Exploring the Acquisition of English Plural Formation and Compounding: Insights from L1 speakers of Libyan Arabic

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Received: February 24, 2025 Accepted: May 8, 2025 Online Published: June 5, 2025

doi:10.5430/wjel.v15n6p325 URL: https://doi.org/10.5430/wjel.v15n6p325

Abstract

One of the most widely studied morphological phenomena in psycholinguistics is the avoidance of regular but not irregular plurals in noun compounds (e.g., *rats eater* vs. *mice eater*). This study addresses this issue by examining the acquisition of English synthetic and root compounding by L1 speakers of Libyan Arabic, focusing on the role of L1 transfer and Universal Grammar (UG) in learning this presyntactic property. Specifically, it investigates whether morphological constraints on plural formation in noun compounds are universally available to second language learners or subject to L1 influence. Participants were selected at different phases of learning English in the classroom to offer an indication of possible developmental progress. A forced-choice gap-filling task was used to investigate how learners apply pluralization rules in English compounds. The results suggest some evidence of L1 influence, but no clear indication of UG influence. Moreover, little development change was observed across proficiency levels. These findings challenge the claims that morphological level-ordering is universally and innately accessible (e.g., Clahsen, 1991; Clahsen et al., 1992; Gordon, 1985). Overall, the results are consistent with an L1 transfer/access to UG view of the L2 acquisition of pre-syntactic properties, without providing strong support for this position.

Key words: L1 transfer, level-ordering, plurality in compounds, UG, Libyan Arabic

1. Introduction

Words can undergo two types of morphological changes: derivational and inflectional operations. Derivational operations create new words from a base. For example, from the verb "*employ"*, a number of words can be formed: *employment, employer, employee* and *employable*. Inflectional operations, on the other hand, modify the base form to meet syntactic requirements. They typically express grammatical features such as number (singular/plural) and tense (present/past). Furthermore, while regular forms follow predictable patterns (to pluralize a count noun, we add -s (e.g., *rat/rats*), and to form the past tense, we add the suffix -ed (e.g., *play/played*)); irregular forms, such as *mouse/mice* and *think/thought*, do not follow these patterns and are considered idiosyncratic (Essa, 2015). Several studies (e.g., Marcus et al., 1992) have argued that native speakers store regular and irregular forms differently in memory. In addition, these forms are acquired differently by first language (L1) and second language (L2) learners. As mentioned above, this study examines a notable aspect of English compound nouns: the restriction on regular plurals within compounds, in contrast to the occasional acceptance of irregular plurals (e.g., *mice eater* vs. **rats eater*). Despite evidence from studies on elicited production (e.g., Clahsen, 1991; Clahsen et al., 1992; Gordon, 1985; Nushi, 2020), the explanation for this distinction remains a subject of debate.

The paper is structured as follows: Section 1.1 outlines SLA theories on L1 influence, UG access, and developmental drivers. Section 1.2. explores the linguistic properties of root and synthetic compounds, focusing on constraints that prevent regular plurals within compounds. Previous research on English word formation constraints is summarized in Section 2 followed by a comparison of English and Arabic compounds in Section 3. The study concludes by reporting findings on the acquisition of English compound nouns by native speakers of Libyan Arabic.

1.1 Theoretical Perspectives on L1 Transfer, UG Accessibility, and L2 Development

Research indicates that L2 learners often struggle with morphological properties, both in early stages and in end-state grammars (Adjémian, 1983; Lardiere, 1998a,1998b; Larsen-Freeman & Long, 1991). Issues include the omission, overgeneralization, or erroneous use of inflectional morphemes associated with functional categories (e.g., AgrP, TP). While some researchers (e.g., Eubank, 1993; Meisel, 1991) attribute these difficulties to impairments in functional categories or features, others propose alternative explanations. For instance, the Missing Surface Inflectional Hypothesis (MSIH) suggests that L2 learners can access abstract functional categories but face challenges mapping these to surface morphology (e.g., Haznedar & Schwartz, 1997; Lardiere, 1998a, 1998b,2000; Prévost & White, 1999, 2000). In contrast, the Full Transfer/Full Access Hypothesis (Schwartz & Sprouse, 1996) proposes that when learning a second language (L2), learners initially rely entirely on the grammar of their first language (L1). As they are exposed to L2 input, they gradually restructure their grammar to align with the L2, guided by UG. In other words, L1 grammar is the starting point, and L2 learning involves adapting it based on the new input. Furthermore, extensions of the Full Transfer/Full Access Hypothesis, such as the Feature Reassembly Hypothesis

(Lardiere, 2009), emphasize the importance of reconfiguring L1 grammatical features to fit the morphosyntactic demands of the L2. This process goes beyond simple transfer, requiring learners to reassemble or repackage L1 features in ways that align with L2-specific structures. For example, learners may need to redistribute features like tense, aspect, or agreement in ways that differ from their L1, which can pose significant challenges (especially when the L1 and L2 differ considerably in how they express grammatical features). On the other hand, the Representational Deficit Hypothesis (Hawkins & Chan, 1997) takes a more restrictive stance, claiming that L2 learners cannot acquire uninterpretable syntactic features (e.g., case or agreement) that are absent in their L1, while interpretable features remain accessiblesible. In short, these theories differ in whether L2 learners fully access UG, partially restructure their L1 grammar, or face inherent limitations in acquiring L2-specific features.

As previously mentioned, this paper investigates a grammatical phenomenon that occurs prior to syntactic operations: the formation of synthetic and root compound nouns. Given that the hypotheses discussed above were primarily developed based on observations regarding the acquisition of syntactic processes in L2 learners, it is crucial to determine how these hypotheses could be applied and tested in the context of a pre-syntactic process. Two types of compounds are examined: synthetic compounds (e.g., *dishwasher*) and root compounds (e.g., *plate cupboard*).

