Jordan Journal of Modern Languages and Literatures Vol.12, No. 3, 2020, pp 291-305

JJMLL

Similarity Effects on the Emergence of Default Inflection in Jordanian Arabic

Sabri AI-Shboul, Anas Huneety, Bassil Mashaqba, Wael Zuraiq, Moh'D AI-omari
Department of English, The Hashemite University, Jordan

Received on: 05-9-2019 **Accepted on: 30-1-2020**

Abstract

This study investigates the similarity effects that determine the default inflection in the nominal system of Jordanian Arabic (JA). Unlike the single route hypothesis (e.g. Rumelhart and McClelland 1986), the dual-route account assumes that regular and irregular forms are stored and processed in two autonomous systems (e.g. Kim et al. 1994; Pinker 1999, Pinker and Prince 1998, Pinker and Ullman 2002, Clahsen et al. 2015). A Paired Sample *t*-test was used to measure the effects of similarity on agreement between the inflected forms and the base forms. We used 40 triplicate words designed by analogy to 20 pairs of existing JA nouns (base nouns) given to 20 JA native speakers. The results showed that JA speakers manifested tight matching of inflection among irregular forms which was not observed with regularly inflected forms. The results of the study support the idea that the regular inflection is a default; such observation indicates that the regular inflection applies regardless of the similarity of the target to existing regular tokens. The default inflection is triggered by an 'elsewhere condition' upon the failure to activate a similar irregular token in associative memory (Kiparsky 1973). This research also provides evidence on the regular inflection application to non-word targets that show phonological distance from their base nouns.

Keywords: Jordanian Arabic, default, similarity, sound feminine, regular inflection.

1. Introduction

Research on inflectional morphology displays an area of controversy between the dual and associative theories. While both accounts propose that the irregularly inflected forms (e.g. *see -saw*, *louse-lice*) are processed by single route memory, they diverge in the treatment of the regular inflection (e.g. *walk-walked*, *book-books*) (Pinker 1999). Based on associative accounts, the mental processes rely upon the associations between specific tokens. Irregular forms, according to associative theories, are stored as whole units and processed by associative patterning (e.g. Rumelhart and McClelland 1986, MacWhinney and Leinbach 1991, Plunkett et al. 1991, Daugherty and Seidenberg 1992, Plunkett et al. 1991, Hare and Elman 1993, Hare et al. 1995). Irregular forms that have high frequency are retrieved more easily than those that are not (Clahsen et al. 2015). This type of mental treatment accounts for the over-regularization errors (e.g. **goed*). The associative theories claim that all inflected words are stored and processed by associative patterning, which is based on phonological and semantic similarity between base and inflected forms (e.g. Plunkett and Marchman 1996, Rumelhart and McClelland 1986, Bybee 1995). According to this account, the retrieval of both regular and irregular forms is widely explained by their frequency rates or the frequency of the group to which they belong. The frequency of some forms is also responsible for their over-

regularization to other less frequent forms. Accordingly, this associative account attributes both regularly and irregularly inflected forms to an associative process (Jaensch et al. 2014).

The regular and irregular inflectional representations are identical and are not distinguished in terms of their treatment (Bybee and Moder 1983). All word forms in the lexicon are shown only by their orthographic, semantic and phonological features (Pinker 1999). It is important to notice that variables, such as 'NOUN' or 'VERB', are excluded from the mental representations. According to the dual-route account, regular and irregular inflections are stored and processed in two different chambers in the lexicon (e.g. Marcus 2001, Pinker 1999, Pinker and Prince 1988, Pinker and Ullman 2002, Clahsen et al. 2015). Thus, regular forms are stored as discrete morphological units (*e.g. walk-ed*) and processed by general rule application. Given the rule-based combinatorial system, both the frequency and the distributional asymmetry have no effect on the processing of regular forms (Clahsen et al. 2015). Put differently, this account (Pinker 1991) supports the idea that the regularly inflected forms are produced via the symbolic process which applies to labels and is blind to the contents of certain tokens (Fodor and Pylyshyn 1988, Jacob et al. 2013). Consequently, the regulars apply despite the target's built-in specifications or features and apply as a default pattern, i.e., they apply to any target that is unable to retrieve the stored associations by the *'elsewhere condition'*. An 'elsewhere condition' is viewed as the application of a general cognitive linguistic process upon the failure to retrieve a more specific process (Kiparsky 1973). The circumstances for activating irregularly inflected forms (e.g. '*have*' as a condition for '*had*) establish a subgroup of the conditions for motivating regular inflection (e.g. the identification of *any* canonical verb stem). A failure to activate irregular inflection thus triggers the regular default.

