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Mastering English Multiple Adjectives Ordering among Early versus Late Second Language Speakers: Evidence from Arabic-English Bilinguals

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Abstract

Recent research has shown that learners demonstrate huge variability in second language (L2) end-state attainment. While some L2 learners attain native-like command, others only attain an undeveloped command and some stuck in between. It is also assumed that early learners often surpass owing to Lenneberg's Critical Period Hypothesis (1967) that proposes that early onset often advances L2 development. This study investigates the extent to which, age is associated with mastering the target language among late versus early Arabic-English bilinguals. Specifically, this study concerns itself with the issue of how Arabic-English bilinguals typically perceive the right ordering of multiple consecutive adjectives (e.g., the small yellow bird). A considerable amount of literature has established that L2 learners encounter challenges in mastering the right sequence of adjectives, particularly when there are several adjectives modifying a single noun. To determine how Arabic learners of English perceive English descriptive adjective orderings, this study observes whether an earlier age of first contact with English enhances the learners' accuracy and reaction time. To test this assumption, the intuitions of two groups of early (n=8) vs. late (n=8) Arabic-English bilinguals in the United Kingdom (i.e., Leeds) were compared for English descriptive adjective ordering preferences through a Speeded Acceptability Judgment Task (SAJT). The participants were requested to show their ordering preferences for a couple of multi-adjective strings (n=16). The findings suggested that early Arabic-English bilinguals significantly outperformed late Arabic-English bilinguals in terms of exhibiting native-like ordering preferences. The study concludes that early exposure is more likely to facilitate mastering the target system and that it generally accelerates L2 development. This study also concludes that accuracy and response time may reflect the L2 development. The study suggests a number of pedogeological implications for teaching and learning an L2.

1. Introduction

"Every Friday, my mother-in-law fries a Scottish big salmon," said no one ever. Although it is technically acceptable—it is a big salmon, it is a Scottish salmon, and my mother-in-law fries it. However, the utterance does not sound fairly accurate due to the fact that the descriptive adjectives ordering in that utterance does not sound acceptable. Following that systematic ordering is what makes a specific statement sounds "accurate," and unfollowing that typical order is what makes a certain utterance sounds weird.

According to Ebaid (2018:1P), adjectives are defined as "integral elements in linguistic structures whose main function is to identify, describe and modify nouns or pronouns". Adjectives offer more information about a noun or pronoun that functions as the subject/object in an utterance (Mac Fadyen, 2008). Words such as *fluffy*, *green*, *clumsy*, and *tiny* are all adjectives. The majority of English foreign/second language learners do not receive sufficient explicit instructions or adequate practice about how descriptive adjectives must be ordered in classrooms and yet they often learn it through receptive skills (i.e. listening and reading).

The rules concerning English descriptive adjectives order are stricter and more governed than they are in other languages which seem to have different and somehow flexible adjectives ordering. Rosato (2013) and Scontras (2023) claim that languages show robust and consistent preferences regarding adjectives ordering and positioning. Some adjectives are favoured closer to the modified noun (e.g., color, material), whereas others are favoured remoter (e.g., age, size). Consider, for instance, the preference for *the small yellow bird* (size + color + noun) in English. Other prenominal languages such as Tagalog, Mandarin and Greek, to name a few, typically allow the same order. Other postnominal languages such as Hebrew, Spanish and Arabic allow the reverse order (e.g., noun+ color+ size), e.g., *ālʿṣfwr ālsfār āsāġyr* which means 'the yellow small bird' in Arabic.

A considerable amount of literature has investigated adjective ordering preferences (e.g., Dixon, 1982; Sproat and Shih, 1991; Amer, 2013; Leung et al., 2020), and much of the literature acknowledges that some adjectives are favoured nearer to the modified noun than others. Much of the literature has shown that languages largely vary in their ordering preferences of multi-adjective strings pre, post, or nearby the noun, nonetheless they typically indicate robust interlanguage preferences on ordering of multi-adjective strings. According to Brown (2000), interlanguage stands to the disconnectedness of a second/foreign language learner's system, a system that has representations with halfway position between his/her first language (L1) and the target language. A large volume of studies in the field have examined L1 interference on adjective ordering and positioning (e.g., Shamsabadi and Nejadansari, 2013; Abubakar et al., 2017; Hassan, 2017), to explore the influence of learners' mother tongue on the target language development. Several lines of empirical evidence (e.g. Alotaibi and Alotaibi, 2017) suggest that L2 learners tend to exhibit non-target like adjective ordering preferences or use them less frequently and with less variety than native English speakers or generate shorter multi-adjective strings due to the influence of their L1, especially Arabic-speaking learners of English.

English and Arabic belong to two different language systems: the former is Indo-European whereas the latter is Semitic. English is an SVO language whereas Arabic is a VSO language. The difference with respect to word order leads us to undertake that there may be a number of other differences including ordering of multi-adjective strings. The typical order of English adjectives is: *size, opinion, condition, age, color, shape, material,* and *origin*. On the other hand, Arabic, a language with post-nominal adjectives, multi-adjective strings are typically flexibly juxtaposed without any robust restrictions according to some empirical evidence (e.g., Fehri, A. F. 1999; Alghazo and Jarrah, 2023). One possible reason for the lack of firm ordering preferences in Arabic is the fact that Arabic adjectives are largely post-nominal. Besides, high usage of multi-adjective strings with conjunctions was observed in Arabic, which can account for this flexibility.

Extensive attention has been devoted to English adjective ordering preferences (e.g., Frank, 1972; Quirk et al.1985; Malouf, 2000; Mitchell, 2009; Mitchell et al., 2011; Hill, 2012; Scontras et al., 2017), but insufficient research is attainable on Arabic-English adjective ordering preferences, particularly in relation to some variables such as, age of first exposure to the target language and its relationship with accuracy and speed of processing.