1.2 Synthetic and Root Compound Nouns in English and Their Plural Formation

Compounding is the process of creating new words by merging two or more existing full words. In English, compounds can be formed by combining various types of word classes, such as nouns (N), adjectives (A), verbs (V), and prepositions (P) (Haspelmath, 2002). The examples in (1) and (2) illustrate how noun, adjective, and verb compounds can be generated from different lexical classes:

1. Compound nouns

a. N + N website

b. V+ N breakfast

c. A+N blackberry

d. N+P+N editor-in-chief

2. Compound adjectives and verbs

   a. N+A leadfree

   b. A+A fat-free

   c. N+V babysit

   d. A+V dry clean

As shown in the above examples, a compound can consist of two or more free morphemes that function as a single syntactic unit. However, similar to derivational rules in general, not all compounding patterns are equally productive. For instance, the **N + N** pattern is productive in English whereas the **V + N** is not (Essa, 2015).

Semantically, the first component of a compound noun typically serves to modify the second component. As a result, a '*dishwasher'* is considered a subcategory of '*washer*' rather than a subcategory of '*dish*'. This is because the primary meaning of a compound, known as the *head*, is determined by the second component while the first component is called the *non-head* or *dependent*. According to Fabb (1998), the head of a compound, like the head of a phrase, assigns its categorical status to the entire compound. For instance, a *drawbridge* is a type of *bridge* rather than a type of *draw*. Since *bridge* is a noun, it logically follows that *drawbridge* is also a noun and not a verb (Essa, 2015, pp. 34-35).

Research in L2 acquisition studies (e.g., Garcá Mayo, 2006; Lardiere & Schwartz, 1997; Murphy, 2000) has focused on two types of compounding: root compounds and synthetic compounds. In root compounds, the word is composed of more than one lexeme stem, with neither stem functioning as an argument of the other, as illustrated in (3):

(3) a. snowball

b. bookcase

As the examples show, root compounds do not have deverbal heads, and the exact interpretation of the relationship between the two roots is not always transparent. For example, while a *snowball* is a ball made of snow, a *field mouse* is not a *mouse* made of *fields* but rather a mouse that lives in a field (Essa, 2015, p. 36). Moreover, the interpretation of these compounds often depends on pragmatic factors (Roeper, Snyder & Hiramatsu, 2002; Yamashita, 1997). This suggests that understanding their meaning often requires considering the context in which they are used. For instance, the compounds provided in (4) demonstrate how a single form can convey a range of interpretations:

(4) a. truck-man = a man who drives/repairs/sells/buys ... trucks

b. fish-man = a man who catches/keeps/sells ... fish

c. TV-man = a man who installs/sells/maintains/repairs ... TVs

(Essa, 2015, p.36)

In contrast, synthetic compounds (compounds formed from verbs) differ from root compounds in that there is an evident semantic connection between the head and the non-head in these compounds. Specifically, the non-head must be a word that can directly follow the verb in the related verb phrase as shown in the examples in (5):

(5) a. cake baker

b. (to) bake cake → cake baker

Since synthetic compounds have deverbal heads, their meanings are generally more transparent than those of root compounds. For instance, a *cake baker* can only be understood as *someone who bakes cakes.*

1.3 Compounding and Pluralization in English

Most English compound nouns follow a principle that prevents the non-head noun component from being morphologically marked. Interestingly, this constraint appears to affect regular and irregular plurals differently. Consider the following examples (where (*) denotes ungrammaticality and (?) indicates marginal acceptability):

(6) Root compounds

a. Rat trap	rat traps	*rats trap	
b. Mouse trap	mouse traps	?mice trap	

(7) Synthetic compounds

a. Rat catcher	rat catchers	*rats catcher
b. Mouse catcher	mouse catchers	?mice catcher

(Essa, 2015, pp. 38-39)

As shown in the examples, regular plurals with an -s inflection inside compounds (6a, 7a) are unacceptable, while irregular plurals (6b, 7b) may be marginally acceptable.

One of the main approaches to explaining the asymmetry in how regular and irregular plurals are represented and processed is the level-ordering model (Kiparsky, 1982). According to this model, irregular plurals are processed differently from regular ones, suggesting that learners do not depend solely on input to develop their grammatical systems. In particular, the low frequency of plurals within compounds in the input makes it unlikely for learners to infer the distributional differences between regular and irregular forms. This observation has led some researchers to argue for the presence of an innate morphological constraint (Gordon, 1985). The fundamental concept of level-ordered morphology is that derivational and inflectional processes occur sequentially, at different levels in a specified order as shown in (8):

Level 1: Bare forms and irregular inflection (comprising derivational suffixes

such as –al, -ous, -ity, -th,; and inflectional suffixes such as those in *kept,*

teeth, lice)

Level 2: derivation and compounding (including derivational suffixes such as

–hood, -ness, -er, -ism, -ist).

Level 3: regular inflection (for example, leap**ed**, book**s**, conundrum**s**, etc.)

(adapted from Kiparsky, 1982, p. 3)

The arrangement of the morphological rules shown in (8) can be exemplified through the two compound nouns *rat catcher* and *mouse catcher* presented in (9):

(9) **Level 1**: mouse, mice, rat, catch

Level 2: mouse catcher, mice catcher, rat catcher

Level 3: mouse catchers, mice catchers, rat catchers

Since compounding takes place at level 2, prior to the application of regular inflectional affixes at level 3, regular plural inflection is disallowed within compounds (**rats catchers*). However, irregular plural inflection may be allowed, as in *mice catcher*. It is important to note that pluralizing the first element of an irregular compound (*mice* in this case) is optional, as adults rarely-if ever- use the plural form in such contexts. Kiparsky (1982) argues that the formation of regular plurals differs from that of irregular plurals because irregular plural forms are stored in the lexicon alongside their singular counterparts. As a result, they may appear within compounds as part of the noun stem.