1.1 The 'Elsewhere Condition' in Jordanian Arabic (JA)

The mechanism of defaultness triggers the application of the sound feminine form with the suffix */–a:t/* as a default form in JA (Al-shboul et al 2020; Mashaqba et al 2020). Both the dual and pattern associator models can handle inflectional systems like English because of the distributional characteristics this language displays. The English system is one in which the default is regular both theoretically and psychologically: theoretically because the lexicon is positively skewed towards regular forms with 95% of the verbs in the language taking the *–ed* regular suffix, and psychologically because speakers tend to overgeneralize this pattern as in '*fax-faxed, xerox-xeroxed*' (Marcus et al. 1995, Ullman 2005). Accordingly, this is a relatively simple situation for a dual-route model, as it would easily deal with the low number of irregulars via associative memory and the rest via a default regular rule (Marcus et al. 1995). According to the symbolic model (Marcus 1998a, 1998b, Pinker and Prince 1988, Berent and Pinker 1999), the wide application of the default inflection results from the fact that the regular inflection applies to mental variables that are abstract labels 'VERB or NOUN'. Marcus et al (1995) views defaultness as an operation which applies not only to particular sets of stored items or to their frequent patterns, but also to any item whatsoever, as long as it is not listed in the lexical memory. This item may be unfamiliar, dissimilar to familiar items or computationally inaccessible because of noise in memory or because of the way the data in memory is structured. Corbett (1994), on the other hand, deals with the default inflection rather than 'markedness' since defaults are language specific, while 'markedness' is universal. Based upon our

assumptions, the notion of 'defaultness' is an indispensable mechanism to account for the lexical status of the nominal system in JA. The new forms (which exhibit the typical canonical root) are supposed to deal with the already existing forms as variables or labels with no semantic content.

The pattern associator network is expected to explain these defaultness inflections. Generally, this network is likely to store information about all forms and the predominance of regular forms will motivate a regularization process, by virtue of the fact that any novel form is more likely to resemble a regular form than an irregular one (Rumelhart and McClelland 1986). Proponents of the dual route model argue, however, that a dual mechanism can also deal satisfactorily with linguistic systems where the default is a minority as is the case of the German participle ***/-t/*** and the plural ***-s*** (Marcus et al. 1995). This is because the rule application fashion does not rely upon default pattern applying to the majority of the forms in the language. Rather, a default can be defined even in terms of the least frequent patterns, because this process merely depends on applying the same procedure to different items bearing the same symbol ''VERB'' (Clahsen 1999, Marcus et al.1995). Conversely, the pattern associator system seems to be unable to simulate people's regularization of novel forms in languages which have a minority-default; this is supported by the fact that this system is highly sensitive to factors such as frequency and asymmetry distribution. Along with the German inflectional system, the Arabic plural is introduced as an example of a minority default system (McCarthy and Prince 1990, Pinker and Prince 1994, Ravid and Farah 1999). One of our aims in the present study is to see whether regular and irregular inflections differ in their sensitivity to similar stored tokens.

Different explanations have been proposed for the application of the default in the language at the language acquisition level (Aljenaie et al. 2011, Ravid and Farah 1999, Ravid and Hayek 2003, Ravid et al. 2008, Mashaqba et al. 2020) or language learning (Benmamoun et al. 2014). Finally, evidence of regular inflection as a default (the sound feminine with the suffix */–a:/ t*in our case) can be observed in the inflection which is assigned to borrowings, names, and denominals in English and Arabic, all of which fail to trigger default irregular patterns as a stored association because these default forms lack a canonical root (Kim et al 1991, 1994, Marcus et al 1995, Say and Clahsen 2002). According to the symbolic account (Prasada and Pinker 1993), default inflection can also apply to non-words that are dissimilar to English forms, hence are unlikely to activate stored irregular tokens. In terms of the irregular inflection, this account has the same application observed in the distribution asymmetry account. This account is motivated by the argument that irregular forms are tightly bounded, and thus new words take similar inflection to these clustered ones and if blocked the default regular inflection is applied.

