languages A and B, a notion confirmed by Nazari (2023), as previously mentioned. Upon comparing the data, Group A (with congruent English and Persian syntax) showed a lower frequency of N-Adj word order selections than Group B (with Persian-based syntax), supporting the LPM theory that posits syntactic similarity as a contributing factor.

In this study, our primary objective is to investigate the phenomenon of Cross-Linguistic Influence (CLI) during the early stages of third language (L3) acquisition. We specifically examine the use of Adj/ N versus N/ Adj word order preferences among our Arabic-English bilingual participants.

Our study involves Arabic-English bilinguals exposed to two artificial languages: A and B. Both Languages share lexical and phonotactic resemblances with English, one of the languages already known to our participants.

In Language A (Group A), participants will encounter a language that follows a standard SVO (Subject-Verb-Object) word order pattern similar to the pattern found in English and Arabic. Conversely, as mentioned earlier, Arabic features a flexible word order. Therefore, in Language B (Group B), participants will be exposed to VSO word order, a characteristic found in Arabic but absent in English. This setup enables us to investigate how the presence of VSO in Language B may impact both word order preferences and the use of Adj/ N versus N/ Adj word order preferences among our participants in the early stages of their L3 acquisition.

3.2 Methodology

This study was inspired by Jensen and Westergaard's (2023) study. Their study was designed to test whether previously acquired languages, Norwegian and English, contribute to the acquisition of the morphosyntax of an artificial language (AL) during the early stages of a third language acquisition (L3A). I adapted the methodology used in Jensen and Westergaard's (2023) study by substituting Arabic for Norwegian as the L1 and English as the L2.

3.3 What Is an Artificial Language?

Unlike natural languages, artificial languages are intentionally constructed for experimental purposes. The first explorations of this principle in the early stages of implementation were labeled 'artificial linguistic materials' or 'artificial grammars' (Reber, 1967). However, in the 1980s and 1990s, the term 'artificial language' became widely recognized (Saffran et al., 1996). Grey (2020) defined artificial languages as compact linguistic systems with a limited set of grammatical structures that mirror those found in natural languages. These systems incorporate lexical semantics and grammar and can be spoken and comprehended entirely (Grey, 2020, p. 81).

According to Ettlinger et al. (2016) or Grey (2020), artificial languages are often categorized based on the composition of their lexical inventories. The first category encompasses artificial languages wholly made up of nonce words, often referred to as mini-languages or miniature languages. Several artificial languages have been developed, such as BROCANTO (Friederici et al., 2002), BROCANTO2 (Morgan-Short et al., 2010), and the language used by Culbertson and colleagues (e.g., Culbertson et al., 2019; Culbertson et al., 2017; Culbertson & Newport, 2015).

Semi-artificial languages, which blend aspects of one natural language with those of another, fall into the second category. According to Grey (2020), semi-artificial languages combine the morphosyntax of one language with the vocabulary of another. Recent examples of semi-artificial languages include the work of Mitrofanova et al. (2023), which investigated the role of lexical and structural similarity in L3 acquisition. Using a mini-artificial language learning task, the researchers designed a novel L3 lexically similar to Norwegian. However, they included a property present in Russian and Greek but absent in Norwegian (grammatical case).

Additionally, González Alonso et al. (2020) created mini-English and mini-Spanish by integrating English or Spanish lexical items with the Spanish-based grammatical gender system. In another study, detailed in section 2.6, Jensen and Westergaard (2023) conducted an artificial language learning experiment to explore how lexical and syntactic similarity between an artificial L3 and existing grammar affected the early stages of learning.

3.3.1 The Artificial Language (AL) Learning Framework

Artificial language learning involves exposing learners to a constructed language purposefully created to explore various aspects connected to the acquisition of natural languages. Researchers define artificial language learning as a method where participants are taught a language or language-like system in a controlled laboratory setting. Their acquired knowledge is then assessed (Ettlinger et al., 2016). To date, an essential contribution of artificial language learning experiments is the ability to test the predicted effects of hypothesized constraints in a controlled laboratory setting (Culbertson, 2023).

In this study, I investigated the effects of cross-linguistic influence on third language acquisition (L3). Instead of adhering to the conventional laboratory setup described by Ettlinger et al. (2016), I opted for an online-based version of the experiment. This adaptation allowed me to significantly expand the number of participants, which would have been impractical in a traditional face-to-face scenario due to time and distance constraints. As a result, I was able to conduct more comprehensive statistical analyses of the collected data.

Some researchers (e.g., Ettlinger et al., 2016; Fedzechkina et al., 2016; Grey, 2020) have supported the application of artificial language (AL) learning experiments to study language acquisition. This methodology allows researchers to control stimuli precisely. I chose the AL learning paradigm because it enables me to manipulate the input in L3 finely, facilitating the testing of predictions made by contemporary models of third language acquisition. Furthermore, this methodology enabled data collection from a large and relatively homogenous group of L3 speakers.

3.4 Participants

This study involved 44 participants who were organized into two groups. The age range of the participants was 15 to 50. They were bilingual and proficient in both L1 Arabic and L2 English.

English acquisition occurred at home or in school, starting between ages 3 and 30—the recruitment process involved language institutes in Iraq. The participants, predominantly with limited language exposure beyond Arabic and English, were randomly assigned to either Language A or B as their third language (L3). The gender distribution consisted of 20 female and 24 male participants.

Table 2-*Description of the participants*

Groups	N	Mean Age(years)	Mean AoO in English (years)	LoC With mother /father	LoC with friends	Mean English Proficiency
A	23	29.60	11.30	Ar/Ar	Ar(n=15) Eng(n=1) Ar&Eng(n=7)	21.39
B	21	27.38	10	Ar/Ar	Ar(n=12) En(n=2) Ar&Eng(n=7)	21.04

***AoO** = Age of Onset, **LoC** = Language of Communication, **Ar** = Arabic, **Eng** = English*

3.5 Proficiency Test and Background Questionnaire

Although participants' ages may offer insights into their general English proficiency, more is needed to ensure everyone's proficiency matches the expected standard. To address this, we utilized a subset of the standardized Oxford proficiency test (see Appendix 2), as adapted by Nazari (2023) from Jensen et al. (2020) and Jensen (2017). One alteration was related to the length of the study. In the study by Jensen et al. (2020), the proficiency test consisted of 40 questions. However, in the current study, the number of questions was reduced to 29 following the modifications made by Nazari (2023).

The standardized Oxford proficiency test features multiple-choice questions, presenting a sentence with a blank space and three options. Participants had to choose the correct option for each blank to complete the sentence correctly. They received one point for each accurate

response. Participants were provided with additional information in Arabic to avoid misunderstandings or confusion. As examples 21 and 22 demonstrate, the proficiency test consists of two sections, with the sentences in the second section extracted from a continuous narrative.

(21) Example: Multiple choice with individual sentences

1. Water _____ at a temperature of 100° C.

a. is to boil b. is boiling c. boils.

(22) Example: Multiple choice with a continuous story

11. Mohammed Ali _____ his first world title fight in 1960.

a. has won b. won c. is winning.

12. After he _____ an Olympic gold medal, he became a professional boxer.

a. had won b. have won c. was winning.

The subsequent activity involved a brief background survey, where participants were asked to answer various questions about their age, gender, and language interactions with their mother, father, and friends, as detailed in Appendix 2. To prevent confusion, the questions were provided in both English and Arabic.