Lenneberg (1967) postulated that language could be mastered only within a critical phase, ranging from early childhood till puberty. In basic terms, Lenneberg's (1976) Critical Period Hypothesis (CPH) is argued to only have impacts on L1 development. Nonetheless, it is crucial to better understand the nature of the postulated critical period to establish whether or not it operates also in L2 development. If this is the case, young children are expected to outperform adults in mastering L2 and must accordingly attain advanced levels of final attainment in the target language owing to the early exposure to the target language which contributes to advancing L2 development and minimising the influence of their L1. This assumption was tested by comparing the accuracy and reaction times (RTs) of Arabic-English bilinguals' intuitions who learned the L2 at different ages: early (n=8) versus late (n=8) Arabic-English bilinguals who had arrived in the United Kingdom (UK) between the ages of 0 and 26 (M= 11.19, SD= 9.79) at the onset of the experiment. The participants were tested on a couple of different English descriptive adjective ordering, using a Speeded Acceptability Judgment Task (SAJT) to measure accuracy and RTs.

Descriptive Adjectives Ordering Patterns in English

English adjectives typically occur before the noun, which suggests that adjectives depend more on the head-final segment of the hierarchy. As already mentioned, English holds a strict ordering system for adjectives. Adjectives should always precede the nouns they modify. The typical order for English descriptive adjectives is called "the Royal Order of Adjectives", which is: determiner (e.g., *the, our*), quantity (e.g., *many, few*), opinion (e.g., *delicious, cool*), size (e.g., *huge, tiny*), age (e.g., *new, old*), shape (e.g., *square, round*), color (e.g., *yellow, green*), origin/material (e.g., *Japanese, wooden*), and purpose or qualifier (e.g., *running, swimming*). The table below represents examples of the aforementioned Royal Order which can generate different nouns phrases in English:

Table 1: Examples of the Royal Order of Adjectives in English.

	Quantity	*Opinion*	*Size*	*Age*	*Shape*	*Color*	*Origin/ Material*	*Purpose/Qualifier*	*Main Head (Noun)*
Examples	two	mysterious		ancient			Scottish		castles
			tiny			white			cat
	One	chic		brand-new			silk	sleeveless	dress

Following the aforementioned multi-adjective string ordering, we can generate e.g., *one chic brand-new silk sleeveless dress*. However, in English, it is very odd to string 5 or more adjectives together in written or verbal communication. It will sound awkward and native speakers usually find other different ways to evade it.

The reason why English adjectives must strictly follow the royal order remains unclear, despite the fact that there are a number of principles that attempt to explain why. To name a few, the subjectivity/objectivity principle, the iconic principle and the nounness principle (Jung, 2008). According to Wulff (2003), adjective ordering is established by a wide range of factors. For example, one principle is related to the fact that the closer an adjective neighbour to its modified noun, the more crucial it is to the description. Typically, the adjective most detached from the noun is the most highlighted. For instance, for describing a castle as a *Scottish house* is more specific than signifying to it as *an ancient castle* or *a mysterious castle*. Nonetheless, this principle, among other principles, does not always rationally account for all ordering patterns in English. Consider the example, *a tiny white cat*. Is *a white cat* truly a more precise description than *a tiny cat*?

Scontras et al. (2017) and Franke et al. (2019) maintained that subjectivity is a robust predictor of ordering preferences. Semantic classes such as age, opinion and size are somewhat subjectively familiar, while material, color and origin, are somewhat objectively familiar, while material, color and origin are somewhat objective. Furthermore, condition is less subjective than opinion and size. However, again, none of the aforementioned principles adequately accounts for all ordering patterns in English neither in other languages (Samonte and Scontras, 2019). Nevertheless, it is beyond the scope of this study to examine any of the ordering principles in English. Yet, one must admit that adjective ordering is something the speaker just has to follow just like other English oddities.

A number of studies have shown that English adjective ordering is unfixed and that it has different juxtapositions (e.g., Praninskas, 1975). For instance, size follows opinion in some research (e.g., Praninskas, 1975; Byrd, 1992), but the reverse order in others (e.g., Jung, 2008). This variation supports the claims of Yoo (2004) that English adjective ordering is unstable, but somewhat flexible, according to the speakers' perspectives and the given context. This assumption also seems to lend support to Ney's (1983) claims that any order patterns of

adjectives appear to be potential, on the basis of the anticipated meaning of the speaker or the context in which s/he generates the expression. This variation strongly indicates even native speakers of English may expose a wide range of different preferences in several ordering patterns as they may represent different perceptions towards adjectives ordering. In view of the above discussion, the next section shows whether post-nominal languages, such as Arabic, have certain ordering preferences.

Descriptive Adjective Ordering Patterns in Arabic

Arabic, on the other hand, is a language with post-nominal adjectives or one of the head-initial languages, which means the noun typically comes before the modifying adjectives. The common order in Arabic as follows: Determiner Phrase (DP), Noun Phrase (NP), Adjective Phrase (AP). The AP typically follows both the DP and the NP (Kremers, 2003). However, some Arabic scholars (e.g., Al Mahmoud, 2014) argue that Arabic does not only entail post-nominal adjectives but also pre-nominal adjective. Yet, Arabic adjectives are strongly favoured post-nominally.

Arabic adjectives typically match the nouns they postmodify in number, gender, case and (in)definiteness (Al Mahmoud, 2014). Arabic does not have a typical adjective ordering preference and we can string adjectives without a specific preference of order. That is, there is no definite or firmly favoured adjectives ordering preference to modify nouns in Arabic. Arabic multi-adjective strings can be also flexibly moulded without conjunctions (Al-Shurafa, 2006; Al-Sharifi and Sadler, 2009). The reverse orders of the Royal order are true for the Arabic patterns among many other ordering scenarios. Consider the following example:

I played with the cute tiny white Persian cat. (English)

lʿbtu	*mʿ*	*ālqṭẗ*	*Ālšyrāzyẗ*	*ālbyḍā*
ālṣġyrẗ		*ālāṭyfāh*		
PAST-play-nom	with	def-cat-gen	def-Persian-fem-gen	def-white-fem-gen
def-small-fem-gen		def-cute-fem-gen		

‘I played with the Persian white tiny cute cat’. (Arabic)

Early research provided evidence (e.g., Al Mahmoud, 2014) that Arabic (both Classical Arabic and Modern Standard Arabic) multi-adjective strings do not have stable ordering and that the Arabic adjective ordering is looser than the English adjective ordering patterns and great variations were seen in Arabic patterns.