2. The Level-Ordering Model in L1 and L2 Acquisition: Evidence and Challenges

A number of studies have claimed to provide evidence for the level-ordering model in L1 acquisition. Gordon (1985), for example, tested the claims of the level-ordering model by asking 33 English-speaking children (aged 3–5) to create novel compounds using an

elicited-production task. The children were introduced to a Cookie Monster puppet and asked questions about what he eats. They were then shown other objects and asked what to call someone who eats those objects, expecting answers like "X-eater" (e.g., *cookie-eater*). The study included 18 test items, including regular and irregular plurals as well as pluralia tantum nouns (e.g., *scissors*, *clothes*). The results showed that children often produced compounds with irregular plurals, like *mice-eater* (90%), but rarely used regular plurals in compounds, such as *rats-eater* (only 2%). As for pluralia tantum nouns, some were reduced to their singular forms in compounds (e.g., *scissor-eater*), while others were not (e.g., *clothes-eater*). These findings are consistent with the level-ordering model, suggesting that children's lexicons apply morphological rules in a specific order.

However, one could argue that the distinction between regular and irregular forms in English compounds may not stem from innate morphological constraints. Instead, it might arise from a structural difference: regular forms in English are marked with the suffix -s, while irregular forms lack a suffix (Essa, 2015). Therefore, children may observe, through exposure, that only suffix-less forms appear as the non-head noun in compounds. Clahsen, Marcus, Bartke, and Wiese (1996) explored this issue by examining German—a language in which both regular and irregular plural forms are marked with a suffix. Their results mirrored Gordon's findings: children excluded regular plurals from compounds while optionally including irregular ones. Similar patterns were observed in Persian-speaking children (Nushi, 2020), providing additional cross-linguistic evidence in support of the level-ordering constraint. Further evidence for the level-ordering model comes from studies involving children with specific language impairment (SLI). For instance, Grela et al. (2005), Oetting and Rice (1993), and Van der Lely and Christian (2000) found that both typically developing children and children with SLI adhered to the constraint prohibiting regular plurals within compounds. While the findings of the above studies appear to support the predictions of the level-ordering account, this model faces several significant challenges. One major challenge is the existence of exceptions where regular plurals appear in grammatical compounds, such as *pilots union* and *weapons inspector* (Haskell et al., 2003; Selkirk, 1982). Some researchers argue that semantic or syntactic factors may permit such exceptions (Alegre & Gordon, 1996; Kiparsky, 1982; Pinker, 1999). For instance, *drinks cabinet* refers specifically to alcoholic drinks, making it a semantically idiosyncratic item stored in the mental lexicon (Haskell et al., 2003). Yet, the theory fails to explain why some plurals, like *pilots*, qualify as idiosyncratic, while others, like *rats*, do not.

A second challenge comes from cross-linguistic evidence showing that some languages permit regular plurals in compounds, contrary to the predictions of the level-ordering model. Additionally, the model does not account for the distinction between root and synthetic compounds (Lardiere, 1995b). For example, Lardiere observed that children produce regular plurals exclusively in root compounds—a distinction the level-ordering model cannot explain.

As for L2 learners, the applicability of the level-ordering model to L2 acquisition has yielded mixed results. Clahsen (1995), for instance, found that 11 adult L2 learners of German with Romance language backgrounds excluded regular plurals from compounds. However, Lardiere (1995a) found that Spanish-speaking L2 learners allowed regular plurals in compounds 77% of the time, while Chinese speakers did so only 30% of the time. Both groups produced irregular plurals more frequently than regular ones, leading Lardiere to conclude that level-ordering is not universally applicable in L2 acquisition. Similarly, Essa (2015) investigated the acquisition of English plural formation and compounding by L1 speakers of Libyan Arabic. Although the methodology closely followed Gordon's (1985) elicited-production task, the results echoed those of Lardiere: learners produced more plural non-heads in compounds than singular forms. Essa argued that Arabic-speaking learners do not consistently adhere to English compounding constraints and may instead rely on L1 structures or distributional patterns in the input. In another study, Murphy (2000) further explored these issues in L2 acquisition. A total of 100 adolescent Francophone ESL learners and 15 adult native-speaker controls were tested on a compounding task. The non-native speakers were divided into three groups based on their school's in-house proficiency test, with the aim of examining whether proficiency influenced compound generation. Unlike Gordon's (1985) and Lardiere's (1995a) studies, participants in this study were asked to write the compounds rather than produce them orally. Since compound formation in French is similar to English in that regular plurals rarely appear inside compounds, it was expected that the French learners would avoid using regular plurals in such constructions. However, the results revealed a different pattern. The native speakers allowed irregular plurals inside compounds 28% of the time but produced regular plurals in only 1.7% of cases. In contrast, the non-native learners used regular plurals within compounds approximately 46% of the time, with 81 out of 100 participants producing at least one such example. They also accepted irregular plurals over 70% of the time. Interestingly, proficiency did not appear to influence the participants' compound production: learners across all levels allowed regular plurals at similar rates. Although irregular plurals were more frequent than regular ones, Murphy concluded that the level-ordering model was not supported, as learners consistently produced regular plurals within their compounds. Methodological considerations, such as priming effects in elicited production tasks, have also been raised in the literature. For instance, Gordon's (1985) methodology may have influenced participants to favour irregular plurals. In response to such concerns, researchers have employed alternative methods—such as eye-movement tracking (Cunnings & Clahsen, 2007) and acceptability judgment tasks (Haskell et al., 2003)—which have confirmed that irregular plurals are generally rated as more acceptable than regular ones in compounds. These studies have also revealed a more nuanced three-way preference: singular non-heads tend to be most acceptable, followed by irregular plurals while regular plurals are consistently dispreferred. To account for these patterns, Haskell et al. (2003) proposed that the acceptability of plural modifiers in compounds depends primarily on phonological and semantic constraints rather than on morphological rules. Specifically, they argue that such preferences reflect general properties of pluralization and compounding found in the linguistic input available to children. This input-driven explanation is further supported by Banga et al. (2013), who observed a similar preference for singular modifiers in Dutch and English

compounds. However, Berent and Pinker (2007) challenge this explanation, demonstrating that even phonologically identical regular and irregular plurals are rated differently in terms of acceptability—a finding that lends support to a morphological account.

