

ARAB EFL LEARNERS' STRESS OF COMPOUND WORDS

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Abstract

Compound words are ubiquitous in English. Stressing compounds is difficult for EFL learners and native speakers, especially when the meaning is not a sum of the constituent parts. This study explores Arab EFL learners' stress strategies and outlines their difficulties. It examines whether any of these factors (a) word class, (b) orthography, (c) understanding of phonetics and phonology, (d) age and (e) grade point average (GPA) influence their behaviour and levels of success. It involves 130 second and third-year Jordanian English majors in reading 50 opaque non-frequent compound words, 25 with right-stress and 25 with left-stress. The majority opted for right-stress, producing about half of the stimuli correctly. They right-stressed more often in compound verbs, nouns and adjectives of all spelling forms. Their performance was slightly influenced by the study of phonetics and phonology, training in stress and GPA. However, there was no noticeable relationship between their stress performance and age. Notably, the subjects needed more training in compound word stress production.

Keywords: English compound words, compound word stress, Arabic prosody, Arab EFL learners

1. Introduction

Compounding is a frequent and straightforward mechanism to create extra words for illustrating new concepts, objects, etc., and broaden the repertoire of a language (see Clark et al., 1986). It is highly productive for word formation in many languages: English, Vietnamese and all North Germanic languages (Finkbeiner and Schlücker, 2019; Nguyễn and Ingram, 2007). Ayto (1996:65–66) argues that an analysis of the first volume of the *Longman Register of New Words* showed compounds representing 39.8% of new words. A similar analysis of the *Macquarie Dictionary of New Words* revealed that compounds accounted for up to 54.5% of instances.

Besides compounds' semantic and syntactic features, stress remains a central issue in determining their correct usage. Stress distinguishes compound nouns, such as 'White House' (the official home of the President of the US), from the more productive attributive phrase pattern containing a modifier and head noun, i.e. 'white 'house' (a house that is white). The same is true for

lexical units such as ‘hot dog’ vs. ‘hot 'dog’, ‘greenhouse’ vs. ‘green 'house’ and ‘redhead vs. ‘red 'head’. Both compounds and phrases are segmentally identical and prosodically distinct; they may be minimal pairs (Bauer, 1998; Giegerich, 2004). Chomsky and Halle (1968) have established the following two rules for compound words and phrasal stress: (a) the “compound stress rule” where the stress falls on the leftmost constituent, be it a noun, verb or adjective, and (b) the “nuclear stress rule” where stress is assigned to the rightmost constituent. Some authors claim that compounds and phrases used attributively may also differ significantly in length – where the latter are slightly longer than compounds (see Farnetani, Torsello, and Cosi, 1988; Ingram et al., 2003, as cited in Plag et al., 2008). However, several other studies (e.g., Fudge, 1984; Lieberman and Sprout, 1992) revealed many exceptions to this rule. Phoneticians usually find it difficult to account for the puzzling behaviour of the variable compound stress, especially noun-noun constructions.

EFL learners have problems articulating English compounds correctly. In essence, they encounter difficulty assigning stress to the correct element; Arab EFL learners are no exception. Findings from earlier research (see section 2) lead to the inevitable conclusion that Arab learners encounter problems stressing compound words correctly. These problems stem from the unpredictability of English compound stress and L1-L2 compound stress differences. Taylor (1991: 67) states, “English does not seem to be at all consistent in the way it treats compounds, either from the point of view of writing or from their pronunciation and especially stress”. Some compound word stress variations may baffle native speakers, let alone EFL learners (Fromkin, Rodman and Hyams, 2011). Idiomatic opacity and some syntactic and lexicalisation factors may also exacerbate the problem. There is sound evidence that the latter posed genuine problems for EFL learners and hindered their comprehension of compounds (Charteris-Black, 1998), mainly as some would be idiomatic and syntactically opaque.

Few studies explored Arabs’ stress strategies in common English items, including only small numbers of frequent compounds. It was, therefore, necessary to conduct in-depth research to explore Arab learners’ compound word stress involving more compound words and subjects. The primary focus will be on two-element compound words, including the three most frequent cases of compounding – compound adjectives, nouns and verbs. The aim is twofold: (a) exploring how Arab EFL learners handle compound word stress, and whether L1 stress strategies influence their stress patterns and (b) investigating whether any other factors such as word class, spelling form, age, grade point average (GPA) and training in compound stress influence stress assignment. Specifically, this will show how such factors affect their discourse intelligibility and highlight difficulties to be appropriately addressed.

1.1. English compound words

A *compound* is a “lexical unit” with two or more words strung together to form a new construction, functioning “grammatically and semantically as a single word” (Quirk et al., 1985: 1567). Thus, a noun such as ‘post’ can combine with another word to form a compound noun, adjective and verb as in ‘post code’, ‘postdoctoral’ and ‘postdate’, respectively. The new construction becomes a permanent part of the language and the meaning is self-evident or idiomatic. Structurally, Williams (1981) points out that English compounds follow the right-hand head rule, where the rightmost constituent in a compound is always the head. Heads usually determine the morphological, syntactic and semantic properties of the compound.

Compounds fall into two categories (Lieber, 1992): synthetic (or deverbal) compounds, e.g. ‘pan fried’, ‘school teacher’ or root compounds, e.g. ‘rattlesnake’, ‘watertank’. The former is a construction whose head, the rightmost element, is derived from a verb and is labelled as the ‘stem’. The first element is known as the ‘argument’ of the stem. The latter, root compounds, is a construction headed by an underived noun and differs from other compounds headed by deverbal nouns because their head does not take an argument (see Roeper and Siegel, 1978).

When the construction segments belong to the same part of speech, the resulting unit is of the same grammatical category. Where they belong to different word categories, the part of speech of the whole construction is that of the second element (Fromkin et al., 2011).