Some scholars attempt to account for Arabic adjectives preferences (e.g., Kachakeche and Scontras, 2020). Some researchers attribute ordering preferences to the fact that adjectives are juxtaposed according to their prominence in the utterance. For example, when there are multi-

adjectives modifying a single noun in Arabic, ethical descriptive adjectives are typically ordered before physical ones indicting that ethical adjectives are more important than physical ones, and if there are multi-ethical adjectives within the same phrase, then the position of these ethical adjectives depend on their prominence in the context. For instance, the speaker may order *clever* before *beautiful* as in *ālfātāẗ ālḏākyẗ ālǧāmylāẗ* 'The clever pretty girl'. Nevertheless, a close investigation of descriptive adjective arrangements in Arabic suggests that ordering takes place in numerous facets.

One adjective class may occur in the closest proximity to the modified noun in one language and in the greatest distance from it in another language. The ordering principles also appear less systematically relevant to the Arabic adjective ordering. For instance, size may follow color, though the former is more subjective than the latter. Again, none of the principles proposed is entirely adequate to explain adjective ordering patterns in Arabic as well.

To conclude, by examining the adjective ordering in Arabic and English, it seems that the order patterns are asymmetrical in both languages, particularly in Arabic. Therefore, they represent a potential learnability challenging area for Arabic learners of English. This study examines descriptive adjective ordering preferences by early versus (abbreviated vs.) late Arabic-English bilinguals. If we assume that native and near native speakers of English (i.e. early bilinguals) have stronger intuitions than late Arabic-English bilinguals, we expect to observe some kind of variations in their accuracy and reaction times with respect to the appropriate adjective orderings. The study tests the assumption that late bilinguals are more likely to be less sensitive to the appropriate adjective ordering in comparison with early bilinguals, despite the fact they may have reached higher proficiency levels.

The Onset Age of Acquisition (AoA) and Its Relationship with Accuracy and Reaction Times

According to Lenneberg's (1967) Critical Period Hypothesis (CPH) or the sensitive period hypothesis, when learning a language, there is a time of progression during which complete native-like competency is feasible. This time spans from infancy until adolescence. Although the crucial period concept has consequences for scholars and learning programs, it is not widely acknowledged and still a matter of debate. According to Lenneberg's CPH (1967), the natural development of (a first or second/foreign) language from simple exposure happens over a key time that typically initiates at the age of two and finishes in puberty.

The Onset Age of Acquisition (AoA) typically stands for the learner's age of his/her first arrival in the target language country (Flege et al. 1999) or the age at which s/he begins to learn the target language (e.g., Saito 2015; Wei et al. 2015). According to Hernandez and Li (2007), AoA stands for the age at which a certain notion or a language skill is being learned. Several lines of evidence suggest that AoA correlates negatively with L2 development typically in real-life contexts (e.g., Zevin and Seidenberg, 2002; Montrul and Foote, 2014; Birdsong, 2005). There is a large volume of published studies that acknowledge that different facets of language in bilingual contexts are differentially influenced by AOA. If there are different critical periods for mastering the system of the target language, AOA should differentially impact the

performance of the L2 speakers. Nevertheless, the presence of a "critical period" for language development is still debatable.

AOA is linked with a number of key factors, such as accuracy and reaction times (RTs). Accuracy stands for how accurate learners are with the linguistic system including word ordering. For instance, accuracy reveals a learner's aptitude to appropriately order the descriptive adjectives in English. According to Gass (1983), intuitions, mainly judgments of acceptability, have played a key role in the field of theoretical linguistics, however the nature of acceptability judgments by L2 learners has not received empirically ample consideration particularly speeded acceptability judgments.

According to Jain et al. (2015), Reaction Times (RT)s is defined as a measure of the swiftness with which the human reacts to a certain stimulus. It is the time that intervenes between the onset of a stimulus and the incidence of a certain reaction to that stimulus. The time the participant takes to react is typically measured in milliseconds (ms). The fastest human average RT to visual stimulus is approximately 2500ms. Simply, visually-mediated RTs can be described as the period taken to react (usually via a button press) to the rapid presence of a visual stimulus.

Several factors have an impact on RTs, counting age, gender, left-handedness or right-handedness, and whether the stimulus is visual or auditory. Some studies (e.g., Shim, 1996) have examined the relationship between RTs and accuracy of the syntactic judgment by L2 Learners. Shim (1996) concluded that the RTs are appropriate indicators of linguistic proficiency in L2 development. And the existence or non-existence of any time restriction did not yield any significant effect on both speed and accuracy for the native speakers.

The current study presupposes that early AoA has advantage over late AoA in accuracy and speed. If we undertake that AoA negatively correlates with accuracy and positively correlate with speed of processing of the L2 learners. The study observes whether an earlier age of first contact with English enhances the learners' accuracy and the RTs and account for the reduced RTs and the greater accuracy of early Arabic-English bilinguals compared with late Arabic-English bilinguals. The study simply examines accuracy and RTs of early vs. late Arabic-English bilinguals with respect to English multiple adjectives ordering.