In conclusion, the broader body of evidence consistently demonstrates a dispreference for plural non-heads in compounds, with irregular plurals generally rated as more acceptable than regular ones. While input-based accounts emphasize the influence of exposure and distributional frequency, morphological constraints appear to play a more decisive role in driving this asymmetry. These findings underscore the complexity of pluralization within compound structures and point to the need for further research—particularly in L2 contexts—to better understand how such constraints are acquired and applied by language learners.

3. Compounding in English and Arabic: A Comparative Perspective

Lexicalist theories (Di Sciullo & Williams, 1987; Lieber, 1983; Roeper & Siegel, 1978; Selkirk, 1982) argue that complex and compound words are derived through lexical rather than transformational rules. Central to these theories is the First Sister (FS) Principle (Roeper & Siegel, 1978), which explains how certain types of compounds—specifically synthetic compounds—are formed. According to this principle, a noun in the first sister position of the verb is incorporated into the compound during word formation. For example, in the compound *window cleaner*, the noun *window* functions as the verb's first sister and is incorporated into *clean* to form a well-structured compound (Roeper & Siegel, 1978). This explains why *peacemaker* is acceptable (*he made peace*), while *peacethinker* (*he thought peace*) is not a valid construction as it violates the structural requirements of the FS Principle. In this way, the FS Principle offers a systematic framework for understanding how meaning and structure interact in the formation of English synthetic compounds.

When comparing compound nouns in English and Arabic, significant differences emerge. English compounds are predominantly right-headed, following the Right-hand Head Rule (RHR) (Williams, 1981; Selkirk, 1982), which states that the head of a compound is the rightmost element. For instance, in *dishwasher*, *washer* is the head. However, it should be noted that this pattern is not universal. While English compounds are typically right-headed, compounds in other languages —such as Arabic— are left-headed as shown in the examples in (10):

Libyan Arabic		English
a. ġassa:lit	ṣwa:ni	dishwasher
Washer-sing	dishes-pl	
'dish-washer'		
b. du:la:b	'aħdiya	shoe cupboard
cupboard-sing	shoes-pl	
'shoe cupboard'		

(Essa, 2015, p.85)

In *ġassa:lit ṣwa:ni* ('*dishwasher*'), the head *ġassa:la* ('*washer'*) precedes the modifying noun *ṣwa:ni* ('*dishes'*) (Ryding, 2005). Arabic compounds often follow the ida:fa (annexation) construction, where the first noun (the head) is modified by the second noun. These structural differences highlight cross-linguistic variation in compounding patterns.

Thus, a key distinction lies in the formation of synthetic compounds (Roeper & Siegel, 1978; Selkirk, 1982). In English, the first sister of the verb is incorporated into the head during nominalization, as in *dishwasher* ('something that washes dishes'). In Arabic, however, the first sister remains in postverbal position and does not incorporate into the head, allowing pluralization of the non-head noun. For example, *ġassa:lit ṣwa:ni* ('*dishwasher'*) retains the plural form of *ṣwa:ni* ('*dishes'*), whereas in English, the non-head is typically singular (*dishwasher*) (Di Sciullo & Williams, 1987). Furthermore, English synthetic compounds disprefer regular plurals in the non-head position (e.g., *cars washer* is strongly dispreferred), though irregular plurals (e.g., *mice eater*) are sometimes acceptable (Pinker & Prince, 1992). This suggests that incorporation in English occurs before inflectional rules apply, whereas Arabic allows pluralization of the non-head noun.

Another important distinction is found in root compounds, which are formed by merging two open-class words. In English, this process is highly productive and allows for recursive compounding, as in *restaurant coffee cup* (Roeper, Snyder, & Hiramatsu, 2002). Roeper et al. (2002) propose the Root Compounding Parameter (RCP), which states that some languages permit the combination of non-maximal projections through set-merger. English has a positive RCP value, enabling productive root compounding with a range of potential meanings (e.g., *frog man* can mean '*undersea diver*,' '*man who collects frogs*,' or '*man resembling a frog'*). In contrast, Arabic has a negative RCP value, limiting root compounding to fixed, conventionalized forms with specific meanings (e.g., *ḍifdaʕ baʃari* ('*frog human'*) only means 'undersea diver') (Bauer, 1978; Roeper et al., 2002). This difference in productivity and flexibility underscores the parametric variation between the two languages.

Based on the above discussion, these cross-linguistic differences have significant implications for L2 acquisition, particularly for Arabic-speaking learners of English. The formation of synthetic and root compounds in English and Arabic can be explained through parametric variation, specifically the Incorporation of First Sister Parameter and the Root Compounding Parameter (Roeper et al., 2002). Since English is different from Arabic in that it allows the incorporation of the verb's first sister in synthetic compounds and productive root compounding through set-merger, Arabic-speaking learners may initially transfer L1 compounding structures into their L2 English.