1.2. Compound nouns, verbs and adjectives

English allows several compounds that can be made from all word classes. The three most common types are:

- (a) Compound nouns where one noun is paired with another noun (or possibly with another word class), e.g. ‘soap opera’, ‘toothpaste’ and ‘pickpocket’
A nominal compound is a fixed expression with two or more words making up a lexical unit that functions as a noun. Compound nouns account for approximately 90% of compound words (Gimson, 1989). There are diverse compound noun structures that can yield various meaning relations (Carter and McCarthy, 2006).

Compound nouns can be created using any part of speech, not being limited to nouns, and fall into some 12 categories (see Aarts, 2011), with “noun-noun”, e.g. ‘water tank’, ‘bathtub’, ‘bedroom’ and ‘bus stop’ and “adjective-noun”, e.g. ‘fast food’, ‘wet nurse’, and ‘blackbird’, by far the most frequent subtype).

Orthography can vary according to its meaning and the word classes of its constituents. For example, the compound noun 'redhead' means "a person with red-orange hair", but the construction 'red head' means "a red head". Semantically, distinct elements can combine to produce agentive, instrumental or other constructions.

- (b) Compound adjectives where one adjective is paired with another adjective (or possibly with another word class), e.g. 'fat-free', 'oven-ready' and 'redbrick'. These comprise two or more words functioning as an adjective. Hart (1994) claims compound adjectives constitute about 1/12 of compound nouns; they are mostly hyphenated: 'green-eyed' and 'cold-blooded'.
- (c) Compound verbs, where two separate words combine in a structure that functions as a verb, where either or both of the parts could be verbs on their own but usually the last one is a verb, e.g. 'double-park', 'sky-dive' and 'house-sit'. A compound verb usually comprises one element, a head, preceded by a modifier, being another verb, a noun, an adjective or a preposition, e.g. 'break dance', 'dry clean', 'spoon feed' and 'underachieve', respectively (see Bauer, 1983: 207-209).

Authorities do not unanimously "agree on how to delimit" or possibly style the class of the individual compounds (Aarts, 2011, "Compounding", para 1); it usually takes years to achieve a high degree of consistent format. According to Jackson and Zé Amvela (2000: 82–83), the part of speech of the second element of a compound word determines the whole compound's part of speech. If the compound's constituents belong to the same word class, e.g. N–N, the resultant construction will belong to the same part of speech as the constituents.

1.3. Compound words stress patterns

Compound stress patterns, like word stress patterns, are key to stating the speaker's precise intention of any construction. Several factors appear to affect compound stress placement, including syntactic, semantic, orthographic and morphological characteristics, along with the number of syllables in the compound word.

English compounds have primary and secondary stress patterns. The first element of a compound often bears the primary accent and the second element the secondary one. It usually applies to compound nouns of the structure N–N (see Giegerich, 2004), particularly in constructions with open- and closed-forms, e.g. 'dream ₁ticket', 'picture ₁messaging' and 'dish ₁washer'. Giegerich (2004: 3) states that "rather more pattern and less chaos" exist among N–N compounds "than has been assumed" by some phonologists. Teschner and

Whitley (2004) maintain that approximately 90% of such compounds strong-stress the left constituent.

The above 'so-called' rules have exceptions. For example, the primary stress may fall on the second element, e.g. 'picture 'postcard'. The second element in the N-N compound particularly bears the primary accent in the following cases, among others (Gimson, 1989: 250; Giegerich, 2004):

- (1) where the first constituent is a name, e.g. 'Bermuda 'triangle', 'Christmas 'bonus' and 'Christmas 'carol',
- (2) where the first element is a value, e.g. 'dollar 'bill',
- (3) where the second item is made out of the first item, i.e. the first constituent names the material or the ingredient the second element is made out of, e.g. 'silver 'plate' and 'silver 'dollar' vs. 'silver fish'; 'apple 'cider' and 'apple 'pie' vs. 'apple tree' and 'rubber 'band' vs. 'rubber plant', and
- (4) where both constituents are equally referential, e.g. 'acid 'rain'.

Stress is usually assigned to the second element when the compound looks like a phrase pattern, a modifier-head or attribute-head construction, e.g. 'adult 'education' (see Giegerich, 2004). Often, such compounds comprise an adjective and a noun, e.g. 'central 'heating; 'high 'heels' and 'outer 'space', also involving "thoroughfare" compounds, e.g. 'Oxford 'Road', 'Madison 'Avenue' and 'New 'York' (see Collins and Mess, 2013)., with some exceptions, e.g. 'orange juice'. However, a few compounds have different stress patterns in English varieties: 'ice cream', 'matinée jacket', 'horse chestnut', etc. (see Olsen, 2000, 2001). Some researchers (e.g. Dretzke, 1998) argue that another type of stress occasionally exists, viz. 'level stress', e.g. 'garden 'wall'.

Although many compound verbs are said to have right-stress, e.g. 'under'estimate' and 'take 'over', several other compounds have left-stress, e.g. 'wind-shop', 'house-sit' and 'water-proof'. Compound adjectives, on the other hand, usually have right-stress, e.g. 'high-'risk', with exceptions, e.g. 'airtight', 'hair-raising', 'air-conditioned' (see Marks, and Hewing, 2007). Occasionally, there is no logic behind the different stress patterns. Consider, for instance, 'far-'reaching'. 'slow-'growing' and 'thought-provoking'.

The way English compounds are spelt is sometimes associated with their stress pattern. The first element in closed-form compounds usually bears the primary accent, e.g. 'summertime' and 'raincoat'. However, the open-form compounds follow no particular pattern and are variously stressed, e.g. 'carbon 'offsetting' and 'dress code', possibly based on their context (see also Gimson, 1989; Teschner and Whitley, 2004).