2. Literature Review

Extensive research had been done on adjective ordering preferences. Adjective ordering preferences have been examined in languages with pre-nominal adjectives such as English (e.g., Scontras et al. 2017), Mandarin Chinese, (e.g., Shi and Scontras, 2020), and in languages with post-nominal adjectives, such as Arabic (e.g., Al Mahmoud, 2014; Alghazo and Jarrah, 2023) and Indonesian (e.g., Martin, 1969). The findings of these studies suggest that the adjective ordering patterns are non-arbitrary. A large and growing body of literature has investigated the L1 interference in mastering the L2 adjective ordering patterns and the challenges English as a Foreign language (EFL) learners often encounter (e.g., Al-Dabbagh and Naief, 2018).

While some research has confirmed the advantage of early AOA, nevertheless, recent evidence (e.g., Xue et. al, 2017) suggests that L2 development relays on numerous aspects, including length of L2 experience (e.g., Rakhlin et al., 2015), impact (e.g., Pfenninger and Singleton, 2016), quantity as well quantity of input (e.g., Flege et al., 1999). Nevertheless, early AOA does not guarantee the sorts of development one may perhaps anticipate. Particularly, prior research has not established the longstanding advantages of an early AOA (Muñoz, 2008). Up to now, too little attention has been paid to the impact of early AOA on the accuracy and the RTs of native speakers of Arabic who learned English as an L2 typically in naturalistic settings.

To the best of the researcher's knowledge, so far, only two empirical research: i.e., Lu and Tu (2010) and Huang (2014), have considered the AoA impact among bilinguals (i.e., Chinese-English) and their findings were debateable. Lu and Tu (2010) investigated whether AoA has an impact on the lexicon development of Chinese-English bilinguals with a bilingual stroop task. The findings did not provide evidence of any difference between the early and late Chinese-English bilinguals. On the other hand, Huang (2014) examined English syntax and speaking productions of 118 Chinese-English bilinguals in the United States (US). The findings suggest that the AoA had a strong impact on both English syntax and speaking productions with other variables, such as length of residence as well as length of education in the US, being controlled. Nevertheless, and to the best of the researcher's knowledge, no study has examined accuracy and RTs of early AoA vs. late AoA with respect to English multiple-adjectives ordering in Arabic-English context.

3. Statement of the Problem

A considerable amount of literature has established that non-native speakers of English often encounter challenges in mastering the right sequence of adjectives, particularly when there are several adjectives modifying a single noun. The majority of studies have examined native language interference, which denotes the influence of the mother tongue language on the target language. The findings suggest that the direct evidence of L1 interference (i.e., Arabic) was detected in the learners' overall adjectives ordering patterns (Abubakar et al., 2017; Alotaibi and Alotaibi, 2017).

However, a few studies have examined adjective ordering in L2 development among early and late bilinguals. To the best of the researcher's knowledge, no study has examined adjective ordering in L2 development among early and late bilinguals. More particularly, whether age of first exposure to the target language is associated with mastering English descriptive adjective ordering among early versus late Arabic-English bilinguals. To the best of our knowledge, the current research is the first attempt that was guided to empirically contribute to the field by examining the role of the age of first exposure to English on the learners' accuracy and RTs in bilingual contexts with respect to ordering of multi-adjectives strings. The current study seeks to establish whether accuracy as well as RT vary between late vs. early bilinguals. We postulate that early Arabic-English bilinguals would have an advantage if Lenneberg's (1967) CPH holds true.

4. The Experimental Study

The study examines whether early Arabic-English bilinguals have an advantage owing to the CPH (Lenneberg, 1967) and whether age of their first exposure to the target language has an impact on their English adjective ordering compared with late Arabic-English bilinguals. That is, whether early bilinguals have an advantage with respect to accuracy and RTs.

4.1 Research Questions and predictions

The current study is guided by the following question:

RQ1: Do early Arabic-English bilinguals order English multiple adjectives more accurately and rapidly than late Arabic-English bilinguals?

4.2 Null Hypothesis

H_0: Early Arabic-English bilinguals do not order English multiple adjectives more accurately and rapidly than late Arabic-English bilinguals.

4.3 Alternative Hypothesis

H_a: Early Arabic-English bilinguals do order English multiple adjectives more accurately and rapidly than late Arabic-English bilinguals.

5. Methodology

Lenneberg's CPH (1967) was tested by comparing the accuracy and RTs exposed by 16 Arabic-speaking learners of English. The instrument includes two sections: the first section is planned to gather biographical information such as age, gender, nationality, mother language, AoA, length of stay in the UK,…etc. The second section is devoted to the main task.

The study was conducted in Leeds, the United Kingdom in January 2022. A total of 16 Arabic-English (AE) bilinguals (male= 6, female= 10) were randomly selected to participate in the current study. The participants are originally from the Arab countries including Iraq (n=4), Lebanon (n=1), Palestine (n=4), Morocco (n=3), Egypt (n=1), and Yemen (n=3). Although they speak different Arabic varieties, some empirical evidence (e.g., Alghazo and Jarrah, 2023) suggests that there is no variation among these different Arabic varieties with respect to multi-adjective ordering particularly. The study includes two groups of Arabic-English bilinguals: (a) early AE bilinguals (n=8): native Arabic speakers who began learning English before the age of five (n=8), and (b) late AE bilinguals (n=8): native Arabic speakers who began learning English after the age of 13. The participants' mean age ranged from 18 to 38 with an average age of 27.94, with a variance of 33.39 and a standard deviation of 5.78. The participants' mean AoA of L2 ranged from 0 to 26 with an average age of 11.19, with a variance of 95.90 and a standard deviation of 9.79. According to the 5-point self-rating scale (*0*= no knowledge and

5= highly proficient), their mean self-rating English proficiency was 4.47 (*SD* = 0.50), and 4.07 (*SD*= 0.57) for Arabic proficiency.

The participants were tested on different ordering patterns of English adjectives, using a Speeded Acceptability Judgment Task (SAJT). They were offered two ordering options and requested to select the more natural and proper order of the two selections. Consider the following example:

(2) a. I saw a long black Cadillac.
b. *I saw a black long Cadillac.