3.6 Main Experiment

3.6.1 Materials

3.6.1.1 L3 Input

I modified lexical items to resemble English more closely to enhance language acquisition. This process involved altering either one consonant or one vowel in each word. For example, 'read' was modified to 'reat,' 'book' to 'boog,' and 'pasta' to 'pesta.' These adjustments were derived from either (pseudo)cognates—including verbs, function words, and adverbials—or generated using the online tool available at https://gibberishfactory.com/. This strategy was aimed at facilitating rapid language learning. The learners could acquire the new language quickly by ensuring that the modified words bear lexical similarities to English. Furthermore,

in comparing lexical and structural similarities, it was important that the words closely resembled English in their lexical characteristics.

Concerning syntactic input, half of the participants encountered Subject-Verb-Object (SVO) word order in the L3, while the other half were exposed to Verb-Subject-Object (VSO) word order. As explained in the Background chapter, Arabic permits flexible word order and can adopt the same word order as English. This flexibility, characteristic of Arabic, allows the usage of both SVO and VSO. Considering this flexibility, for group A, we employed SVO, which is like English, as exemplified in (23a). Conversely, learners encountered VSO for group B, a word order exclusive to Arabic, as depicted in (23b).

(23) a. Noor glay diano.

Noor play piano.

"Noor plays piano."

b. Glay Noor diano.

Play Noor piano.

"Noor plays piano."

Table 3 summarizes how Languages A and B vary in terms of lexical and syntactic matches to Arabic and English.

Table 3*-Summary of linguistic crossover in the language triads*

L3	**Similarity**		**Congruency**
	Lexicon	**Syntax**	
A	English-based	Both (neutral)	Congruent
B	English-based	Arabic-based	Incongruent

3.6.1.2 The Experimental Task and Critical Condition

The primary method for gathering data for this study was a forced-choice acceptability judgment task (AJT). According to Dabrowska (2010), AJT is commonly used in linguistics due to its straightforward implementation. Participants must select the correct sentence from a presented pair of sentences in this assessment type. In linguistics, “grammaticality judgment task” (GJT) and "acceptability judgment task" (AJT) are often used interchangeably. These tasks involve participants evaluating the grammaticality of sentences. Cowart (1997) asserted that the term AJT is preferable to the term GJT. Cowart considers grammaticality an abstract concept, meaning a sentence is either grammatical or not based on a specific grammar. Direct testing of grammaticality is impractical. Instead, experiments can evaluate sentence acceptability through speaker judgments. These speaker judgments can then be employed to draw inferences about grammaticality (Ionin & Zyzik, 2014).

Furthermore, Leivada and Westergaard (2020) note that acceptability and grammaticality do not always align. They point out cases where sentences are acceptable even if they do not fully meet grammatical standards, and vice versa. Grammaticality refers to a sentence adhering to language rules, while acceptability depends on how speakers perceive it. This distinction shows that the two concepts can diverge. Following Leivada and Westergaard (2020), this study adopts the "acceptability judgment task."

In this study, 20 pairs were examined, comprising 10 filler items and 10 critical items (all sentences, including the test items and fillers, are presented in Appendix 3). The critical conditions, adapted from Nazari (2023), specifically focused on the Adjective-Noun (Adj-N) word order. Half of the phrases were structured as Adjective-Noun (Adj-N), and the other half as Noun-Adjective (N-Adj), which aligns with the forced-choice study design. Participants were then tasked with selecting between these two structures.

Examples are presented in (24-a) and (24-b), where one-word order corresponds to English and the other to Arabic.

(24) a. Gree affle

b. Affle gree

The application of a forced-choice Acceptability Judgment Task (AJT) is a valuable method for exploring the word order preferences of bilingual individuals. In this task, participants must choose between options categorized as either acceptable or unacceptable in their previously

acquired languages. Notably, the participants' responses cannot be attributed to exposure or training in the third language (L3) since they had no prior experience with Adjective-Noun (Adj-N) or Noun-Adjective (N-Adj) word order in the L3. They encountered this word order for the first time during the AJT. Therefore, according to the LPM, the preference for a specific word order is a result of cross-linguistic influence. This influence is characterized by the co-activation of both languages, with the more strongly activated one prevailing.

3.6.2 Procedure

Gorilla (www.gorilla.sc), an online experiment builder, was used to develop and run experiments. According to Anwyl-Irvine et al. (2019), this web-based platform streamlines global participant recruitment. The experiment was conducted entirely online to accommodate participants from Iraq and lasted 25-30 minutes. Participants were informed that they would learn words in an unfamiliar language, followed by a progress assessment test. A consent form, including study details, was part of the consent process (refer to Appendix 4). Animated videos created using Animaker (2021) guided participants to prevent instructional language priming. The experiment consisted of two phases following the work by Jensen and Westergaard (2023). The data collection ended when I reached a total of 44 participants.

3.6.2.1 The Exposure Phase

At the start of the study, participants were randomly assigned to either Language A or B groups. Initially, participants watched an animated video (Animaker, 2021) where a native speaker of the third language (L3) introduced herself, her country, and the language spoken in her country. Subsequently, she explained her daily activities. Each video contained 15 sentences. Examples from the Language A video exposure are depicted in Figure 1, while examples from Language B are illustrated in Figure 2.