In sum, there are no hard and fast rules for compound words stress, and the above remain mere anecdotal claims, as they are solely based on introspection and observation. Taylor (1991) points out that for compound word stress to be determined, one can utilise features such as the 'predictability' and

'information conveying' of the compound's constituents. Undoubtedly, the many exceptions may confuse EFL learners; some recommend learning compound word stress from the dictionary (see Roach, 2009).

1.4. Arabic compound words

Compounding in Arabic is less productive than in other languages, including English. Orthographically, Arabic compounds are mainly open-form. Only a few constructions are agglutinated and therefore are closed-form. These fall into the following general categories (see Amer and Menacere, 2020: 566–567):

- (1) Construct state compounds, genitive compounds, e.g. 'رئيس الدولة' /ræʔi:s ældæwlæh/ (country's president/ head of state) and 'كأس العالم' /kæʔs alʔɑ:læm/ (world cup),
- (2) Fusional compounds, synthetic compounds, e.g. 'بيت لحم' /bait lam/ (Bethlehem), 'حضرموت' /ħæðræmøt/ (Hadramawt)
- (3) Predicative compounds, e.g. 'تأبط شرا' /tæʔ æbbætæ-færræn/ (a person who carries out evil), and
- (4) Numeral compounds, e.g. 'أحد عشر' /æædæ æfæ:/ (eleven).

Few studies have explored word stress in Arabic, possibly because stress plays a minor role in its lexical word realisation, whether single or compound. More systematic acoustic studies on manipulating phonetic features are required to reveal Arabic word stress patterns.

Stress assignment is more straightforward and rule-governed in Arabic than English, as syllable weight has a significant role in stress assignment (see Abu Abbas, 2008). Interestingly, most stress falls on the leftmost heavy syllables (Siloni, 1997; Davis, 2011; Khatib and Al-Tamimi, 2014). Although nominal Arabic compounds have their rightmost element stressed, some compounds with a vocative function have the primary accent on the first element, e.g. 'يا أستاذ المدرسة' /jæ ʊs'tɑ:ð ælmædræsæh/: (oh, you schoolteacher/male). Altakhaineh (2017) claims that examining spectrogram data from Arab native speakers' production of Modern Standard Arabic N–N combinations showed that stress fell on the first element. However, this result remains highly questionable because of the small sample of subjects and stimuli examined.

2. Literature review

Most literature about compound stress concerns the speakers' stress of compound words versus attributive phrases. The existing body of research into EFL learners' compound stress placement primarily stems from a set of studies,

which included very few compound test words within the English lexical stimuli. These studies concluded that EFL learners and native English children had stress placement difficulties.

Vogel and Raimy (2002) studied monolingual American English speakers' acquisition of compound word stress vs. phrasal stress. Forty children, divided into four groups between five and twelve, and ten adults, were shown pairs of pictures representing compound words, including nine genuine constructions and nine false ones. The subjects had to designate the word they heard. A significant difference existed between the subjects' behaviour at all ages regarding their recognition of compound and phrasal stress in 'real' and 'false' items. Those below nine failed to acquire the stress shift, suggesting the contrast between compound stress and phrasal stress, with a plain bias towards compounding. The researchers ascribed it to the young subjects' "slow development of the ability to use prosodic information to override a strong lexical bias" (225). Interestingly, Shilling (2010) reached almost similar results. Her subjects, of all ages, displayed phrasal bias in the comprehension task; stress placement was never a simple task for British schoolchildren.

Nguyên, Ingram and Pensalfini (2008) explored Vietnamese EFL learners' acquisition of word stress in broad-focus and narrow-focus noun phrases and compounds. They found that both beginning and advanced subjects employed F0 and intensity correctly to lend different contrast levels to stressed syllables. However, they failed to recognise the timing contrast between compound words and phrases. L1 prosodic features interference such as the lexical tonal pitch and tonal patterns hampered their correct production of the stimuli.

Hismanoglu (2012) attempted to uncover the cause of Turkish EFL learners' difficulties in stressing English items, including compound words. He also investigated the impact of internet-based pronunciation instruction on the accurate production of lexical stress to discern whether it is more effective than traditional stress teaching. The subjects had deviant stress placement in polysyllabic compound adjectives and compound verbs. Unfamiliarity with English lexical stress patterns and L1 stress transfer were the key causes of mistakes.

Bian (2013) tested 20 frequent compounds of all types on 40 Chinese EFL learners – 20 college students and 20 middle school pupils. All were required to assign stress to the appropriate element. Their performance displayed clear evidence of L1 transference. They correctly produced most items with double stress patterns but struggled with the rest, stressing the rightmost element rather than the leftmost, as in L1 compounds.

More recently, Bu and Zhou (2021) involved 25 participants in three recording tests using isolated and contextualised stimuli, including compounds. Lexical stress assignment was a frequent problem, with subjects making the weak syllables almost as prominent as those stressed. They pronounced compounds with a double-stress, i.e. primary stress on each constituent, failing to interpret them as compounds but rather as separate words. The authors

attributed this to the 'complexity' of L2 lexical stress and the disparity between L1 and L2 stress patterns, as Chinese lacks similar stress mechanisms for the stimuli.

Zubizarreta, He and Jonckheere (2013) compared English native speakers, 16 undergraduates, and Spanish EFL learners, 16 undergraduates, graduates or lecturers or professors at USC, to test their compound word stress patterns. The participants performed a reading protocol task and read short passages containing the stimuli. Both groups systematically opted for 'left-stress', i.e. 'strong-weak patterns but differed significantly in their stress production of the infrequent compounds, as most Spanish learners opted for 'right-stress' in modifier-head combinations.