The task entailed a total of 16 items, each having a pair of unlike arrangements of two adjectives come from different semantic classes of descriptive adjectives. This study revolves around ordering descriptive adjectives, the target multi-adjective strings were random arrangements of 40 descriptive adjectives that belong to eight semantic classes 'the Royal Order' (i.e., opinion, quality, size, age, shape, color, origin/material, purpose/qualifier; see Table 1). This is consistent with Praninskas's (1975) classification, which entailed descriptive adjectives, with slight adjustments inspired by Jung's (2008) design. The researcher randomly selected naturally-appearing multi-adjective strings taken from the British National Corpus (BNC), which presents genuine authentic data. Then, the researcher manipulated the original multi-adjective strings patterns taken from the corpus creating the reverse ill-formed orders. The researcher unified the structure for all of the test items, so each sentence starts with 'I saw + multi-adjective strings + noun' to reduce any potential effect related to the length or the complexity of other structures on the participants' RTs. The arrangements of two adjectives respected the assertion that arrangements of more than three adjectives rarely appear in verbal and written communication in English and that two-adjective successions are the most typical string according to Celce-Murcia and Larsen-Freeman (1999), Wulff (2003) and Jung (2008). However, few test items (*n*=4) include three-adjective successions to explore how accurate and fast the late bilinguals will be with longer adjective strings compared with their early peers (See Appendix A).

Although there are eight forms of English adjectives, this study examines only descriptive adjectives. The study is also limited by including only adjectives with uninterrupted strings with no conjunction linking them. The current study did not focus on the learners' proficiency, but highlighted bilinguals' overall tendency of adjective ordering. It also is essential to consider that adjective ordering in this research are not founded on any prescriptive rules of English but on the intuitions of native speakers compared to early vs. late Arabic-English bilinguals. The purpose of this study is to examine how accurate and fast early vs. late Arabic-English bilinguals are with ordering English multi-adjective strings. A comparison was made between accuracy and RT of early vs. late Arabic-English bilinguals with respect to their intuitions towards different adjective ordering patterns.

To measure RTs, the researcher used a computer software (i.e., Inquisit 4.0) which was launched by Millisecond Software in Seattle, Washington, 2013. The test items were stored in a laptop program that randomised the test items for each new participant. The program

displayed the test items once at a time and record the RTs and the accuracy of the participants' responses. The participants were asked to select the more natural order and to press 'resume' as soon as the stimulus appears in the centre of the white screen background. The participants' RTs for each stimulus were recorded. Note that one second (s) is equal to 1000 milliseconds (ms). The time intervals of the two groups range from 3090-120734 ms. (M=15855.14, SD=17769.87). The time intervals of the late AE bilinguals range from 2664-120734 ms. (M=10071.19, SD=13766.16) whereas the time intervals of the early AE bilinguals range from 2664-7893 ms. (M=4287.26, SD=979.47).

The participants were tested individually in a quiet private room. They were entirely familiarised with the task procedure and one training trial was allowed for each participant before the experiment onset. The participants progressed at their own pace and were not allowed to go back or change their responses once they were recorded for the first time. They were instructed to make their judgments as fast as they can.

Lastly, ethical considerations were taken into account (see Ethical approval section). Each participant agreed to voluntarily partake and signed an informed consent form before the study onset. To validate the research instrument, the researcher consulted intuitions of two teachers who have extensive experience of teaching English for overseas students. They are native speakers of English currently work as members of a language centre in Leeds, UK. They were chosen to assess whether the test items are appropriate. A pilot study was performed three times to evaluate the study design and according to it essential adjustments were made. The statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 17.0 developed by SPSS Inc. (Chicago).

6. Results

To answer the research question, t-test analysis was carried out to determine if there is a significant difference between the means of the two groups (early vs. late Arabic-English bilinguals).

Table 2 shows t-test use of independent samples to observe if late Arabic-English bilinguals do not order English descriptive adjectives more accurately and quickly than early Arabic-English bilinguals. The participants who were exposed the language at early stages (M = 7.93, SD =.26) compared to the participants who were exposed the language at later stages (M = 3.20, SD = 1.01) demonstrated significantly more accurate intuitions regarding multi-adjective ordering, $t(28, 0.05) = 17.51$, *p-value* =.000. That is, by comparing the value of the statistical significance of the t-test for accuracy (0.000) less than the level of significance (0.05), therefore, we cannot reject the null hypothesis, which indicates that the early AE bilinguals are more accurate than the late AE bilinguals, and this is clear and visible, as we find that the average of accurate responses for the early bilinguals is 7.93, while the average of accurate responses for the late bilinguals is 3.20.

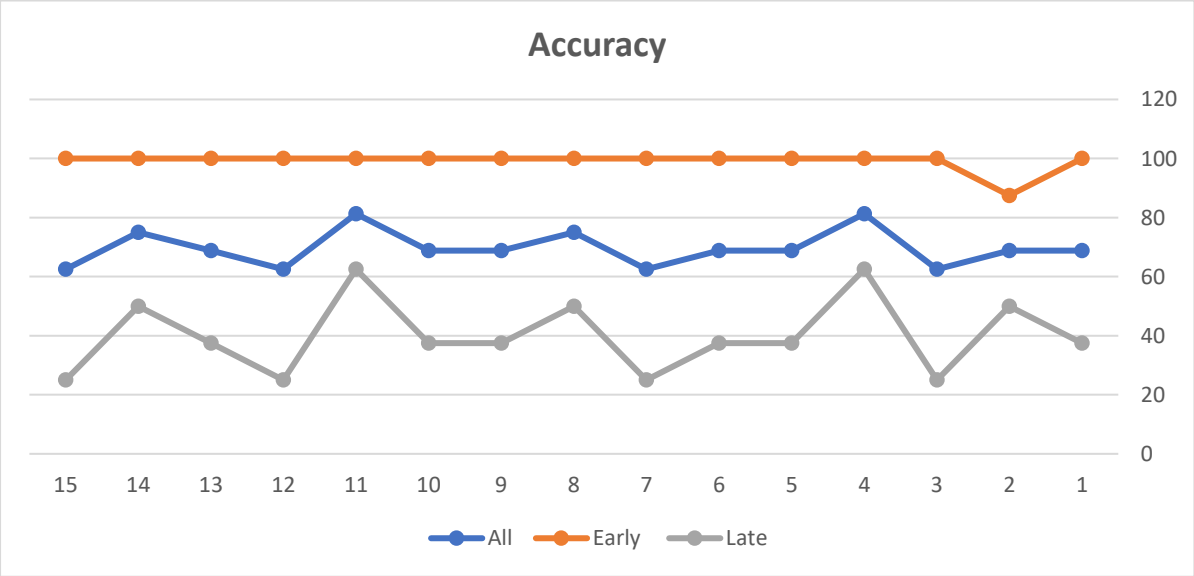
Table 2. The independent samples t-test for early Arabic-English bilinguals vs. late Arabic-English bilinguals.