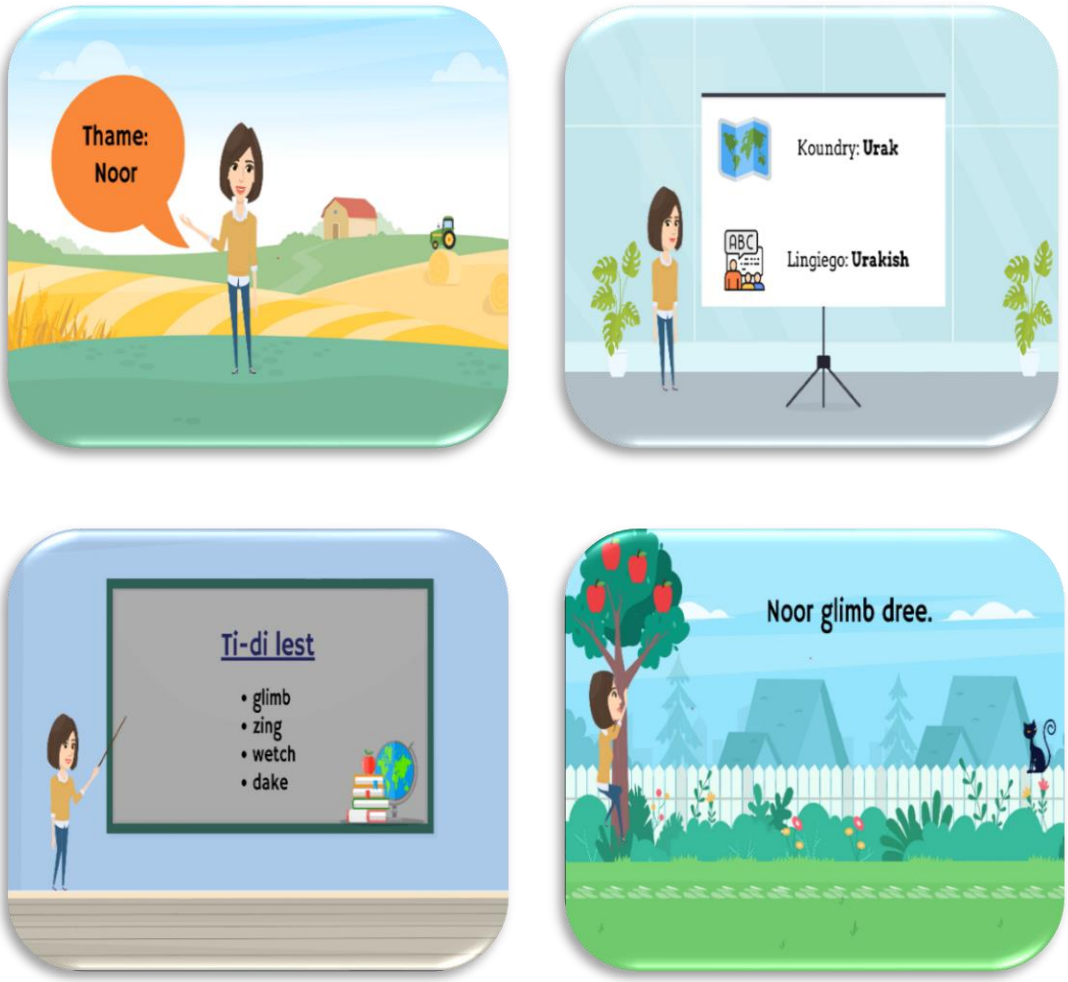

Figure 1-*Example of video exposure to the artificial L3 (Language A)*

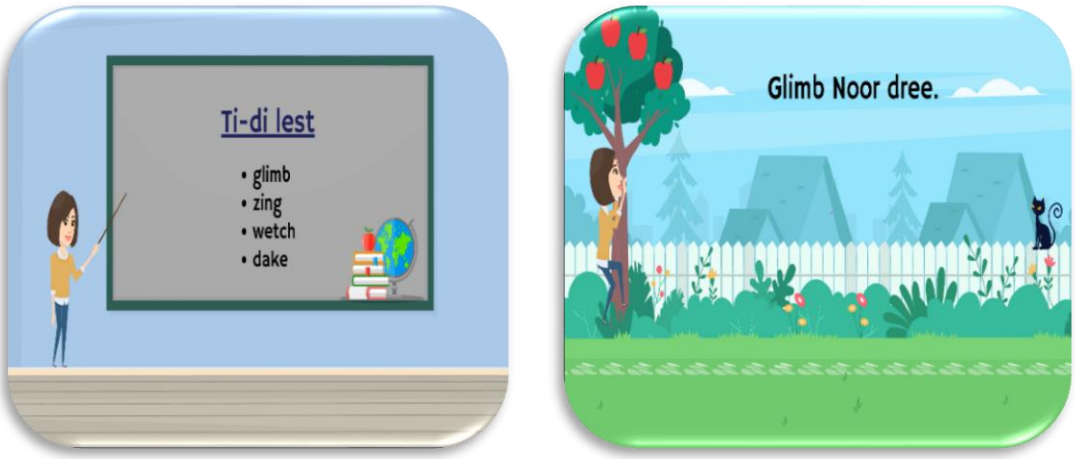

Figure 2-*Example of video exposure to the artificial L3 (Language B)*

3.6.2.2 The Testing Phase

I conducted a forced-choice Acceptability Judgment Task (AJT) to assess participants' preferences regarding word order. The AJT consisted of 20 trials, including 10 target items and 10 filler items. In the critical condition, phrases varied in word order (Adj-N vs. N-Adj word order), as illustrated in Figure 3. Participants were instructed to click on the sentence they deemed more natural. After selection, they were automatically directed to the next trial. The order of trials was randomized.

Figure 3-. *Example of the forced-choice acceptability judgment task*

3.7 Chapter Summary

Arabic-English bilinguals were the focus of this study. They learned two artificial languages with varying degrees of similarity to their existing languages. The study employed two main models in the field of L3 acquisition, TPM and LPM, to investigate the influence of CLI. According to the TPM, CLI is influenced by the degree of lexical similarity between a previously acquired language and the input of L3. Hence, this model proposes that the origin of CLI comes primarily from lexical cues since these are considered the most important factors based on Rothman's (2015) hierarchy of lexicon, phonology, morphology, and syntax.

By contrast, the LPM suggests that participants' behavior would differ depending on their L3 exposure (language A and language B). It proposes that lexical and syntactic similarities influence CLI, highlighting the co-activation of both L1 and L2 can affect L3 acquisition, especially when the L3 shares syntactic and lexical features with both languages. The LPM's argument is aligned with H2, which contends that syntactic similarities play a role in addition to lexical similarities.

The remainder of this chapter explained artificial languages (AL) and introduced the AL utilized in the present study. Finally, the main procedure of the experiment, participant details, and English proficiency assessment tools were discussed.

4 Results

The study involved 44 participants, who were randomly divided into two groups: Language A (N = 23) and Language B (N = 21). The experiment utilized a forced-choice AJT comprising 20 trials of 10 target items and 10 fillers. Proficiency levels were assessed before the experiment, with participants in Language A demonstrating a mean proficiency score of 21.39 and participants in Language B having a mean proficiency score of 21.04.

The primary data were obtained from Gorilla and subsequently analyzed using RStudio, running R version 4.3.0 (R Core Team, 2023). The findings revealed that participants exposed to Language B preferred the N-Adj word order structure (74.28% on average) more than participants exposed to Language A (37.82% on average), as shown in Table 1.

In the following sections, the 'filler/control condition' will be referred to as the 'learning condition' to reflect our research focus better. This change is based on the insights of this condition on how early word order properties can be learned. In the learning condition (SVO/VSO), participants exposed to Language A preferred the SVO word order more than those exposed to Language B. Learners in Language A were primarily exposed to SVO and mostly favored this word order. Conversely, participants in Language B displayed a notably higher preference for VSO word order in the learning condition compared to Language A. Learners in this group were exposed to VSO and mostly opted for this word order. Regarding the TPM, we can conclude that although lexical similarities cause significant transfer from English, learners can quickly overcome the transfer result and learn a non-transferred word order. Specifically, while they followed the SVO word order standard in English, they also learned the VSO word order when exposed to Language B. Hence, this could stem from learning or CLI rather than a random preference.

Table 4-*Comparison of structure selection*

	Condition	Group A (n=23)	Group B (n=21)
1	SVO word order (fillers)	215/230 (93.47%)	24/210 (11.42%)
	VSO word order (fillers)	15/230 (6.5%)	186/210 (88.5%)
2	N- Adj word order (critical items)	87/230 (37.82%)	156/210 (74/28%)
	Adj/N word order (critical items)	143/230 (62.17%)	54/210 (25.71%)