However, as proficiency increases, learners may reset parameters to align with English, demonstrating the role of Universal Grammar (UG) in L2 development (Roeper, 1988; Keyser & Roeper, 1992). Evidence of UG-constrained learning includes a preference for singular non-heads in synthetic compounds, the disallowance of regular plurals in synthetic compounds (with limited acceptance of irregular plurals), and the acquisition of productive root compounding with novel interpretations. This process highlights the interplay between L1 transfer and UG-constrained development in second language acquisition. Furthermore, these cross-linguistic differences raise the question of whether L2 learners transfer L1 properties into their L2 grammar. The Full Transfer/Full Access hypothesis (Schwartz & Sprouse, 1994, 1996) predicts that Arabic-speaking learners will initially allow structures like washer dishes due to L1 influence. However, as proficiency increases, learners are expected to reset these features based on L2 input and UG access.

4. The Study

This study aims to further examine the differences between L1 and L2 acquisition in relation to compounding and inflection. As discussed above, while plural modifiers, especially regular plurals, are generally disfavoured within compounds in English, L2 learners seem to allow both regular and irregular plurals in such contexts (e.g., Lardiere, 1995; Murphy, 2000; Essa, 2015). This study aims to investigate this phenomenon by examining the acquisition of English plurality and compound formation by L1 speakers of Libyan Arabic. Drawing on the preceding analysis of L1 and L2 studies on compounding and plurality, the following four research questions are proposed:

(i) To what extent do Arabic-speaking learners transfer the structural patterns of Arabic compound nouns into their L2 English grammar?

(ii) How do Arabic-speaking learners of English compare to native speakers in their acceptance of regular plurals within English synthetic and root compounds?

(iii) Are there observable differences between Arabic-speaking learners and native speakers in their treatment of regular versus irregular plurals in the production of synthetic compounds?

(iv) To what extent does the proficiency level of the Arabic-speaking learners influence their acceptance of different types of English compounds?

4.1 Method: forced-choice gap-filling task

A forced-choice gap-filling task was administered to two participant groups: native speakers of English and L1 speakers of Libyan Arabic. The goal of this task was to eliminate any potential artifacts arising from the specific methodology of Gordon's experiment (it is worth recalling that in Gordon's study, participants were presented with plural non-heads, such as "*what do you call someone who eats rats*?" which may have influenced their responses). It is important to note that this task is similar to the one employed by Berent and Pinker (2007).

4.2 Participants

36 native speakers of Libyan Arabic participated in the study. They were all undergraduate students, enrolled in the department of English at Almergib University. There were 18 first-year students: 8 males and 10 females; and 18 fourth-year students: 6 males, 12 females. The mean age was (19.6) for the first-year students and (21.2) for the fourth-year group. There was also a control group of 10 native speakers of English: 4 females and 6 males.

It should be noted that the non-native speakers' proficiency level was determined based on the scores received in the placement test, their university course results and their teachers' evaluation report. On average, the learners started learning English at around the age of 12 within a classroom environment. While the instructors were native Arabic speakers, English was the primary language of instruction, with Arabic used only sparingly. None of the participants were informed about the overarching objective of the study.

4.3 Materials

As outlined earlier, the primary goal of this study was to examine how L1 speakers of Libyan Arabic acquire English root and synthetic compounds. In this task, participants were presented with a pair of sentences. The first sentence introduced an activity performed by a person or described the function of an object, as illustrated in examples (11) and (12). The second sentence was incomplete but included three possible expressions to complete it. Participants were asked to read both sentences and select the expression that best described the action or purpose of the device mentioned in the first sentence. 32 sentences were used in this study (see Appendix B for the experimental items).

(11) a. John likes eating salad.

b. I call him the..... (salad eater- salads eater- eater salad).

→

b'. I call him the..... (<u>salad eater</u>- salads eater- eater salad).

(12) a. This shed is used for storing wood.

b. I call it the…….. (shed wood – woods shed – wood shed)

→

b'. I call it the…….. (shed wood – woods shed – <u>wood shed)</u>

(Essa, 2015, p. 116)

4.4 Procedure

The participants were divided into two groups, with two testing sessions conducted. The first session was designed for the first-year students and was held in a language lab, followed by the second session for the fourth-year students. As for the native speakers, they were tested in a quiet office at the University of Leeds. The experimental items and fillers were pseudo-randomized to ensure that no two items of the same compound type were placed next to each other. Participants were initially presented with a set of practice items to familiarize them with the task. The entire experiment took about 25 minutes.

5. Results

This section presents the study's results. The study aimed to examine whether:

(i) Libyan-Arabic-speaking learners of English transfer the structure of Arabic compound nouns into their L2 English grammar.

(ii) (ii) native and non-native speakers differ in their acceptance of regular plurals in English synthetic and root compounds.

(iii) (iii) native and non-native speakers treat regular and irregular plurals differently in synthetic compounds.

(iv) (iv) proficiency influences the types of compounds Arabic-speaking L2 learners of English accept.

Scoring was based on counting the number of Object-Verb (OV) compounds selected with an uninflected non-head noun (e.g., *story teller*), OV compounds selected with a plural-inflected non-head noun (e.g., *stories teller*), and Verb-Object (VO) compounds selected (e.g., *teller stories*).

Recall that the initial research question examines whether the L2 learners show any tendency to select VO compounds (similar to the compound structure in Arabic). As shown in Table 1, in the case of synthetic compounds, the L2 learners predominantly avoided selecting sentence completions with VO order: very few instances were observed. As for the regular plurals inside OV compounds, while the native speakers rarely selected the compound with a non-head plural (**cars washer*), non-head plurals were more common among the Arabic speakers.