		Group Statistics			*Independent Samples Test*	
	G	*M*	*SD*	*Std. Error Mean*	*t-test*	*sig*
Accuracy	Early *n*=8	7.93	.26	.07	17.51	**0.000**
	Late *n*=8	3.20	1.01	.26		
RT	Early *n*=8	6.00	1.20	.30	3.12	**0.004**
	Late *n*=8	3.20	3.26	.84		

Besides, the participants who were exposed the language at early stages (M = 6.00, SD =1.20) compared to the participants who were exposed the language at later stages (M = 3.20, SD = 3.26) demonstrated significantly more accurate intuitions regarding adjective ordering, $t(28, 0.05) = 3.13$, *p-value* = .004. By comparing the value of the statistical significance of the t-test for the RTs (0.004) less than the level of significance (0.05), therefore, we cannot reject the null hypothesis, which indicates that the early AE bilinguals are faster than the late AE bilinguals, and this is clear and visible, as we find that the average of RTs for the early AE bilinguals is 6.0, while the mean of RTs for the late AE bilinguals is 3.20.

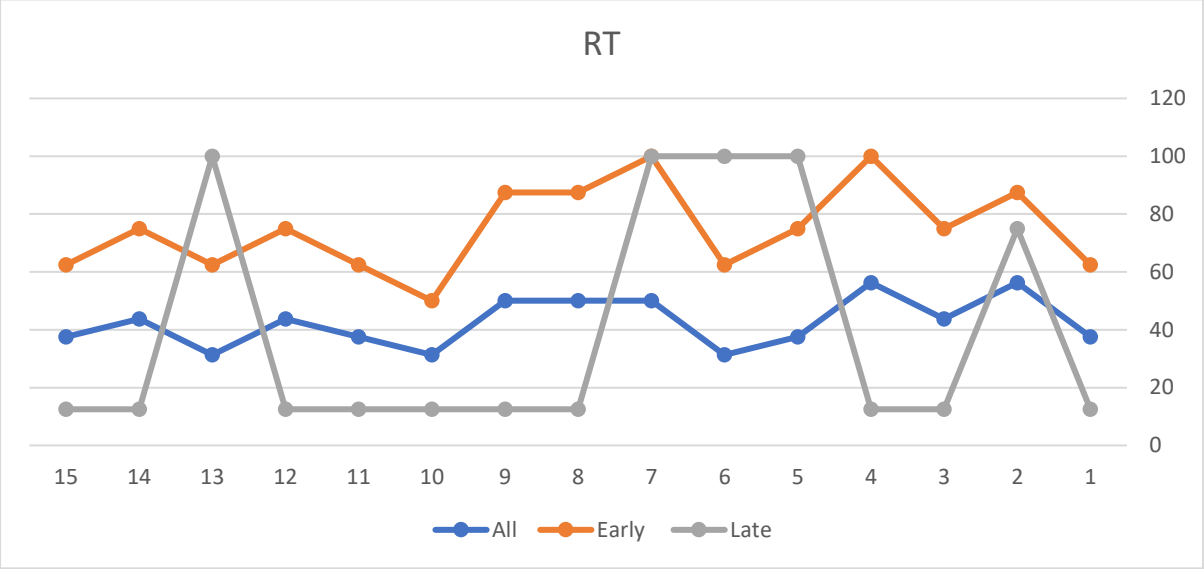
The results suggest that a robust advantage for earlier AOA bilinguals over the late AOA bilinguals. Significant difference was also found between accuracy of early vs. late Arabic-English bilinguals ($P < 0.001$) as late Arabic-English bilinguals were significantly less accurate than early Arabic-English bilinguals on multi-adjective ordering. If there is no effect of the age of exposure to the target language, there was no significant differences found among early vs. late Arabic-English bilinguals' as Figure 1 shows.

Figure 1. The mean of the accuracy among the two groups of Arabic-English bilinguals.



As far as the RTs is concerned, significant difference was found between RTs of early vs. late Arabic-English bilinguals ($P < 0.001$) as early Arabic-English bilinguals have faster RTs when compared with late Arabic-English bilinguals on multi-adjective ordering. If there is no effect of the age of exposure to the target language, there was no significant differences found among early vs. late Arabic-English bilinguals' RT as Figure 2 shows.

Figure 2. The mean of RTs among the two groups of Arabic-English bilinguals.



Based upon the achieved results, the null hypothesis is rejected in favour of the alternative hypothesis. That is, there are a relationship exist between AOA and accuracy as well as AOA and RT and the effect is statistically significant ($p > 0.05$). The study offers evidence to claim that the alternative hypothesis is true: Early Arabic-English bilinguals do order English descriptive adjectives more accurately and rapidly than their late peers.