4.1 Statistical Analysis: Data Visualization

4.1.1 Distribution of Critical Items

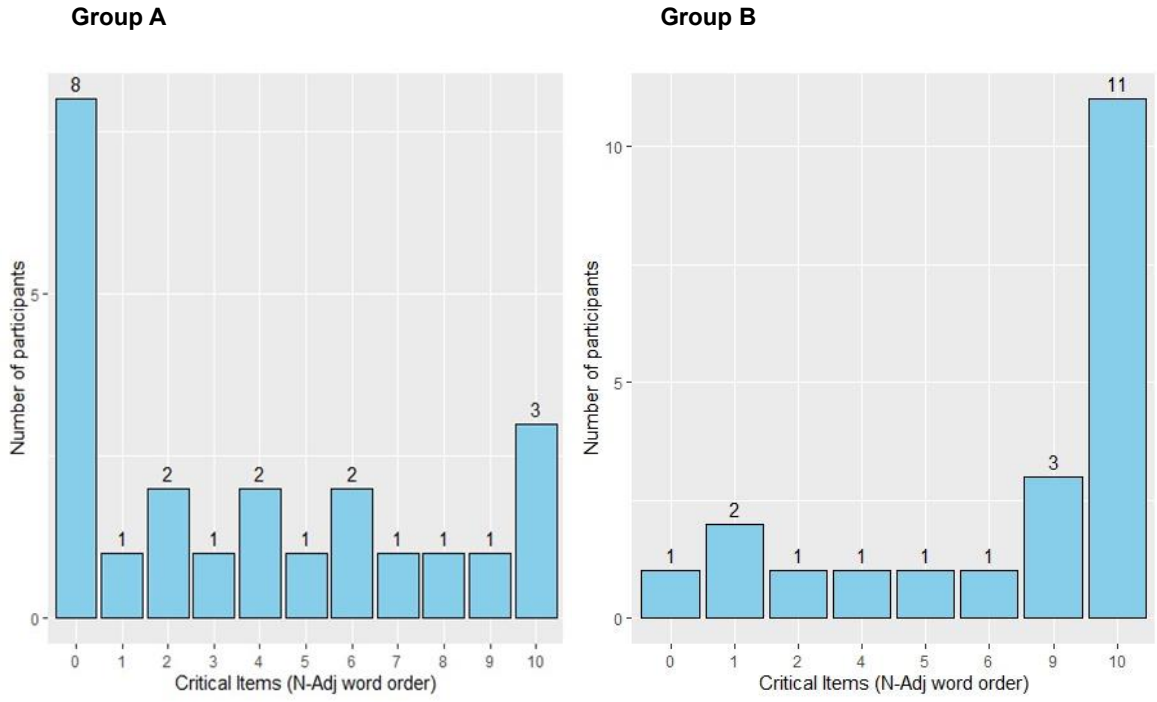

Figure 4-*Distribution of N-Adj word order selection by participants*

Figure 1 shows the number of participants who selected the Arabic structure (N-Adj word order) among the main phrases, ranging from 0 to 10. In Group A, which included 23 participants, a majority of 8 participants chose the Adj-N word order, showing a strong preference for English syntax. However, 15 participants showed variability, using N-Adj structures between 1 and 10 times. Conversely, in Group B, with 21 participants, 11 preferred the N-Adj word order, showing a preference for Arabic syntax. Although there were instances

of moderate acceptance (up to 9 individuals) and a single example of rejection (1 person), the overall trend suggests a consistent preference for N-Adj among Language B participants. These findings highlight distinct patterns between the two groups: while Group A participants generally favored the Adj-N word order, Group B participants exhibited a stronger preference for N-Adj, reflecting a preference for Arabic syntax. Nonetheless, both groups displayed some variability in their word order preferences.

4.1.2 The Acceptability Judgements

This section describes the participants' acceptability judgments through plots depicting the mean proportions of SVO/VSO and N-Adj selections in the forced-choice AJT categorized by group (Languages A and B). Figure 4 shows the filler/control condition, while Figure 5 illustrates the critical conditions.

Figure 1 illustrates the word order preferences among participants, with Language A showing a strong preference for SVO selections (approximately 93.47%) and Language B favoring VSO selections (about 88.5%). These distinct patterns suggest that participants acquired the SVO/VSO word order to which they were exposed.

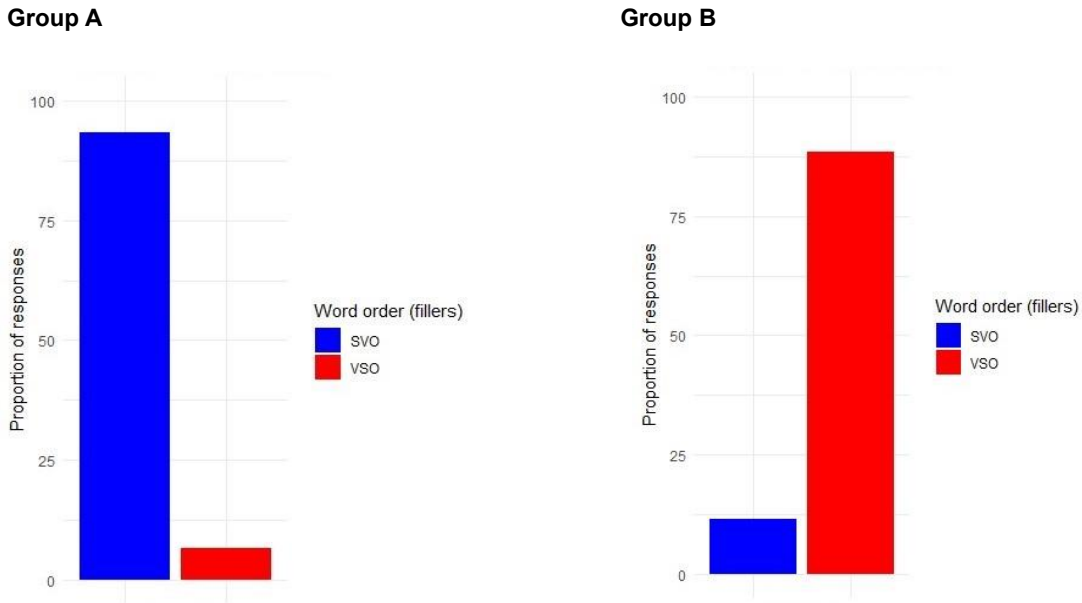

Figure 5-*Acceptability judgments of SVO/VSO*

Figure 5 displays the acceptability judgments of the critical items (Adj-N and N-Adj) by group. The figure demonstrates that Group B favored the N-Adj structure more than Group A, with an average score of 74.28% compared to Group A's average of 37.82%. Participants

had not been exposed to this structure in the AL input. Our expectation was for participants in Group B to produce more of the Arabic word order (N-Adj), given their exposure to another property with Arabic word order (VSO), which was hypothesized to activate their Arabic grammar more than the learners of Language A.

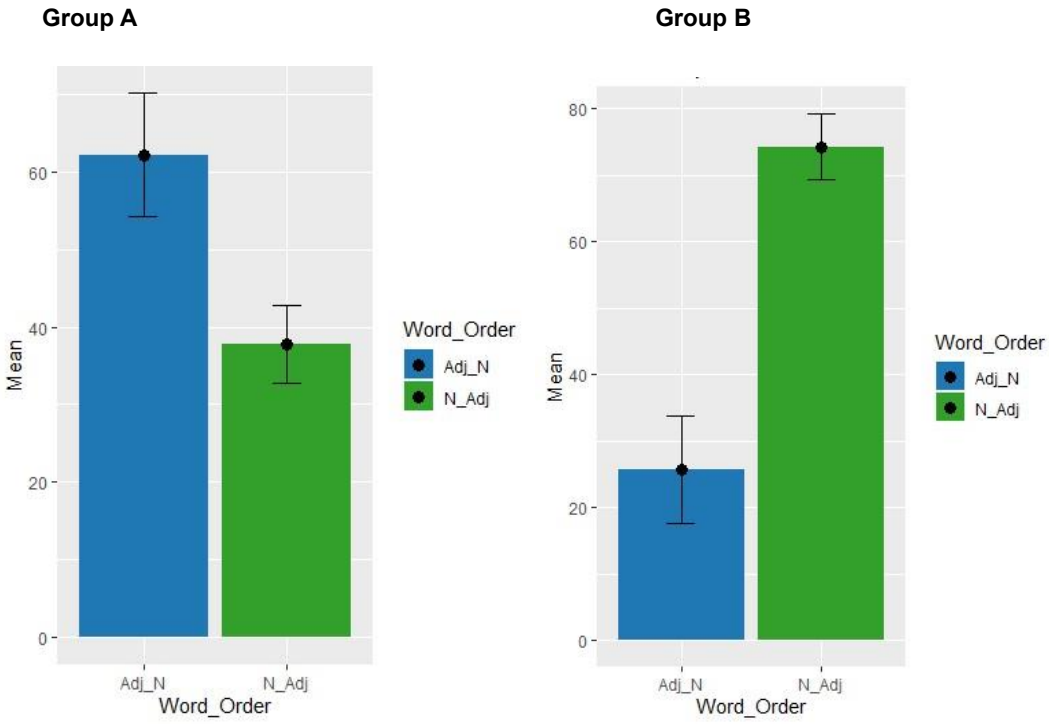

Figure 6-. *Acceptability judgments of adjective placement*

4.1.3 Analyzing the Impact of EPT Score and AoO on N-Adj Word Order

4.1.3.1 EPT Score

As discussed in section 3.5, the participants' English proficiency was assessed using a multiple-choice test with 29 items derived from a more extensive standardized test. Each correct answer received one point, with a maximum score of 29. Participants' scores ranged from 12 to 27 points in this study, averaging 21.22.