Helal (2014) explored Egyptian EFL learners' problems stressing two-to-five syllable words, focusing on compound words. To evaluate the efficacy of different instruction degrees, she used 15 senior English majors in four tests – two pretests and two posttests. The stimuli included, among others, some compound words which represented a mismatch of the metrical parameter settings and stress placement rules in Arabic, with all having penultimate stresses. The subjects performed poorly on the pretest, with fewer than 20% of their stress assignments correctly. They were tempted by the weight of the syllable and ignored the stress rule, which was an L1 stress pattern. They stressed what they regarded as a superheavy syllable (either a long vowel or a diphthong followed by a consonant) instead of the first syllable, which bore the correct stress. Successes increased to about 46% on the posttest. The subjects did much better after the treatment, particularly on the audio test, and their written test improvement was more significant than the audio-recorded test.

Researchers investigated compound stress with many other EFL learners, including Indonesian, Polish, Bulgarian, Thai and German. (Jaiprasong and Pongpairroj, 2020; Le, 2017; Popovska, 2019; Szymanek, 2017; Widagsa, 2015). They showed that most learners encountered problems stressing English compounds appropriately. L1 stress patterns seemed to hinder compound stress placement, particularly for low proficiency learners. However, Bulgarians had more difficulty stressing attributive phrases.

The above studies point to EFL learners' difficulties stressing compound words and demand educationalist attention to resolve their problems. Therefore, it was necessary to conduct a large-scale study to further the studies above and confirm their initial findings, particularly L1 stress patterns transference. Inappropriately, most researchers used small samples of stimuli and subjects.

3. The study

As indicated above, the present study concerns Arab learners' compound stress strategies and the reasons behind their difficulties in stressing compound words.

3.1. Aims

This study seeks answers to the following questions:

1. To what extent do Arab EFL learners appropriately stress compound words in English?
2. Do Arab EFL learners follow stress patterns when accentuating compound words?
3. Do factors such as 'word class' and 'orthography' affect subjects' stress strategies and, consequently, their accurate stress placement?
4. Do factors such as 'age' and academic attainment, subjects' GPA, influence their stress behaviour patterns?
5. Is there any influence on the accuracy of Arab EFL learners' stress performance or correct placement when there is a history of "phonetics and phonology" or training in the specific area of stress compounds?

Arab learners tended to stress the second element in two-word compound items. Findings from previous research (e.g., Helal, 2014) lent support to this hypothesis (see also Celce-Murcia et al., 2010). It could be anticipated that factors such as word classes or spelling forms do not influence the subjects' compound stress performance, as such variables have nothing to do with the Arabic compound stress mechanism. Although common sense would suggest that the learners' age and GPA may influence their compound stress competence, the latter would improve with age and GPA increment (see Archibald, 1997; Guion et al., 2003). Likewise, the more stress training the subjects received, the more appropriately they would stress compound items.

3.2. Subjects

A group of 140 third- and fourth-year English studies majors (80 females and 56 males) took part in this study between January and February 2020. They came from four Jordanian universities: Jerash, Philadelphia, Yarmouk and the Hashemite University. Their ages ranged between 21 and 24, and their mean GPA was (79.85, Sd. 3.9). None stated having any speech or hearing impairment.

Many students were reluctant to take proficiency level tests, and thus it was difficult to assess their language level. On the evidence of their GPA's, they were estimated to be upper-intermediate to advanced. However, it was possible to ensure the homogeneity and capability of the group by having them take Meara's (1992) *EFL Vocabulary Tests*. This set of tests measures the proficiency level of EFL learners. All subjects took test (310), i.e. No. 10 at

Level 3. The results of four candidates were excluded because they were far below 70. The mean score for the sample used was (87.2, Sd 4.2) (max.100). Furthermore, the data of six participants was excluded, as it did not contain all test words. The final count of participants was 130.

Prior to the recording and on a separate test sheet, some participant data was collected to see whether the subjects:

1. did Phonetics and Phonology,
2. received any general training in stress placement, and
3. received any particular training in compound word stress along with their GPA.

It appeared that 91 participants completed a course in English phonetics and phonology; 46 had prior instruction in word-stress patterns, including correct stress identification and production. This information would facilitate the analysis of any potential relationship between these variables and the subjects' proper stress placement.

3.3. Materials

The stimuli were 50 'opaque' infrequent compound words, 25 with left-stress and the rest with right-stress. One reason for selecting such items was to ensure the subjects' unfamiliarity with the stimuli's meanings. The author made a manual and electronic search to select infrequent compounds with left- and right-stress. The researcher randomly selected the stimuli from a random dictionary section. These began with the letter 'd'. The researcher used several British learner's dictionaries to check frequency, spelling and part of speech, including *Cambridge Advanced Learner's Dictionary* – 3rd Edition (CALD), *Longman Dictionary of Contemporary English* – 6th Edition (LDOCE) and *Oxford Advanced Learner's Dictionary* – 10th Edition (OALD).

Semantically, opacity meant non-transparency of expressions; the meaning of the construction was not the sum of the meaning of the two elements making the compound. Here, identifying the meaning of the first element, the modifier, and that of the second element, the head, would not assist learners in decoding idiomaticity. For instance, if the learners had never learnt the construction 'hot dog' (v), it would be doubtful they could infer its meaning (see also Libben et al., 2003).

As to orthography, eight compounds were hyphenated, 12 were closed-form compounds, and the remainder, 30 compounds, were open-form items. Regarding 'word class', three items were verbs, four adjectives and 43 nouns. Syntactically and orthographically, it was difficult to choose equal numbers because the stimuli were selected from only one dictionary section, not to mention the frequency factor. Compound nouns were the most frequent English type of compounds, and these were the predominant type in the above dictionaries.

It might not be surprising that some stimuli were not included in 'all' dictionaries, even though they advertised that their word lists contained many references. For instance, LDOCE missed out on *dosshouse*, *dab hand*, *damp squib* and *dreamboat*, and both LDOCE and CALD missed out: *dance umbrella*, *dark store*, *divine office*, *delta rhythm* and *deep-dyed*.