Taken together, the results showed that the performance of the two groups was significantly different. The early bilinguals outperformed the late bilinguals with respect to performing on English descriptive adjective position and order. The findings suggest that the earlier the learners are exposed to the target language, the more accurate they are with ordering English adjectives. Also, the earlier the learners are exposed to the target language, the less reliance on their L1 and the more successful accommodation they are likely to perform to better approach the target forms. Furthermore, the results showed that RTs were significantly lower by early Arabic-English bilinguals as compared to that of their early peers. The results are consistent with the claim that the critical period for language development spreads its impacts to L2 development.

7. Discussion

With early AOA, there is more variations and vaster incidence in comparison with speakers who started to learn the L2 late or behind the critical period. Though studying abroad may enhance the appropriate ordering of descriptive adjectives, this does not always occur. Arabic speakers of English struggle with deciding the appropriate ordering of descriptive adjectives,

since bilinguals use English multi-descriptive adjective strings with less assortments and less incidences than native speakers.

The findings suggested that late acquirers' L1 (i.e. Arabic) largely influence their English multi-adjective ordering. Interlanguage inappropriate multi-adjective position can be traced back to L1 interference (Abubakar et al., 2017). Consistent with the literature, late acquirers who have limited knowledge develop weaker intuitions towards appropriate adjective ordering greatly compared with their early peers. Late acquirers' intuitions are typically less strong than those of early acquirers. The study showed that AOA is a factor that effects accuracy and RTs. The younger the speakers the more accurate and quicker in responding to the target forms. Late acquirers appropriately encounter challenges in identifying appropriate adjectives ordering in long lexical strings (i.e. more than one adjective) compared to early acquirers. Furthermore, late acquirers' RTs in response to the tasks slower than early acquirers. The study supports the conclusions of several studies that AoA correlates negatively with L2 development typically in real-life contexts (e.g., Zevin and Seidenberg, 2002; Montrul and Foote, 2014; Birdsong, 2005). It also supports the conclusion of Shim (1996) that the RTs are appropriate indicators of the linguistic proficiency in L2 development. And the existence of time restriction yields significant effect on both speed and accuracy for the late AOA.

The early Arabic-English bilinguals showed native-like performance. In many examples, the late bilinguals' overall preferences are equal to the English native speakers' preferences. Whereas the late Arabic-English bilinguals did not. This opens kind of probability of the influence from their L1. This suggests that their interlanguage combinations mirror actual ordering patterns of native English speakers without their L1 interference, Arabic. A huge number of the late Arabic-English bilinguals demonstrate somewhat significant variations in each pair. Many of them do not appear to identify that the reverse orders are not appropriate in English. To put differently, the results show that L1 patterns may perhaps inappropriately be transferred to the L2 system.

It is not surprising that late Arabic-English bilinguals extensively accepted the reverse order. Since the target language pattern is not corresponding to the L1 pattern, there was evidence of L1 interference in the order patterns of the target language. For instance, the order of opinion or age preceding color was preferred by the late Arabic-English bilinguals to the reverse order. The majority of late Arabic-English bilinguals favored the order of opinion or size following age over the reverse order. This suggests that the late Arabic-English bilinguals appear to encounter challenges to determine which adjective should come first, e.g., age or opinion. The late bilinguals' intuitions failed to identify the appropriateness of the adjective ordering in the same way as early Arabic-English bilinguals did.

Furthermore, there was a case in which precisely the same number of the late Arabic-English bilinguals favored each option of the sequences. Half of late Arabic-English bilinguals favored the typical ordering, e.g., size precedes condition, while the other half favoured the reverse order. This suggests that the juxtaposition of adjectives does not follow a firm order. To put it differently, the late Arabic-English bilinguals appear to consider that size is

frequently substitutable with condition in its location. This ordering pattern is in juxtapose with early Arabic-English bilinguals who favoured order of condition following size and with the late Arabic-English bilinguals' preference of the reverse order. The unacceptable ordering patterns can be traceable to their L1. This supports the conclusion reached by Brown (2000) that L1 interference is the most manifest source of nontarget like among L2 learners, especially with respect to adjective ordering (e.g., Abubakar et al., 2017). This also suggests that the majority of items are exchangeable from the L1 to the L2. The late Arabic-English bilinguals showed huge variations in accepting the juxtaposition of multi-adjectives, moving back and forth between the L1 and L2 ordering patterns.

To conclude, the findings suggested that early Arabic-English bilinguals significantly outperformed late Arabic-English bilinguals in terms of exhibiting native-like ordering preferences. Some traces of L1 patterns are found in the data of the late Arabic-English bilinguals. The study concludes that early exposure is more likely to facilitate mastering the target system by minimizing the L1 influence. This study also concludes that accuracy and RTs can reflect the L2 development.

8. Limitations, Implications, and Avenues for Future Research

It has been revealed that prescriptive grammar is not inevitably comparable to descriptive grammar on adjective ordering. This raises the enquiry: Which descriptive adjective order must be a norm for the learners especially Arabic-speaking learners of English? The majority of native English speakers do not seem to juxtapose multiple adjectives according to any grammatical rules but they position them subconsciously. Thus, their language patterns do not always mirror rules of the prescriptive grammar. Taken this into consideration, teachers must consider prescriptive rules, must also pay close attention to descriptive rules largely as the native speakers' authentic patterns are as vital as rule-governed norms and since it is critical that they must be properly echoed in the learners' patterns as Yang (2005) claimed. This suggests that they must introduce not only grammatical rules but also native speakers' actual patterns of multi-adjective ordering. This account supports Celce-Murcia and Larsen-Freeman's (1999) conclusion that the learners must be familiar with the main traditional rules as well as also familiar with of those cases where real usage appears to evidently diverge from the traditional grammar.

In introducing multi-adjective ordering according to both prescriptive and descriptive grammar, it is essential to take into consideration the learners' proficiency levels, especially in foreign language contexts. Initially, prescriptive grammar must be the norm, but at the higher stages, it is essential to increase learners' consciousness of dissimilarities between prescriptive grammar and native speakers' real patterns of multi-adjective ordering. To avoid confusion with the wide range of different patterns of descriptive adjective orderings, learners must be offered a well-balanced pedagogy on both prescriptive as well as descriptive grammar. The instructors should also offer learners with occasions that allow them to confer the (dis)similarities between English and Arabic multi-adjective ordering. It may be also convenient to confer the juxtaposition of multi-adjective strings which intuitively appear in the target written and verbal contexts.