Figure 7 shows how participants in groups A and B (determined by their English proficiency scores) performed on critical items based on their use of the N-Adj word order. It is important to note that participants in Group A were exposed to SVO word order, which is common in both Arabic and English. In contrast, Group B was exposed to VSO word order, which

is prevalent only in Arabic. The figure depicts the distribution of these scores for both groups. While Group A exhibits a negative correlation, where higher EPT scores seemingly lead to decreased N-Adj usage (favoring English syntax), Group B displays a contrasting pattern with a positive correlation. Higher English proficiency scores for Group B correlated with a stronger preference for N-Adj structures following Arabic syntax.

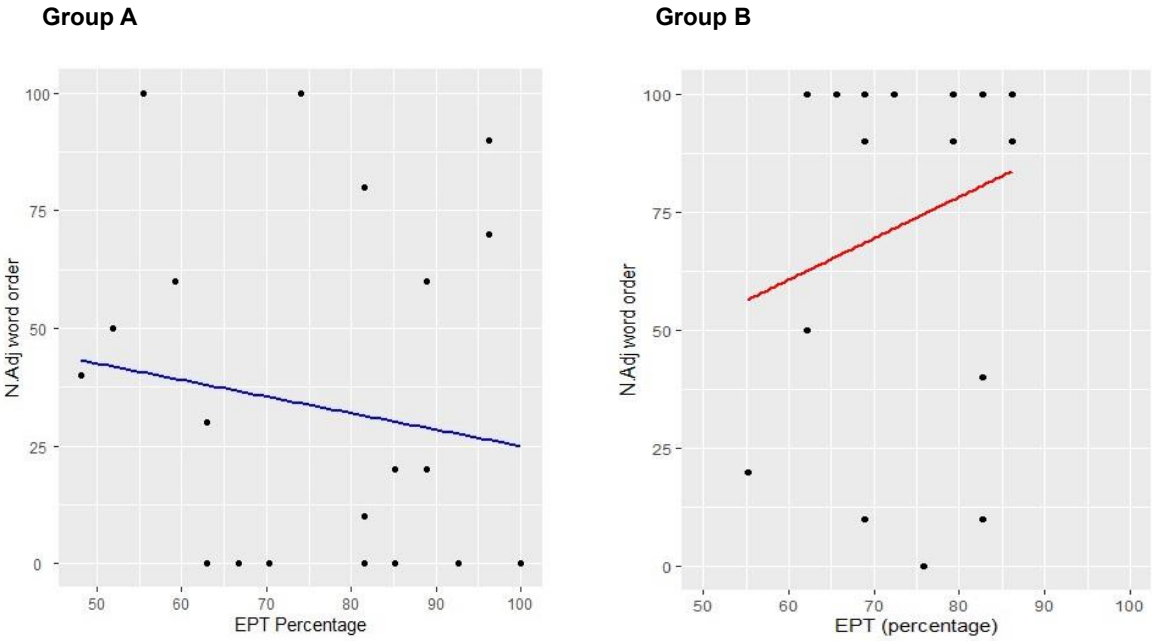

Figure 7- *N-Adj word order by EPT score for the two groups.*

Note. After converting English Proficiency Test (EPT) scores, which were initially out of 29, to percentages based on the total possible points, the effect of EPT scores on N-Adj selection was examined. This impact is graphically represented in Figure 7, where the x-axis shows the Percentage of EPT Scores, and the y-axis indicates the Frequency of N-Adj Selection.

4.1.3.2 Age of Onset (AoO)

Figure 8 was created to investigate the correlation between the N-Adj word order and the Age of Onset (AoO) at which participants began learning English in two groups, A and B . Figure 8 examines the relationship between learners' preference for the Arabic word order (N-Adj) and their Age of Onset (AoO) for both Groups A and B. The figure reveals a positive correlation for both groups, indicating that learners who started learning English later (higher AoO values) tend to prefer the N-Adj structure more than those who started earlier.

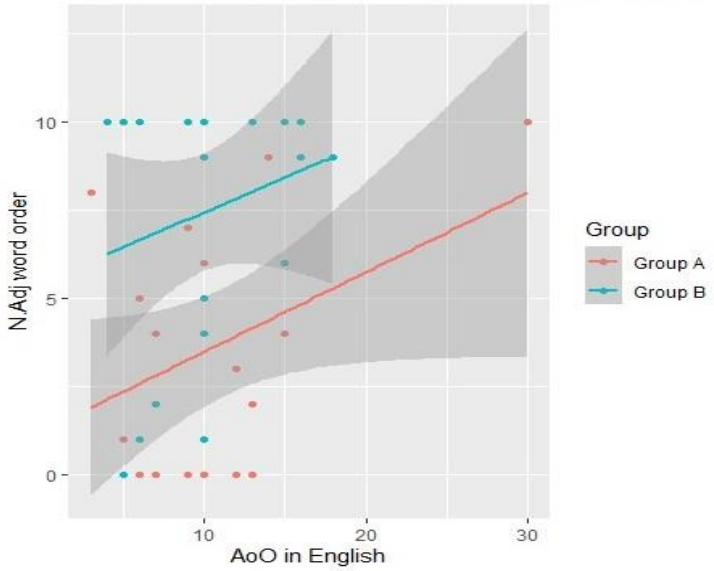

Figure 8. *N-Adj word order by AoO for the two groups*

4.2 Statistical Analysis: Logistic Regression

A mixed-effects binomial logistic regression model was created using the lme4 R package (Bates et al., 2015). This model incorporated both Participants and Items as random intercepts. Its purpose was to explain the variability in the selection of word order (coded as N-Adj = 1 and Adj-N = 0) by considering predictors such as Group (Language A and B), Age of Onset (AoO), and English Proficiency Test (EPT) Scores as potential fixed effects. These predictors were examined to explain the variability in participants' word order preferences. Consequently, the model was developed with N-Adj word order as the dependent variable, Group as the predictor, and centered AoO and EPT Scores as covariates (refer to Figure 9 for more details). The regression model results indicated a trend in the predicted direction: the mean of critical items (N-Adj word order) in Group B was 74.28%, higher than in Group A (37.82%). However,

this effect did not reach statistical significance. The model also confirms that Group B is likelier to choose N-Adj than Group A (positive GroupB coefficient = 0.80). Still, this group difference is not significant (p-value = 0.79).