3.4. Procedure

3.4.1. Data collection

The stimuli were randomly arranged on an A4 sheet, including one stimulus twice, but in two different positions, to establish whether it would be consistently accentuated. If it was identically stressed in both places, it would suggest the subjects were not arbitrarily stressing the remainder. Data analysis showed that all speakers stressed it identically in both positions.

The researcher seated the subjects in a comfortable armchair facing a computer screen to ensure the best recording quality. Each was required to read the items aloud using a WEISRE U – 3315 microphone, at a sampling rate of 44.1 kHz and 16 bit resolution. The microphone was positioned at a reasonable distance of 20 cm from their mouths and at a 45-degree angle. The subjects were recorded into a computer or using a portable recorder.

The subjects were given a list of compounds, and initially, they were required to demonstrate whether they knew the meaning of each construction. If the answer was 'yes', they had to write the meaning, in English or Arabic, in the blank next to the compound. Several testing sessions were held according to the availability of subjects. Due to varying accommodation availability, some recordings took place in a quiet secluded room, but most were made in a language lab, an anechoic chamber. Each subject was tested individually, and there was a separate sound file for each of them. The average recording time for each subject was about three minutes.

3.4.2. Data analysis

Data analysis involved 136 sound files containing 6800 tokens, comprising 544 adjectives, 5848 nouns, and 408 verbs, covering 1632, closed-form, 4080 open-form and 1088 hyphenated compounds. Three judges, the author and two other native linguists familiar with Arabic-accented English, analysed the data and rated the subjects' stress production. The judges listened to the tokens and identified the element receiving the primary accent. Two judges listened to the whole recordings, and the third listened to slightly more than half of them, with an inter-rater consistency of approximately 97%, according to Cohen's Kappa statistic. Most tokens were perfectly audible, with no impediment to identifying the stressed element. However, 30 constructions were challenging to judge and determine which element was accentuated, and these were handled with PRAAT.

The tokens were first decoded and labelled as '1' or '2', indicating whether the first or second element was stressed, respectively. It enabled the researcher to display the exact word stress behaviour of the subjects. Secondly, each correct stress placement was awarded one point and the incorrect stress 'naught', enabling the accurate stress proportion calculation.

The subjects did not know the purpose of the study, and the researcher never asked them to attend to stress or prosody during the test but to their whole pronunciation. They were briefed on the purpose of the research afterwards.

3.5. Results

3.5.1. Accuracy of performance (Q1)

Detailed analysis was carried out to examine Arab EFL learners' production of correct stress placement, bearing in mind that 25 stimuli had left-stress and 25 right-stress. Presented below are Arab EFL learners' overall mean score for correct and incorrect stress scores.

Table 1: Subjects' correct answers within left-stressed and right-stressed compounds

	left-stressed stimuli	right-stressed stimuli
correct answers	39%	61%

The subjects achieved 1422 correct answers out of the 3400 left-stressed stimuli and 2130 out of the 3400 right-stressed. The subjects' tendency for right-stress yielded more correct answers within the right-stressed constructions, increasing the proportion of those correctly stressed. A chi-square test showed the subjects produced more incorrect utterances in left-stressed stimuli than correct ones ($\chi(1)= 8.582, p = .003$), suggesting they stressed the second element in left-stressed stimuli, which accounted for their low achievement. Another chi-square test showed they achieved more correct utterances with the right-stressed stimuli ($\chi(1)=15.67, p = .000$).

Then Arab subjects produced slightly more than half of the stimuli correctly (3552 out of 6800, corresponding to 26.1, Sd. 3.1, Max. 50). As expected, significant numbers of subjects assigned stress to the second element. Interestingly, a chi-square test revealed a marked difference between the subjects' correct and incorrect responses ($\chi(1)=13.95, p = .000$). This is attributed to subjects articulating the right-stressed stimuli correctly because they often stressed the second element.

3.5.2. Stress placement strategies (Q2)

The figures in table 1 indicate more subjects stressed the second element. The subjects' mean score for right-stress patterns in the whole data is (30.1, Sd. 3.1, with 19.8, Sd. 2.4 for left-stress). A Chi-square test showed a significant difference between the subjects' left-stress and right-stress performance ($\chi(1)=294.86, p = .000$). Noticeably, more subjects opted for right-stress,

producing 4108 right-stress tokens out of 6800, suggesting they had an underlying tendency for right-stress.

3.5.3. Factors affecting stress placement (Q3)

Word class

The subjects' scores per part of speech were computed and crosstabulations were run between all word classes relating to their proper production, i.e. correct answers and right-stress performance (see table 2 below).

Table 2: Subjects' stress behaviour and correct scores per word classes

	verb		noun		adjective	
total of tokens	408		5848		544	
stressed element	1 st	2 nd	1 st	2 nd	1 st	2 nd
total of items	153	255	2375	3473	164	380
subject performance	correct	incorrect	correct	incorrect	correct	incorrect
total of items	255	153	2961	2887	336	208

To reiterate, total correct stresses was 3552 out of 6800. More subjects produced right-stressed compound verbs with nouns and adjectives, yielding fewer correct responses. A highly significant difference existed between the subjects' overall correct and incorrect responses in all compound words of the three word classes ($\chi(2) = 43.043, p = .000$).

Table 2 shows the subjects produced 153 left-stress compound verbs, viz. deviant stresses, out of 408 compared to 255 right-stressed tokens, viz. correct responses. It is noteworthy that compound verbs often have right-stress. The subjects significantly favoured right-stress in compound verbs ($\chi(1) = 25.50, p = .000$), yielding substantially more correct responses ($\chi(1) = 25.50, p = .000$).

The subjects had also produced 2375 left-stress compound noun tokens out of 5848, compared to right-stress 3473. They achieved 2961 correctly stressed tokens out of 5848, leaving 2887 incorrect. Overall, they significantly produced more right-stress compound nouns ($\chi(1) = 206.15, p = .000$), yielding non-significant scores for correct stresses ($\chi(1) = .936, p = .333$), as compound nouns had either left-stress or right-stress.