Table 1. Results on test items eliciting synthetic compounds

Test Item	1st Years (N = 18)	4th Years (N = 18)	Native Speakers (N = 10)
Car washer (Nsing-Ver)	27/108 (25%)	41/108 (38%)	57/60 (95%)
*Cars washer (Nplur-Ver)	77/108 (71%)	65/108 (60%)	3/60 (5%)
*Washer cars (VO)	4/108 (3.7%)	2/108 (1.85%)	0/60 (0%)

An independent samples Kruskal-Wallis test was conducted to compare the three groups (1st year students, 4th year students, and native speaker controls). The results revealed significant differences for regular synthetic compounds with the OV word order: *car washer* (χ^2 = 23.026, df = 2, $p < .001$) and *cars washer* (χ^2 = 22.340, df = 2, $p < .001$). This difference was entirely attributed to the variation between the Arabic speakers and the native speaker controls. Further analysis using Mann-Whitney U tests revealed no significant differences between the 1st-year and 4th-year groups.

As for root compounds (e.g., *cupboard plates*), there were very few instances of VO sentence completions. The Kruskal-Wallis test showed no statistically significant differences between the three groups (χ^2 = 5.101, df = 2, p = .078). Nevertheless, the L2 participants showed a clear tendency to favour compounds with regular plural non-heads as table 2 shows.

Table 2. Results on test items eliciting root compounds

Test Item	1st Years (N=18)	4th Years (N=18)	Native Speakers (N=10)
Plate cupboard	11/108 (10%)	25/108 (23%)	56/60 (93%)
*Plates cupboard	89/108 (82%)	78/108 (72%)	4/60 (7%)
*Cupboard plates	8/108 (7%)	5/108 (4%)	0/60 (0%)

An independent samples Kruskal-Wallis test comparing the three groups showed significant differences between the Arabic-speaking groups and native speakers for regular root compounds (*plate cupboard*: χ^2 = 25.570, df = 2, $p < .001$; *plates cupboard*: χ^2 = 23.359, df = 2, $p < .001$). However, no significant differences were found between the two non-native speaker groups. It is worth noting that a total of 15 participants, including 10 first-year students and 5 fourth-year students, predominantly used regular plurals inside compounds.

As shown in Figure 1, when comparing the proportions of non-head plurals in synthetic and root compounds, all three groups showed a tendency to allow more plurals in root than in synthetic compounds.

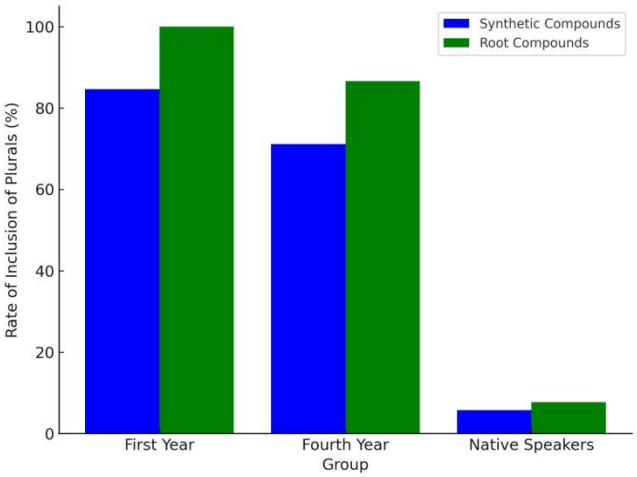

Figure 1. Rate of inclusion of regular plurals inside synthetic and root compounds for native speakers and L2 learners

Regular vs. irregular synthetic compounds

The third research question examined whether Arabic learners and native speakers differ in their treatment of regular and irregular plurals when producing synthetic compounds. Tables 3 and 4 present a comparison of the selections made by participants during the forced-choice elicitation task. As the tables show**,** neither of the L2 groups displayed a strong preference for compounds with VO word order, the typical structure of Arabic compounds.

Table 3. Comparison of regular plural selection in synthetic compounds

response Type	1st Year (N = 18)	4th Year (N = 18)	Native Speakers (N = 10)
Nsing-Ver: Car washer	27/108 (25%)	41/108 (38%)	57/60 (95%)
*Nplur-Ver: Cars washer	77/108 (71%)	65/108 (60%)	3/60 (5%)
Other: *Washer cars	4/108 (3.7%)	2/108 (1.85%)	0/60 (0%)

Table 4. Comparison of irregular plural selection in synthetic compounds

Sentence: This man likes washing cars. I call him a...

Response Type	1st Year (N = 18)	4th Year (N = 18)	Native Speakers (N = 10)
Nsing-Ver: Mouse catcher	14/108 (13%)	21/108 (19%)	53/60 (88%)
Nplur-Ver: Mice catcher	91/108 (84%)	87/108 (80%)	7/60 (11%)
Other: *Catcher mice	3/108 (2.77%)	0/108 (0%)	0/60 (0%)

Figure 2. illustrates the difference in the choice of plurals in OV compounds, comparing cases involving regular non-heads to those with irregular plurals. The graph clearly shows that all three groups exhibit a stronger preference for irregular plural non-heads over regular ones.