Summary

```
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) [
glmerMod]
 Family: binomial  ( logit )
Formula: N.Adj ~ Group + AoO + EPT + (1 | Participants) + (1 | Group:Item)
   Data: Book1

     AIC      BIC   logLik deviance df.resid
    77.2    101.7    -32.6     65.2      434

Scaled residuals:
      Min        1Q    Median        3Q       Max
-0.041429 -0.018089  0.000755  0.000983  0.001617

Random effects:
 Groups       Name        Variance  Std.Dev.
 Participants (Intercept) 5.322e-05  0.007295
 Group:Item   (Intercept) 4.557e+03 67.507726
Number of obs: 440, groups:  Participants, 44; Group:Item, 40

Fixed effects:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) 13.272096   5.473902   2.425   0.0153 *
GroupB       0.806582   3.056510   0.264   0.7919
AoO          0.304207   1.174751   0.259   0.7957
EPT         -0.002189   0.239410  -0.009   0.9927
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:
       (Intr) GroupB AoO
GroupB -0.241
AoO    -0.155  0.080
EPT    -0.896 -0.039  0.180
```

Figure 9-*Summary of the Regression Model*

5 Discussion

This section analyzes the data presented in Chapter 4. I begin by reviewing the research questions and hypotheses. I will also highlight the insights gained and the constraints found. I examine the implications of these findings in light of the theoretical perspectives covered in the literature review.

This study examined how word order preferences, indicative of cross-linguistic influence, are affected by lexical and syntactic similarities between the artificial third language (L3) and the first and second languages (L1/L2) during the initial stages of L3 acquisition. As outlined in Chapter 3, 44 Arabic-English sequential bilinguals were randomly assigned to learn one of two artificial L3 languages. Both were lexically similar to English but varying in syntactic similarity to English and Arabic. There were two phases to the experiment: an exposure phase and a testing phase. The latter phase included a forced-choice Acceptability Judgment Task (AJT). It featured familiar (fillers) and unfamiliar (critical) items for the participants. Subsequently, I introduced the following research question and hypotheses:

R.Q: How does the similarity of lexical and syntactic aspects between L3 input and previously acquired languages affect CLI during the initial stages of L3 acquisition?

Hypotheses:

• H0: There is no relationship between L3 and L1/L2 similarities and word order preferences.

• H1: Word order preferences and lexical similarity between the L3 and the L1/L2 are related.

• H2: Word order preferences and syntactic similarity between the L3 and the L1/L2 are related.

The study's findings are consistent with the theoretical assumption of the LPM, CEM, and TPM models. According to the LPM and CEM models, it was anticipated that the participants' behavior would differ depending on the specific L3 language to which they were exposed. In contrast, the TPM model posited that lexical cues would solely influence CLI. The experiment results indicated a correlation between the participants' word order preferences and the lexical and syntactic similarities shared between the L3 and the languages they had previously acquired. Specifically, Group A participants preferred the English word order, like their L2. In contrast, Group B participants favored the Arabic word order, reflecting their L1.

Furthermore, the findings indicated a connection between preferences for word order and lexical similarity, supporting Hypothesis 1 (H1). The findings also revealed a relationship between word order preferences and syntactic similarity, supporting H2.

As mentioned in section 4.2, a mixed-effects binomial regression model indicated a trend in the predicted direction, indicating the probability of selecting Arabic-like word order (N-Adj). However, this effect was not statistically significant, likely due to substantial participant variation. In the subsequent sections, I address the outcomes of the data analysis.

5.1 The Forced-choice AJT: An Analysis of Filler and Critical Items

Figures 5 and 6 displayed distinct preferences depending on the participant's group exposure. Figure 5, illustrating the learning condition (filler/control condition), showed a strong preference for the SVO word order among Language A participants, with approximately 93.47% choosing this structure. In contrast, participants in Language B demonstrated a notable preference for VSO word order (about 88.5%). This difference in preference indicates a connection between participants' word order preference and the exposure they received to the artificial language (AL) input.

Moving to examine critical items (Adj-N and N-Adj) in Figure 6, it is notable that participants had not encountered this structural format in the AL input. Group B demonstrated a significantly stronger preference for the N-Adj order (74.28%) than Group A (37.82%). This finding supports the LPM theory's prediction, which suggests that lexical and syntactic factors could influence L3A. Participants in Group B were exposed to property with Arabic word order (VSO). This property activated their Arabic grammatical frameworks more than those in Group A, leading to a stronger preference for N-Adj structures. This notion contradicts the prediction of the TPM, which anticipates a wholesale transfer from English to both learners' groups.

Moreover, the congruent syntactic input in Group A resulted in a lower frequency of N-Adj word order selections than in Group B. These observations highlight the limitations of relying solely on lexical indicators to explain CLI. If only lexical similarity mattered, we would not expect the VSO structure to influence Group B. This supports the LPM theory, suggesting syntactic similarity can influence word order preference. This notion is supported by the works

of Jensen and Westergaard (2023) and Nazari (2023). They studied learners' word order preferences in an artificial language and found that lexical and syntactic similarity influence word order preferences.

To put it differently, participants exposed to Arabic-like (VSO) syntax in group B did not primarily transfer from the more lexically similar language, English. This contradicts the expectation of wholesale transfer during testing or the automatic selection of L2 as the primary source of influence. These findings suggest that the nature of the L3 input plays a role in shaping the direction of CLI. Furthermore, they support the idea that lexical and syntactic cues in the input contribute to CLI, as proposed by property-by-property models of L3 acquisition.

5.2 The Forced-choice AJT: Exploring the Effect of EPT Score and AoO on N-Adj Word Order

Our study assessed participants' English proficiency using a standardized test. Scores ranged from 12 to 27, with an average of 21.22. Group A exhibited a negative correlation, as shown in Figure 7. Higher English proficiency resulted in less N-Adj usage, favoring English syntax. On the contrary, Group B displayed a positive correlation. Higher English proficiency was associated with a preference for N-Adj structures, aligning more closely with Arabic syntax.

These findings highlight the relationship between L2 proficiency and word order preferences in L3 acquisition. Higher English proficiency may lead to a preference for English-like syntax in some contexts. However, it could also facilitate the activation of native language structures, especially when learners are exposed to syntax similar to their first language (L1).

The relationship between the Age of Onset (AoO) of English language acquisition and the use of the N-Adj word order is depicted in Figure 8 (Section 4.1.2The graph demonstrates a positive correlation for both Group A and Group B. Individuals who began learning English later showed a stronger preference for the N-Adj structure. This trend indicates a greater reliance on native language structures among those with a higher AoO. The findings of our study, particularly the positive correlation found in both Group A and Group B between AoO and preference for N-Adj word order, are consistent with those of Nazari (2023), who also reported a similar trend in Group B. Therefore, it can be inferred that the Age of Onset (AoO)

might influence how learners apply their native language structures, especially when encountering structures that differ from those found in English.

Figure 4 (section 4.1.1) presents the number of participants who chose the N-Adj word order in main phrases, ranging from 0 to 10. Among the 23 participants in Group A, eight consistently chose the Adj-N word order, reflective of English syntax. The remaining members of Group A showed a range of preferences, which indicates some flexibility in adopting the N-Adj order. Group B, on the other hand, demonstrated a strong preference for the N-Adj order, which is associated with Arabic syntax. Eleven participants consistently selected this word order over the Adj-N word order. These findings support the hypothesis that substantial exposure to the Arabic VSO structure could enhance the activation of learners' native grammatical structures.

5.3 Chapter Summary

This study investigated the influence of lexical and syntactic similarities between an artificial third language (L3) and learners' first (L1) and second languages (L2). It looked at how these similarities influence word order preferences during the initial stages of L3 acquisition. Individuals who speak Arabic and English were chosen to learn one of two third languages through random selection. Each L3 was lexically similar to English and varied in how closely it resembled English and Arabic syntactically. After the exposure phase, participants completed a forced-choice Acceptability Judgment Task (AJT) during the testing phase.