The subjects significantly opted for right-stress compound adjectives ($\chi(1) = 85.76, p = .000$), leading to more correct responses ($\chi(1) = 30.11, p = .000$), as, unlike compound nouns, compound adjectives are right-stressed. The subjects produced 164 left-stressed tokens out of the 544 compound adjectives and the rest, 380, were right-stressed. Thus, they correctly stressed 336 utterances out of 544, with 208 being incorrect.

Impact of spelling

A similar procedure was adopted for the compound stress pattern, assessing subjects' stress performance within all spelling forms. Table 3 displays the

results of the crosstabulation between subjects' left- and right-stress performance and correct stress scores.

Table 3: No. of subjects' left-stressed, right-stressed and correct responses per spelling forms

	closed form		open form		hyphenated	
total of tokens	1632		4080		1088	
stressed element	1 st	2 nd	1 st	2 nd	1 st	2 nd
total of items	738	894	1543	2537	411	677
subject performance	correct	incorrect	correct	incorrect	correct	incorrect
total of items	744	888	2193	1887	615	473

Arab learners frequently right-stressed closed-form, open-form and hyphenated compounds. Several constructions were correctly stressed, as all hyphenated compound adjectives had right-stress. A chi-square test showed a marked difference between the subjects' overall correct and incorrect answers within the three spelling forms ($\chi(2)= 40.674, p = .000$). The subjects achieved more accurate utterances with open-form compounds, as many compounds were open-form.

It was necessary to examine the subjects' dominant stress behaviour pattern in all three spelling forms. They stressed the first element in 738 closed-forms and the second in 894. Fewer than half of the tokens 744 were correctly stressed, and 888 were incorrect. A chi-square test revealed that they significantly assigned stress to the second element in closed-form compounds ($\chi(1)= 14.92, p = .000$). This strategy resulted in significantly fewer correct answers ($\chi(1)= 12.70, p = .000$) because many closed-form compounds were left-stressed. This suggests that the subjects produced more right-stress compounds, thereby lowering the success rate as only half the stimuli were left-stressed.

The subjects produced 1543 left-stress open-form compounds out of 4080, meaning 2537 constructions had right-stress. They inappropriately stressed 1878 tokens out of 4080, tallying as 2193 constructions properly stressed. A chi-square test showed they had more right-stress open-form compounds than left-stress ($\chi(1)= 242.16, p = .000$). This induced more correct responses ($\chi(1)= 22.95, p = .000$), as many open-form compounds had right-stress.

For hyphenated compounds, the subjects had 411 left-stress constructions, 677 being right-stressed. In all, they appropriately stressed 615 hyphenated compounds and 473 inappropriately. A chi-square test showed they produced more right-stressed hyphenated compounds ($\chi(1)= 65.03, p = .000$); resulting in more correctly stressed hyphenated compounds ($\chi(1)= 18.53, p = .000$), as most hyphenated compounds were right-stressed.

3.5.4. *Impact of age and GPA (academic attainment) (Q4)*

The fourth research question also measured the effect of two more variables: age and GPA on subjects' stress behaviour patterns. It was necessary to compute their mean age according to their stress behaviour pattern. The mean age of those who mostly stressed the first element was (22.0, Sd. 2.5); they left-stressed 2692 utterances. The mean age of those who mostly stressed the second element was (21.9, Sd. 2.3); they right-stressed 4108 utterances. Taken at face value, these figures suggest that the older the subjects, the larger their right-stress production and the more significant their incorrect responses. However, a t-test showed no significant relationship between the subjects' age and their tendency to stress the second element ($t = -1.929, p = .054$). Likewise, the mean age of those who correctly stressed the stimuli (3552 tokens) was [22.00, Sd. 2.4] compared to [21.9, Sd. 2.4] for those with improper stress (3248 tokens). No significant relationship existed between the subjects' age and correct stress ($t = -1.317, p = .188$).

The mean GPA for those who favoured left-stress was (79.76) compared to (79.99) for those who favoured right-stress. A t-test showed no significant relationship between the subjects' GPA and their tendency for right-stress ($t = -1.957, p = .050$). Further analysis showed the mean GPA score for those who achieved correct responses, 3552, was (80.0) compared to (79.6) for those who inappropriately stressed 3248 stimuli. A t-test suggested a fairly significant relationship between the subjects' GPA and their correct stress ($t = -2.051, p = .040$). The higher their GPA, the larger the number of correct responses.

3.5.5. *Impact of phonology study and stress training (Q5)*

The last research question related to the relationship between the subjects' study of phonetics and phonology (PhandPh) and any training received in lexical stress assignment, be it general or specialised training, on the one hand, and their correct stress placement for compounds, on the other. Common sense suggests the more training, the higher the scores. A detailed description of the relevant findings follows.

It was necessary first to calculate the number of those who did a course in PhandPh and those who received general training in stress placement (GTSP) and special training in compound stress (STCSP). The results appear in table 4 below.

Half of those claiming to have done PhandPh received no general training in stress placement. A roughly similar proportion had never received any training in compound stress. To clarify, 66% and 64% of the subjects had received zero GTSP or STCSP, respectively. Strangely, more subjects claimed STCSP than those with GTSP. Maybe they confused the question, or they really had learned about compound stress and accidentally received some training.