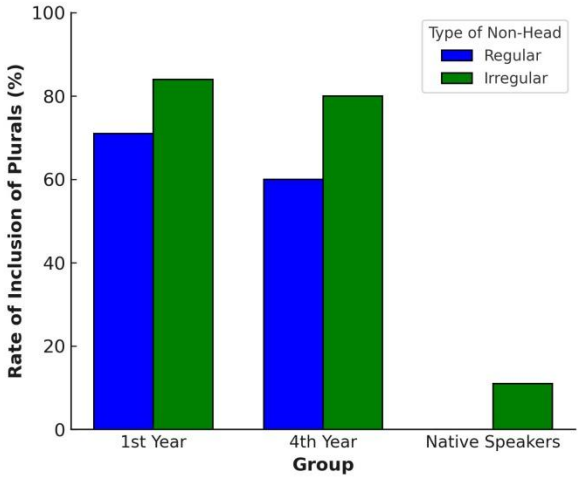

Figure 2. the rate of inclusion of regular and irregular plurals inside synthetic compounds for native speakers and L2 learners

An independent samples Kruskal-Wallis test was conducted to compare the three groups (1st-year students, 4th-year students, and native speaker controls) on their selection of compounds with OV word order. The results revealed significant differences in the selection of irregular singulars and irregular plurals: *mouse catcher* ($\chi^2 = 21.756$, df = 2, $p < .001$) and *mice catcher* ($\chi^2 = 23.023$, df = 2, $p < .001$). While

L2 participants showed a preference for irregular plurals over singulars, native speakers displayed the opposite pattern, favouring singular forms.

Furthermore, a non-parametric repeated-measures Wilcoxon signed-ranks test was conducted to compare the selection rates of sentence completions involving regular versus irregular plurals. The results revealed that the differences were marginally significant at the 5% level for first-year students ($z = 1.968$, N-Ties = 13, $p = .049$), significant for fourth-year students ($z = 2.444$, N-Ties = 14, $p = .015$), and non-significant for native speakers ($z = 1.134$, N-Ties = 4, $p = .257$).While L2 learners seem to violate level-ordering by frequently allowing regular plurals within compounds, they still show sensitivity to the distinction between regular and irregular plural forms, as reflected in their preference for sentence completions with irregular plurals.

As for the proficiency effect, it is evident that proficiency did not influence compound production: the two groups did not differ in the number of regular and irregular plurals produced in their compounds.

6. Discussion

In section 1.1, it was noted that many of the general hypotheses about second language acquisition (SLA)—such as Full Transfer/Full Access—have primarily relied on evidence from the acquisition of morpho-syntax to support their claims. However, it is crucial to determine whether these proposals extend to pre-syntactic properties such as the knowledge of English synthetic and root compounding (a lexical phenomenon). The study was conducted within the general framework of the principles and parameters model of linguistic knowledge. It aimed to explore the degree to which L1 transfer, access to UG properties, and common patterns of developmental restructuring in grammatical knowledge could be observed.

The experiment revealed only limited evidence that Libyan-Arabic-speaking learners of English transfer the VO (verb-object) order of Arabic compounds into English synthetic compounds. Instead, participants consistently selected the English OV (object-verb) order, as in *mouse catcher*. This finding suggests that the participants, who were moderately proficient in English, did not rely on their L1 word order when forming English compounds. It is, however, possible that L1 influence is more prominent at lower proficiency levels, a hypothesis that requires further exploration in future studies.

The study also explored whether the OV structure of the participants' synthetic compounds is the result of having acquired the positive value of the noun incorporation parameter (Keyser & Roeper, 1992). If this is the case, the participants should obey the UG principle of level-ordering which excludes the possibility of the plural marking of incorporated regular plural nouns. According to level ordering, synthetic compound noun formation applies before the inflectional process of plural marking applies. At the same time, irregular plurals may appear in synthetic compounds because they are assumed to be stored as whole forms in the lexicon, and may be selected for noun incorporation. In this study, the behaviour of native speakers is consistent with previous findings, such as those by Clahsen (1995), who observed that L2 learners of German disallowed regular plurals inside compounds while permitting some irregular plurals. In contrast, the Libyan Arabic-speaking learners showed a clear preference for plural non-head nouns over singular forms (e.g., *shoes polisher* over *shoe polisher*). Over 60% of their responses included regular plural non-head nouns, indicating that they may not have acquired the UG constraint of level ordering. This raises important questions about their access to UG in this domain.

An alternative explanation is that the learners are not employing noun incorporation but rather a looser merger operation that combines two nouns after inflectional morphology has applied. This process would allow both singular and plural forms (e.g., *shoe polisher* or *shoes polisher*). Interestingly, the L2 participants produced more irregular than regular plurals. This difference may indicate that they are sensitive to the varying frequencies of regular plurals (which occur infrequently) and irregular plurals (which appear more frequently) in the input they encounter. However, this sensitivity does not seem to directly influence their use of plurals. If it did, they would likely use far fewer regular plural non-head nouns. Moreover, the L2 learners' sensitivity to input frequency might explain why they allowed more regular plurals in root compounds than in synthetic compounds. These findings suggest that the Libyan Arabic speakers may not have reset the noun incorporation parameter from its negative value in Arabic to its positive value in English. Instead, they appear to be using a conjunction operation to model English compounds without recognizing the role of noun incorporation. This does not necessarily indicate a lack of access to UG but rather suggests that parameter resetting may occur at higher proficiency levels than those tested in this study.

With regard to Proficiency, it did not appear to significantly influence the results, as even advanced learners allowed plurals inside compounds —similar to the findings reported in Murphy's (2000) study. However, since all participants were moderately proficient, a potential proficiency effect cannot be entirely ruled out. Therefore, further investigation with less proficient learners would be necessary to test this possibility.

The lack of significant transfer effects, such as the VO order from Arabic, does not align with the Full Transfer/Full Access Hypothesis. However, since the participants were not beginners, transfer effects— which are typically expected during the initial stages of L2 acquisition—may not have been evident in the results. Therefore, testing learners with lower proficiency levels could offer clearer evidence of potential L1 influence. This study also highlights the impact of methodological variations on results. Recall that previous studies have employed a range of methods, including elicited production tasks (e.g., Gordon, 1985; Lardiere, 1995; Essa, 2015), acceptability judgment tasks (e.g., Haskell et al., 2003), and eye-movement tasks (e.g., Cunnings & Clahsen, 2007). Given that different methodologies can lead to varied findings (Birdsong, 1989; Murphy, 1997), we adopted a different approach to assess consistency with prior studies. Unlike Gordon's study, our forced-choice gap-filling task required participants to select the correct compound form from three options. Since the results of this study were consistent with previous research using other methods, the validity and reliability of our findings appear to be strengthened.