Findings supported the theoretical assumptions of the LPM, CEM, and TPM models. Participants' word order preferences correlated with the lexical and syntactic similarities between the L3 and their previously acquired languages. Specifically, Group A preferred English word order, like their L2. In contrast, Group B was exposed to an L3 with a word order like their first language (Arabic - VSO). They showed a strong preference for the Arabic order (N-Adj), even though it was not in the AL input. This supports the LPM theory and suggests lexical and syntactic factors influence L3 acquisition. The finding contradicts the TPM's prediction of a wholesale transfer from English. It highlighted the limitations of relying solely on lexical indicators for explaining CLI and supported the notion that syntactic similarity can influence word order preference.

6 Limitations and Future Directions

This study has some limitations. The relatively small sample size of 44 participants may have limited our ability to detect statistically significant effects. This suggests that the correlations between N-Adj word order preference, age of onset (AoO), and English proficiency test (EPT) reported among L3 learners may not apply to a larger population. A larger study is needed to confirm the observed relationships and investigate the factors that might influence CLI in L3 learners.

In addition, further studies could look at other areas of L3 acquisition, like phonetics and pragmatics. Using a more natural L3 could provide valuable insights into real-world language learning.

This study identified English Proficiency (EPT score) and Age of Onset (AoO) as predictors for N-Adj word order preference among participants in their L3. However, other factors may also play a significant role. Future studies should explore how individual learning styles, motivation, and exposure beyond controlled settings influence EPT scores, AoO, and learners' success in acquiring a new language.

7 Conclusion

Examining the influence of CLI in L3 acquisition necessitates a deeper understanding of how previously acquired languages impact the learning process. This study investigated the impact of lexical and syntactic similarities between an artificial third language (L3) and previously acquired languages (L1 and L2) on word order preferences during the initial stages of L3 acquisition.

The experiment involved forty-four Arabic-English bilinguals. They were learning one of two L3 languages. The languages differed in syntactic similarity with English and Arabic. The results showed that word order preferences, assessed using forced-choice tasks, were influenced by L3 lexical and syntactic characteristics, supporting the view that lexical and syntactic characteristics contribute to CLI in L3 acquisition. This contradicts models that only focus on lexical similarity. In addition, the study showed that exposure is crucial. Those exposed to specific word orders, particularly those in Group B exposed to a VSO word order (Arabic syntax), showed a stronger preference for the N/Adj structures. Also, this research revealed a complex relationship between L2 proficiency and L3 acquisition. English proficiency may influence word order preferences and reliance on native language grammar.

This study contributes to our understanding of CLI in L3 acquisition and how lexical and syntactic similarities, exposure, L2 proficiency, and AoO can influence language acquisition.

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Appendix1 - English Proficiency Test (EPT)

Instructions: Please complete the sentences by selecting the best answer from the available answers below.

1) Water _____ at a temperature of 100° C.

a. is to boil b. is boiling c. boils

2) In some countries _____ very hot all the time.

a. there is b. is c. it is

3) In cold countries people wear thick clothes _____ warm.

a. for keeping b. to keep c. for to keep

4) In Norway people are always talking about _____.

a. a weather b. the weather c. weather

5) In Bergen _____ almost every day.

a. it rains b. there rains c. it raining

6) In the Sahara Desert there isn't _____ grass.

a. the b. some c. any

7) Some countries in Africa have _____ weather even in the cold season.

a. a warm b. the warm c. warm

8) In Norway _____ time of year is usually from December to February.

a. coldest b. the coldest c. colder

9) _____ people don't know what it's like in other countries.

a. The most b. Most of c. Most

10) Very _____ people can visit the King.

a. less b. little c. few

11) Mohammed Ali _____ his first world title fight in 1960.

a. has won b. won c. is winning

12) After _____ an Olympic gold medal, he became a professional boxer.

a. had won b. have won c. was winning

13) His religious beliefs _____ change his name when he became a champion.

a. have made him b. made him to c. made him

14) If he _____ lost his first fight with Sonny Liston, no one would have been surprised.

a. has b. would have c. had

15) He has traveled a lot _____ as a boxer and as a world-famous personality.

a. both b. and c. or

16) He is very well known _____ the world.

a. all in b. all over c. in all

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

a. is believing b. are believing c. believe

18) To be the best _____ the world is not easy.

a. from b. in c. of

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

a. had to b. must c. should

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

a. would b. will c. did

Read the following passage about the history of aviation and choose the best answer for each blank. Note that it is a continuous story.

21) The history of _____ is

a. airplane b. the airplane c. an airplane

22) _____ short one.

a. quite a b. a quite c. quite

23) For many centuries men _____ to fly,

a. are trying b. try c. had tried

24) but with _____ success.

a. little b. few c. a little

25) In the 19th century a few people succeeded _____ in balloons.

a. to fly in b. flying into c. flying

26) But it wasn't until the beginning of _____ century that anybody

a. last b. next c. that

27) _____ able to fly in a machine

a. were b. is c. was

28) _____ was heavier than air,

a. who b. which c. what

29) in other words, in _____ we now call a 'plane'. The first people to achieve.

a. who b. which c. what

Appendix 2- Background Questionnaire

The following questionnaire is to collect background data relevant to our study. Our goal is to understand the proportions of exposure/use you have.

يهدف الاستبيان الآتي إلى جمع البيانات الأساسية المتعلقة بدراستنا. هدفنا هو معرفة نسب استيعابكم ومدى استخدامكم للغات

Please take your time to respond to each question. Note that all of the data will be collected anonymously.

الرجاء أخذ الوقتك في الاجابة على كل سؤال. ملاحظة: سيتم جمع كافة البيانات بشكل سري دون الكشف عن هوية المشارك

Sexالجنس

Female أنثى

Male ذكر

Otherآخر

Current year of studyالسنة الحالية للدراسة

Occupation/student status الوضع الوظيفي أو الطلابى

How old are you? كم عمرك؟

How old were you when you started learning English? كم كان عمرك عندما بدأت بتعلم اللغة الإنجليزية؟

Where did you start learning English?من أين بدأت تعلم الإنجليزية؟

المدرسةSchool

معهد اللغة الإنجليزية (مدرس خصوصي) English institute (private teacher)

المنزل – (من الوالدين) Home (From parents)

بأي لغة تتحدث مع والدتك؟/What languages do you use when speaking to your mother?

/بأي لغة تتحدث مع والدك؟What languages do you use when speaking to your father?

بأي لغة تتحدث مع أصدقائك؟What languages do you use when speaking to your friends?

شكرًا لمشاركتكم !!Thank you for participating!

Appendix 3 - List of Sentences

a) Exposure Items:

	Group A	Group B
1	Noor rum.	Rum Noor.
2	Noor baint.	Baint Noor.
3	Noor deach.	Deach Noor.
4	Noor drint goffee.	Drint Noor goffee.
5	Noor eaf fruib.	Eaf Noor fruib.
6	Noor dook pesta.	Dook Noor Pesta.
7	Noor wesh blate.	Wesh Noor Blate.
8	Noor reat boog.	Reat Noor boog.
9	Noor glay diano.	Glay Noor diano.
10	Noor drife dar.	Drife Noor dar.
11	Noor rife dicycle	Rife Noor dicycle
12	Noor glimb dree.	Glimb Noor dree.
13	Noor zing zong.	Zing Noor zong.
14	Noor wetch divi.	Wetch Noor divi.
15	Noor dake fobo.	Dake Noor fobo.

b) Test Items:

	Test items	
1	Plack pate	Pate plack
2	Plue blum	Blum plue
3	Rod strowperry	Strowperry rod
4	Gree affle	Affle gree
5	Purfle grafe	Grafe purfle
6	Jellow panana	Panana Jellow
7	Trown kibi	Kibi trown
8	Bink feach	Feach bink
9	Naroon sherry	Sherry naroon
10	Biolet eggplank	Eggplank biolet

c)Fillers:

	Group A		Group B	
1	Noor drint goffi.	Drint Noor goffi.	Noor drint goffi.	Drint Noor goffi.
2	Noor eaf fruib.	Eaf Noor fruib.	Noor eaf fruib.	Eaf Noor fruib.
3	Noor dook pesta.	Dook Noor pesta.	Noor dook pesta.	Dook Noor pesta.
4	Noor wesh blate.	Wesh Noor blate.	Noor wesh blate.	Wesh Noor blate.
5	Noor reat boog.	Reat Noor boog.	Noor reat boog.	Reat Noor boog.
6	Noor glay diano.	Glay Noor diano.	Noor glay diano.	Glay Noor diano.
7	Noor drife dar.	Drife Noor dar.	Noor drife dar.	Drife Noor dar.
8	Noor rife dicycle.	Rife Noor dicycle.	Noor rife dicycle.	Rife Noor dicycle.
9	Noor dake fobo.	Dake Noor fobo.	Noor dake fobo.	Dake Noor fobo.
10	Noor zing zon	Zing Noor zong.	Noor zing zong.	Zing Noor zong.