Table 4: Subjects' correct responses and right-stress scores within the groups of those who did PhandPh and received general GTSP or special STCSP

	PhandPh		GTSP		STCSP	
% of subjects	66.9 (4550)		33.8 (2300)		36.0 (2450)	
total correct stress	2420/ 4550		1255/ 2300		1338/ 2450	
stressed element	1 st	2 nd	1 st	2 nd	1 st	2 nd
total stresses	1783	2767	917	1383	891	1559

Crosstabulation statistics revealed that those who did PhandPh and had general GTSP and STCSP provided 2420, 1255, and 1338 out of 3552 correct responses. A chi-square test was used to explore the interaction further and revealed a significant relationship between their PhandPh study and correct answers ($\chi(1)= 4.875, p = .027$). Those who studied PhandPh fared better. Another chi-square test revealed a significant relationship between their correct answers and GTSP ($\chi(1)= 7.422, p = .006$). The subjects trained scored more highly. Likewise, a chi-square test revealed a significant relationship between their correct answers and STCSP ($\chi(1)= 8.524, p = .004$). In-depth stress training seemed to confer better results.

Regarding the association between the subjects' stress behaviour patterns and the variables mentioned above, the crosstabulation statistics showed that those who did PhandPh correctly stressed 1783 left-stressed constructions out of 2692 and 2767 right-stress constructions out of 4108. A chi-square test showed no significant relationship between the subjects' study of PhandPh and their stress behaviour ($\chi(1)=.876, p= .349$). Studying PhandPh did not significantly influence left-stress scores. Table 4 also showed that those with GTSP had left-stressed 917 constructions out of 2692, and right-stressed 1383 out of 4108. No significant relationship existed between their receipt of GTSP and stress behaviour pattern ($\chi(1)=.098, p = .754$).

Likewise, specific training could only slightly boost correct scores. It was probably not sufficiently effective to provide tangible evidence of better achievement, let alone the fact that design should be better controlled to measure the improvement effected. Table 4 above also shows that those with STCSP had left-stressed 891 constructions out of 2692 and right-stressed 1559 constructions out of 4108. A significant relationship appeared between the subjects' STCSP and stress behaviour ($\chi(1)= 16.403, p = .000$). Those with STCSP produced more right-stress compounds, naturally yielding more correct responses. No difference existed between the subjects with zero training in compound stress and those with training regarding the right-stress strategy.

4. Discussion

The current study investigated Arab EFL learners' compound stress competence, identified their stress strategies, and determined some factors

affecting their performance. The results demonstrated the subjects' evident failure to stress the utterances correctly and, as predicted, many utterances being right-stressed. This trend led to fewer correct responses, as half of the stimuli had left-stress, supporting findings from previous research, where EFL learners, Arabs and non-Arabs, had difficulty stressing compound words (Helal, 2014; Nguyễn et al., 2008; Szymanek, 2017).

One may speculate some reasons for the subjects' failure. Firstly, L1 transfer was a primary reason as the Arabic stress mechanism favours right-stress. It was conducive to L1 compound stress transference, as many utterances had right-stress. This factor might not arise if the learners possessed the appropriate stress knowledge and training in compound stress rules (see Hismanoglu, 2012). Interestingly, this was also an influential factor in other EFL learners' compound stress behaviour (Bu and Zhou, 2021; Jaiprasong and Pongpairaj, 2020; Le, 2017). Besides being consistent with findings from earlier research involving learners of different linguistic backgrounds (Bian, 2013; Popovska, 2019; Zubizarreta et al., 2013), this finding confirms the prediction that Arab EFL learners would stress the second constituent in compound words.

Secondly, the Arab learners' tendency to stress the second element was likely due to their focus on the headword, i.e. the base, mainly the second element. Notably, the equivalent constructions in Arabic also stress the second element. Examples: 'long jump <Wathb 'Taweel>', 'brain washing <ghaseel 'dimagh>', etc. Likewise, Arab learners might have stressed the second element as they thought it bore the main semantic properties of the whole construction, viz., the 'meaning-bearer'. Informal chats with some subjects revealed they stressed the element they considered more specific and independent. Interestingly, what they believed the 'meaning-bearer' was not necessarily the element receiving the primary stress.

One may wonder why the subjects did not stress all the stimuli on the second element. It is likely that the subjects confused the headword or could not determine which element was the head of the compound, probably because the compound was 'unheaded' (exocentric compounds are usually headless). Interestingly, after finishing the test, some subjects complained that they could not determine which element bears more prominence, as some constructions had the same grammatical status.

That all subjects had little to no exposure to English outside the classroom or any interpersonal communication with English native speakers might also have played a role in their failure to stress compounds correctly. Earlier research has demonstrated that exposure to an English-speaking environment significantly honed EFL learners' pronunciation skills (see Avery and Ehrlich, 1992).

Another reason could be the subjects' unfamiliarity with the individual stimuli. Some may argue that selecting frequent stimuli to ensure the subjects' familiarity with compound stimuli would lead to different stress scores. Maybe this would be an appropriate assessment for some research with a different

design and research questions. In this case, whether selecting some frequent stimuli would elicit different responses remains to be seen. Selecting an equal number of frequent and infrequent items may be a proper assessment procedure. Also, replicating the current finding in a slightly more natural setting, with the stimuli used in carrier sentences in a reading experiment or ordinary classroom conversations, would gain further insight into learners' problems, yielding broader results that may uncover more definitive answers.

It was also predicted that part of speech and orthography would not influence Arab learners' compound stress strategies. Neither factor invoked any specific stress behaviour or seemed to affect correct responses significantly. The subjects stressed all word classes and spelling forms diversely, but overall the subjects' stress behaviour with these word categories was not widely diverse; their performance was consistent with their right-stress tendency. To clarify, the subjects produced more right-stressed compound verbs, nouns and adjectives, which, as shown above, significantly decreased the correct compound noun stress scores. There were more correctly stressed adjective and verb constructions, as these often had right-stress. The subjects' tendency for right-stress irrespective of word class was also prevalent among tokens of all spelling forms. Specifically, more open-form items were produced with second-element stress, probably because the second element was distinct and quickly made more prominent than in a closed-form or hyphenated construction. The subjects might have rapidly recognised the headword in such forms and stressed it accordingly.