1.2 Nominal inflection in JA

JA displays two gender types: feminine and masculine. The sound feminine plural is formed by attaching the suffix *–a:t* to the end of some non-human masculine singular nouns, (e.g. *matˁa:r > matˁa:ra:t* 'airport/airports') or feminine singular (human and non-human) nouns-ending with the feminine marker *-a-*, (e,g. *sayya:rah > sayya:ra:t* 'car/cars'; *mumarridˁah > mumarridˁa:t* 'female nurse/female nurses). This form of the plural is productive as it has a broad application over different kinds of nouns regardless of their gender (masculine/feminine) or category (human/non-human) in the singular form. To form the sound

masculine plural, the suffix /–*i:n*/ is attached to the end of the singular human masculine accusative noun, (e.g. *muhandis* > *muhandisi:n* 'engineer/engineers-acc.') and the suffix /–*u:n*/ (e.g. *muhandis* > *muhandisu:n* 'engineer/engineers-nom.') to the singular human masculine nominative noun (Alshboul et al, 2012 and Mashaqba and Huneety 2017). JA also has the so-called 'broken plural' forms, which are highly similar to the broken plurals in Modern Standard Arabic (Ratcliffe 1998, Ryding 2005). This kind of plural is formed through a non-linear pattern shift referred to as the broken plural in which the consonantal root is retained as the singular form but vowels are changed nonlinearly between the consonants in accordance with a strict template (El-Yasin 1985, Mashaqba 2015, Huneety 2015). For example, the singular word *kursi* 'seat' of the root {k-r-s} has the iambic plural pattern *kara:si* 'seats' CVCVVCV. JA also has three shape-defined prosodic categories: the *iambic* patterns CVCVV; the *trochaic* patterns CVCVC and *monosyllabic* plural patterns (Refer to Mashaqba and Huneety 2018 for details on iambic and trochaic structures in JA dialects). Finally, JA contains collectives which form a separate morphological category used to refer to uncountable entities or to living things like *fruit* and *animals.* In JA, the collective plural form seems to be used less with the plural replacing it in collective contexts and there is a tendency towards the development of the analytic singular/plural distinction by using free lexemes like 'one, a piece of, a single item of, a single example of, etc.' (Suleiman 1986, Wright 1995). Another way of forming collectives in JA is the deletion of the singular feminine marker /–*a*/ (e.g. *samaka/samak* 'one fish/ fish').

The purpose of this research is to articulate the following predictions. The symbolic account cannot be the only mechanism to deal with the similarity effects of the inflection of both regular and irregular words of various similarity degrees when matched to the plural inflection of their target words. This can be realized through the insensitivity of regular inflection to similarity effects compared to notable sensitivity of the irregular inflection to similarity effects to their targets.

2. The Experiment

This experiment was designed to answer two questions: (1) Do the similarity effects of a nonce word to a JA actual noun have any influence on its inflection?; and (2) Do similarity effects show any modulation by the regularity of these nouns? To respond to these questions, we used a method used by Bybee and Moder (1983), Prasada and Pinker (1993) in their investigations of similarity effects on the inflection of English past tense verbs. We constructed a group of nonce words that systematically differ in their similarity to existing JA nouns. For instance, for the irregularly inflected base noun *kita:b* (CVCVVC) ('book', plural: *kutub*), we created three non-words: *kida:b*, *kifa:b*, and *ʕitˁa:l*. The first member of the trio, *kida:b*, differs from the base *kita:b* in one consonant, /*d*/, which shares the place and manner of articulation with the base's /t/. The second trio member, *kifa:b*, is slightly less similar to the base. Like the first member, it differs from the base in the second consonant, and the new phoneme, /f/, shares neither the place of articulation nor the manner of articulation with the base's second phoneme /t/. Finally, the third trio member, *ʕitˁa:l*, is highly dissimilar to the base, sharing none of its root consonants; rather, it shares its template or pattern. The comparison of these trio members permits assessing whether the inflection assigned to the target depends on its similarity to the base. If the inflection of target words is affected by their phonological similarity to