The current study is subject to a number of limitations. One crucial drawback is that the sample size is small due to the difficulty of accessing the target group. Hence, it is not potential to draw a crystal-clear generalization about this issue. Although the current study is based on relatively a limited sample of participants, the findings strongly suggest that AOA is a strong predicator for English ordering preferences. In mastering the target forms, the younger the learners are, the faster they are, the more sensitive to the accurate patterns, the more native-like they are more likely to sound.

The findings of this study provide the following insights for future investigation. A further study (i.e. bidirectional) could explore whether English-Arabic bilinguals would show the same tendency. The study may be repeated to establish whether we can come to the same conclusion when the experimental tool is modified, e.g., using an auditory stimulus. In foreign language contexts, a greater focus on learners' proficiency and whether might have been any differences between beginning vs. advanced learners could produce interesting findings that account more for English multi-adjective ordering preferences. Furthermore, considerably more work will need to be done to determine whether Arabic-English bilinguals would show the same tendency in acquiring a third language such as Chinese, a language with pre-nominal adjectives where adjectives can typically occur in any order providing, they precede the head noun or Indonesian, a language with post-nominal adjectives.

9. Conclusion

This paper examined multi-adjective ordering among early versus late Arabic-English bilinguals. It intended to investigate how accurate and fast Arabic-English bilinguals perceive multi descriptive adjectives strings. The findings suggested that early Arabic-English bilinguals outperformed late Arabic-English bilinguals in terms of exhibiting native-like English descriptive multi-adjective ordering. This paper concluded that early exposure facilitates mastering English multiple adjective ordering and that it accelerates L2 development. This study concluded that accuracy and RTs can reflect L2 development with respect to multi-adjective ordering preferences. On the basis of the obtained findings, some recommendations are made.

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Ethical Approval

This research was approved by the Research Ethics Committee of Taif University, Saudi Arabia (Application code: 45-007). The author considered all the ethical procedures for involving human participants. All participants agreed to voluntarily participate in the study and signed consent forms.

Declaration of Conflicting Interests

The author declares that the research was conducted in the absence of any financial relationships that could be construed as a potential conflict of interest.

Authors' contributions

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

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Availability of data and materials

The data is available upon request by contacting the author.

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Appendix A: Speeded Acceptability Judgment Task (SAJT)

Section 1: Biographical information

1. Gender: ☐ Male ☐ Female
2. How old are you?
3. What is your nationality?
4. What is the highest degree of education you have?
5. What is your mother tongue?
6. Do your parents speak the same language at home?
7. Do you speak any other language? If yes, how do you learn them? Mention them in order
8. Have you attended any English classes? If yes, for how long?
9. When did you first arrive in the UK? How old were you?
10. When did you start learning English? How old were you?
11. Have you spent time in an English-speaking country bedside the UK? (Where? /For how long? /What for?)

12. On a scale of 0-5, how would you rate your English language?

Level 0	*Level 1*	*Level 2*	*Level 3*	*Level 4*	*Level 5*
No knowledge of English	Elementary level of English	Low intermediate level of English	High intermediate level of English	Advanced level of English	Proficient in English
○	○	○	○	○	○

13. On a scale of 0-5, how would you rate your Arabic language?

Level 0	*Level 1*	*Level 2*	*Level 3*	*Level 4*	*Level 5*
No knowledge of Arabic	Elementary level of Arabic	Low intermediate level of Arabic	High intermediate level of Arabic	Advanced level of Arabic	Proficient in Arabic
○	○	○	○	○	○

Section 2: Speeded Acceptability Judgment Task (SAJT)

- Circle the more natural and accurate order of English multiple adjectives in each pair. Make your judgment as fast as you can:

1. a. I saw an indelible railway wagon.

   b. I saw a railway indelible wagon.

2. a. I saw a white fat whale.

   b. I saw a fat white whale.

3. a. I saw a golden-yellow large flower.

   b. I saw a large golden-yellow flower.

4. a. I saw Indian gold old beads.

   b. I saw old Indian gold beads.

5. a. I saw a beautiful black bag.

   b. I saw a black beautiful bag.

6. a. I saw a pretty little diamond watch.

   b. I saw a diamond little pretty watch.

7. a. I saw a Spanish tiny girl.

   b. I saw a tiny Spanish girl.

8. a. I saw a dazzling white suit.

   b. I saw a white dazzling suit.

9. a. I saw a bitter-looking old little lady.

   b. I saw a bitter-looking little old lady.

10. a. I saw a flaming huge pumpkin.

    b. I saw a huge flaming pumpkin.

11 a. I saw a tiny green dragon.

   b. I saw a green tiny dragon.

12. a. I saw a long black Cadillac.

    b. I saw a black long Cadillac.

13. a. I saw a crocodile-skin huge handbag.

    b. I saw a huge crocodile-skin handbag.

14. a. I saw a great oil painting.

    b. I saw an oil great painting.

15. a. I saw astonishing blue eyes.

    b. I saw blue astonishing eyes.

16. a. I saw beautiful little slate-green lentils.

    b. I saw beautiful slate-green little lentils.

About the Author

Albaqami, Associate Professor in Applied Linguistics, Department of English Language, Turabah University College, Taif University, Saudi Arabia. She received her PhD in Linguistics from the University of York, UK. She completed an MA in Linguistics from the University of Leeds, UK. She is an FHEA (Fellow of the Higher Education Academy) awarded by Advance HE. Her research is primarily concerned with comparative aspects of lexicon, from both empirical and theoretical standpoints. She works primarily in foreign/ second language development, with a special interest in lexicon. Her research papers have been published in different international journals.