Appendix 4 - Information Letter and Consent Form

رسالة معلومات ونموذج موافقة

Hi and welcome to this research project.

أهلا ومرحبا بكم في هذا المشروع البحثي.

This document ensures that you, as a participant in this research project, are fully educated on the nature of the project and are given ample opportunity to ask any questions you need to feel comfortable and informed.

تضمن هذه الوثيقة أنك، كمشارك في هذا المشروع البحثي، على دراية كاملة بطبيعة المشروع ويتم منحك فرصة كبيرة لطرح أي أسئلة تحتاجها لتشعر بالراحة والاطلاع

About the Study:

My name is Ashwagh, and I am a master's student at **UiT the Arctic University of Norway.** This experiment is a crucial component of my master's thesis in Multilingualism, comprising four distinct parts and requiring approximately 20 minutes to complete.

اسمي أشواق، وأنا طالبة ماجستير . تعد هذه التجربة عنصرًا حاسمًا في رسالة الماجستير الخاصة بي في تعدد اللغات، وتتكون من أربعة أجزاء متميزة وتتطلب حوالي 20 دقيقة لإكمالها.

During this study, you will gain familiarity with a set of vocabulary from an artificial foreign language. Your primary task will be to remember the words and phrases as accurately as possible throughout the experiment.

خلال هذه الدراسة، سوف تكتسب الإلمام بمجموعة من المفردات من لغة أجنبية مصطنعة. ستكون مهمتك الأساسية هي تذكر الكلمات والعبارات بأكبر قدر ممكن من الدقة خلال التجربة.

Additionally, we will inquire about your proficiency in English and your linguistic background by asking you a few questions.

بالإضافة إلى ذلك، سوف نستفسر عن كفائتك في اللغة الإنجليزية وخلفيتك اللغوية من خلال طرح بعض الأسئلة عليك.

Research Ethics:

أخلاقيات البحث:

This project is approved by Norsk Senter for Forskningsdata (NSD). Participation in the project is voluntary. All answers and data are anonymous. If you choose to participate, you can withdraw your consent at any time without giving a reason. All information about you will be removed.

تمت الموافقة على هذا المشروع من قبل مركز بيانات البحوث النرويجي. المشاركة في المشروع طوعية. جميع الإجابات والبيانات مجهولة المصدر. إذا اخترت المشاركة، فيمكنك سحب موافقتك في أي وقت دون إبداء الأسباب. ستتم إزالة كافة المعلومات عنك

We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act). We do not collect sensitive or personally identifying information. It will not be possible to recognize you directly or indirectly in the publication.

لن نستخدم بياناتك الشخصية إلا للأغراض المحددة في خطاب المعلومات هذا. سنقوم بمعالجة بياناتك الشخصية بسرية ووفقًا لتشريعات حماية البيانات (اللائحة العامة لحماية البيانات وقانون البيانات الشخصية). نحن لا نجمع معلومات حساسة أو معلومات تعريف شخصية. لن يكون من الممكن التعرف عليك بشكل مباشر أو غير مباشر في المنشور.

Stages of the Experiment:

مراحل التجربة:

1.You will be exposed to an animated video in which someone utilizes another (artificial) language to speak.

ستشاهد مقطع فيديو متحركًا يستخدم فيه شخص ما لغة أخرى (اصطناعية) للتحدث.

2. You should choose between the two options that will be shown on the screen afterward. Choose the one that you think is correct based on what you have seen in the video.

عليك الاختيار بين الخيارين اللذين سيظهران على الشاشة بعد ذلك. اختر ما تعتقد أنه صحيح بناءً على ما رأيته في الفيديو.

3.You will then be asked to read and complete an "English Proficiency Test".

سيُطلب منك بعد ذلك قراءة "اختبار الكفاءة في اللغة الإنجليزية" وإكماله.

4.You will be asked to read and fill in a "Background Questionnaire" at the end.

سيُطلب منك قراءة "استبيان الخلفية" وملؤه في النهاية

Participants' Rights: If you can be identified in the collected data, you have the right to:

حقوق المشاركين: إذا أمكن التعرف عليك في البيانات التي تم جمعها، فيحق لك:

- Access the personal data that is being processed about you.

الوصول إلى البيانات الشخصية التي تتم معالجتها عنك.

- Request that your personal data be deleted.

طلب حذف بياناتك الشخصية.

- Request correction/rectification of incorrect personal data about you.

طلب تصحيح/تصحيح البيانات الشخصية غير الصحيحة عنك.

- Receive a copy of your personal data (data portability).

الحصول على نسخة من بياناتك الشخصية (إمكانية نقل البيانات).

- Lodge a complaint with the Data Protection Officer or The Data Protection Authority.

تقديم شكوى إلى مسؤول حماية البيانات أو هيئة حماية البيانات.

Data Processing Consent: We will process your personal data based on your consent.

الموافقة على معالجة البيانات: سنقوم بمعالجة بياناتك الشخصية بناءً على موافقتك.

Timeline of the Project: The project is scheduled to end in May 2024. All personal information will be excluded from the data after the completion of the project.

الجدول الزمني للمشروع: من المقرر أن ينتهي المشروع في مايو 2024. وسيتم استبعاد جميع المعلومات الشخصية من البيانات بعد الانتهاء من المشروع.

Contact Information: If you have any further questions about the project, please contact:

معلومات الاتصال: إذا كان لديك أي أسئلة أخرى حول المشروع، يرجى الاتصال بـ:

- Ashwagh Jazayeriasl via email: aja132@uit.no
- The Norwegian Centre for Research Data AS via email: personverntjenester@nsd.no.

Participation Consent Form:

نموذج الموافقة على المشاركة:

By checking the boxes and submitting this form, you indicate your voluntary agreement and consent to participate in this study.

من خلال تحديد المربعات وإرسال هذا النموذج، فإنك تشير إلى موافقتك الطوعية وموافقتك على المشاركة في هذه الدراسة.

To participate in this study, please agree to all the points outlined below:

للمشاركة في هذه الدراسة، يرجى الموافقة على جميع النقاط الموضحة أدناه:

I give consent for my personal data to be processed until the end date of the project.

أوافق على معالجة بياناتي الشخصية حتى تاريخ انتهاء المشروع.

I give consent for my anonymized data to be presented/used in research activities (e.g., journal articles, conferences).

أوافق على تقديم/استخدام بياناتي مجهولة المصدر في الأنشطة البحثية (مثل المقالات الصحفية والمؤتمرات).

I willingly participate in this study and understand its purpose and procedures.

أشارك عن طيب خاطر في هذه الدراسة وأفهم غرضها وإجراءاتها.