Finally, this study highlights the limitations of input-based explanations in accounting for the dissociation between regular and irregular plurals in compounds. English input provides limited evidence for these restrictions, as compounds rarely contain either regular or irregular plural forms. Moreover, the existence of exceptional cases where regular plurals occur in non-head positions adds further complexity to the learning process. These findings suggest that input alone may not be sufficient for learners to acquire the constraint against regular plurals within compounds, and that explicit instruction or corrective feedback may be necessary to support accurate acquisition.

7. Conclusion

In conclusion, this study examined the acquisition of English compounding and pluralization by L1 speakers of Libyan Arabic, focusing on the role of L1 transfer and Universal Grammar. The findings indicate that learners did not strongly transfer Arabic compound structures into English but frequently allowed regular plurals inside compounds, contrary to the predictions of the level-ordering model. While native speakers adhered to the constraint against regular plural non-heads, L2 learners showed a preference for pluralized non-heads, particularly in root compounds. The results suggest that learners may not have fully acquired the UG-based constraint but exhibit sensitivity to the distinction between regular and irregular plurals. Furthermore, proficiency levels did not significantly influence the results, suggesting that parameter resetting may occur at higher proficiency levels than those tested. Overall, the study highlights the complexity of L2 acquisition of morphological constraints and underscores the need for further research, particularly with less proficient learners, to better understand the interplay between L1 transfer, UG, and developmental restructuring in second language acquisition.

Acknowledgments

Not applicable.

Authors' contributions

Not applicable.

Funding

Not applicable

Competing interests

Not applicable

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Appendices

Appendix A Participant Personal Information form

Name	
Age	
Sex	
Native language	
Country of origin	
Glasses/contacts	
Other language spoken	
Age started learning English	
Time in English speaking country	
Opportunity to leaning English outside university	
Daily communication in English	

Appendix B Experiment : Forced-choice gap-filling task

1) a. John likes washing cars.

b. I call him the..... ..... (washer cars - car washer- cars washer)

2) .a. This cupboard is used to put plates in.

b. I call it the..... (Plate cupboard- plates cupboard- cupboard plates)

3) a. Chris always shoots geese on Fridays.

b. I call him the..... (shooter geese- geese shooter-goose shooter)

4) Arguments arose as soon as the three..... (Mother-in-laws, mothers-in-law, mothers-in-laws) arrived.

5) That tailor makes good jeans

b. I call him the..... (jeans maker- maker jeans- jean maker).

6) a. Olivia likes collecting stamps.

b. I call her the..... (stamps collector- stamp collector- collector stamps)

7) a. This cupboard is used to put shoes in.

b. I call it the..... (shoe cupboard- shoes cupboard- cupboard shoes).

8) a. This tool is used for catching mice.

b. It is called the..... (mouse catcher - mice catcher- catcher mice)

9) a. This box is used to put cheese in.

b. I call it the..... (cheeses box- box cheeses- cheese box).

10) That man buys three bunches of (lilies of the valley, lily of the valleys, lilies of the valleys) for his wife every day.

11) a. Jack likes handling dogs.

b. I call him the..... (handler dogs- dogs handler- dog handler)

12) a. This cupboard is used to put keys in.

b. I call it the..... (keys cupboard - key cupboard- cupboard keys).

13) a. George hates lice because they make him scratch his head all day.

b. I call him the..... (lice hater- hater lice -louse hater)

14) a. This box is used to put jewellery in.

b. I call it the..... (box jewellery- jewelleries box- jewellery box).

15) During her visit to the city, the queen was accompanied by two of her..... (ladies-in-waiting, ladies-in-waitings, lady-in-waitings).

16) a. My grandma likes telling stories.

b. I call her the..... (teller story- story teller- stories teller)

17) a. this box is used to put pens in.

b. I call it the..... (pens box- pen box- box pens).

18) a. My cat likes killing mice.

b. I call her the..... (mouse killer- mice killer-killer mice).

19) a. Caity loves salad so much.

b. I call her the..... (lover salad – salads lover- salad lover).

20) The president chose five..... (editor-in-chiefs, editors-in-chief, editors-in-chiefs) to represent the country in the press conference.

21) a. My friend's dad polishes shoes.

b. I call him the..... (shoes polisher- polisher shoes- shoe polisher)

22) a. this box is used to put letters in.

b. I call it the..... (letter box- box letters- letters box).

23) a. Julia's Mum loves children so much.

b. I call her the..... (children lover- child lover- lover children).

24) a. This box is used to put goods in.

b. I call it the ..... (box goods- goods box- good box).

25) a. Jody sells cutlery in the market.

b. I call her the..... (cutlery seller- seller cutlery- cutleries seller)

26) a. This tool is used to open cans.

b. It is called the..... (cans opener - can opener- opener cans)

27) a. this box is used to put post in.

b. I call it the..... (post box- box post- posts box).

28) a. My grandfather likes collecting pottery.

b. I call him the..... (potteries collector- collector pottery- pottery collector).

29) a. this box is used to put toys in.

b. I call it the..... (box toys- toys box- toy box).

30) a. That boy always chases geese.

b. I call him the .....(goose chaser-chaser geese- geese chaser)

31) a. Her child loves chocolate so much.

b. I call him the..... (chocolates lover- lover chocolate- chocolate lover).

32) a. That man always drinks beer in the evening.

b. I call him the..... (beers drinker- drinker beer - beer drinker).