The present study showed no significant correlation between the subjects' stress performance and their age or GPA score, and neither improved the subjects' correct scores. Although the older subjects opted for right-stress more often, this was not significant and held true for the GPA variable. The subjects with a higher GPA appeared to produce more correct utterances. Superficially, it did not influence their overall results, and this finding supports data from earlier research (Jaiprasong and Pongpaioj, 2020; Porzuczek and Rojczyk, 2017; Sahatsathatsana, 2017). Advanced Thai EFL learners also fared better on a stress assignment test than lower-proficiency learners (Isarankura, 2018). However, more empirical research is required to obtain more definitive and reliable data.

Significantly, no relationship existed between training in stress placement and the subjects' right-stress performance. Some association could be traced between the subjects' achievement and their knowledge of PhandPh and training in lexical stress assignment. Those who studied PhandPh fared well, as did those who received training in stress placement. To a reasonable extent, this result bears out the prediction made above about the positive effect of these variables on the subjects' compound stress competence. This is a reasonable sign that Arab learners' stress competency could be enhanced with adequate, formal or informal, training (see also Hismanoglu, 2012).

This study is not without limitations. Although it employed three types of compound words, using one kind at a time might have achieved more valuable results. Similarly, more carefully selected and balanced stimuli, in terms of word classes and spelling forms, might have yielded more helpful findings. This would transcend and mitigate a major limitation of the studies reviewed above. Further research to tackle suprasegmental features, mainly lexical stress placement, is still required at various proficiency levels to get to grips with the Arab learners' long-lasting problem. In-depth interviews with larger population samples can amass valuable and insightful data about their word stress difficulties. Besides, it could be beneficial to explore the subjects' perception and production of compound word stress by employing distractors, thereby drawing direct comparisons between comprehension and production. A further limitation was the lack of a native English control group. It might have impeded/deterred direct comparison between Arab EFL learners' performance and native speakers' optimum level of accuracy. Any follow-up research has to extend the scope to draw comparisons between compound stress perception and production.

5. Pedagogical implications

The results above give practical implications that could benefit EFL teachers and learners. Arab learners' compound stress problems are similar to native English children's. Further research could be devised to benefit from learning how native children tackle compound stress, whether common or infrequent idiomatic constructions. Bu and Zhou (2021: 14) suggest that learners can improve their understanding of compound stress by following established guidelines. The key is constant practice and memorising the stress in new compounds, coupled with sufficient practice. Learning the stress rules may enhance their acquisition of compound and hone their overall pronunciation skills. This, over time, may induce an intuitive feel for the correct utterance.

Admittedly, compound word stress is not always rule-governed, complicating the learning process. The subjects proved they had not gained the basic stress competence and desperately needed adequate first-hand training and practice in compound stress mechanisms. Teachers must help them realise that mastering stress is essential to communicating effectively and getting their message across. Equally, they should understand that stress is vital for analysing the utterances they hear before conveying the intended meanings to their interlocutors, especially as English, unlike Arabic, lends great weight to word stress.

Interestingly, the English books currently used in all non-tertiary education in Jordan, as evidenced in *Action Pack* series 1-12 (York Press), provide some segmental and suprasegmental information. Past English-language books lacked such material and focused mainly on structure and vocabulary.

However, *Action Pack* offers limited pronunciation information, constituting only a tiny proportion of the material needed, with very few examples and exercise drills. Jaiprasong and Pongpairroj (2020: 153) argue that including only a few word stress samples reduces the learners' chance of learning and acquiring stress placement rules.

Most teachers, regrettably, care little about articulation and 'functional' intelligibility. They persist in guiding learners towards grammar and vocabulary. Author (forthcoming) contends that many teachers of English ignore suprasegmental information because they consider it unimportant or cannot deal with it (see also Khamkhien, 2010). This is frustrating, as learners regard teachers as their 'role models' for grasping English pronunciation (Sahatsathatsana, 2017). Fraser (2002) argues that teachers today struggle with teaching English pronunciation as they lack sufficient training to perform the task efficiently. Alhabahba, Pandian and Mahfoodh (2016: 3) point out that some international organisations researched Jordanian EFL learners' proficiency as a product of the current educational system. Their proficiency had deteriorated compared to global levels, and similar findings applied to the Arab region at large.

Specialists should broaden school and university curricula to alert teachers and learners to the pivotal role of stress in communication. Holding seminars and workshops and involving EFL learners in some English fora would help hone their overall pronunciation skills. It will also make them aware of stress challenges and implicitly motivate them to heighten their understanding of stress placement importance for verbal communication. More importantly, these curricula should allocate some space to foster learners' awareness of the similarities and differences between Arabic and English stress systems, encouraging them to perfect their use of stress patterns.

6. Conclusion

Few studies have investigated EFL learners' compound stress production. This study endeavoured to fill this gap by comprehensively analyzing Arabs' stress strategies using three categories of compound words. It appeared they encountered serious problems stressing compound words, most likely due to L1 transfer and unfamiliarity with English stress patterns. There was a strong tendency for right-stress, but this tendency seemed not influenced by either word class or spelling form. More adjectives and verbs were correctly stressed as these had right-stress. Similarly, more hyphenated compounds were appropriately stressed because they had right-stressed. Age also did not affect subjects' performance. However, it seemed that academic attainment had slightly impacted Arab learners' compound stress competency, which also held true for doing PhandPh and receiving training in stress placement.

Still, Arab learners' problems are not insuperable. Attention to the linguistic characteristics of compound words and training in stress placement rules and their exceptions will enhance their strategic competence and acquisition of compound stress.

This research is a step towards a more comprehensive examination of Arab EFL learners' acquisition of suprasegmental features. Its findings will prove helpful to both Arab EFL learners and teachers. However, the present results remain tentative and only represent a tendency given the unbalanced number of stimuli regarding orthography and word class.

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