the base, then targets sharing the same place and manner of articulation with the base (e.g. *kita:b*), should be more likely to take its inflection compared to targets that do not share the same place of articulation (e.g. *kifa:b*). Each of these targets, in turn, should be more likely to agree with the base's inflection than dissimilar targets like the word *ʕitˁa:l*.

The major endeavor of this study is to investigate the influence of similarity effects on the appearance of the default patterns which is established between the inflections assigned to the targets in relation to the base form. To examine the effect of regularity on the degree of sensitivity between the base forms and the inflected forms towards the default inflection, we generated three novel words for the regular base (e.g. *madʒa:l*, *maʃa:l*, *mazˁa:l* and *θafa:k*). The trios generated for the regular and irregular bases were matched for their phonological similarity (place and manner of articulation) to their respective base (see Table 1). Participants were asked to produce the plural form for the targets.

Table 1: Singular members of the regular and irregular trios used and their respective base words

	Regular	**Irregular**
Base	madʒa:l	kita:b
Highly similar	maʃa:l	kida:b
Moderately similar	ma zˁa:l	kifa:b
Dissimilar	θafa:k	ʕitˁa:l

Both the dual and connectionist accounts predict that the irregular inflection should be sensitive to the similarity of the target to its base since both hypotheses converge in their view of irregular inflection as an associative process. On the other hand, both mechanisms differ in their view of the notion regularity. According to the dual account, the regular default is a symbolic process. If regular inflection is achieved only by the default mechanism, then it should be insensitive to similarity effects: Targets that are highly similar to a regular base should be just as likely to agree with its inflection as highly dissimilar targets. In contrast, the connectionist account views default inflection a reflection of the distribution of regular and irregular types.

3. Materials and Methods

3.1 Participants

Twenty native speakers of JA served as participants in the current research. They were all students in the Department of English Language, Literature and Cultural Studies at the Hashemite University, Zarqa, Jordan. The experiment was administered as part of a course lecture after a consent sheet had been signed by each student. The participants received no compensation for their participation.

3.2 Instrument

The materials consisted of 40 trios of words constructed by phonological analogy to 20 pairs of existing JA nouns (base nouns, see Appendix A). These base nouns served only as models for the construction of the experimental target words, and they were not presented to the participants. Each pair of base nouns consisted of regular and irregular masculine nouns that are inflected for plural by attaching the

sound feminine marker *-a:t*. The regular and irregular base nouns were matched for the number of letters (*mean = 6.3254*, for regularly and irregularly inflected base nouns). The mean average of the phoneme number (vowels and consonants) for the regularly inflected nouns was (*7.42857)*, while it was (5.2222) for the irregularly inflected nouns. Eight of the regular and irregular pairs were matched for the number of syllables, i.e., eight of the regular base nouns are bisyllabic (*mean: 4.0*), while twelve are trisyllabic (*mean: 6.0*). For the regular pairs, 16 base nouns are bisyllabic (*mean: 8.0*), and only four are monosyllabic forms (*mean: 2.0).*

To ensure that our base nouns are familiar, we asked a group of 15 students at the Hashemite University who were native speakers of JA to assess the familiarity of these base nouns on a 1–5 scale (1 = rare, 5 = familiar). The familiarity of both regular and irregular nouns was high (mean = 4.052 and4.358 for regular and irregular base nouns, respectively). According to the dual mechanism account, the phonological distance of the target from an irregular base is more likely to reduce its agreement with the base's inflection compared to regular bases. Conversely, the higher familiarity of irregular bases is expected to increase agreement with the base's inflection. Thus, the greater familiarity with the irregular bases biases our materials against our hypothesis. For each member of these 20 pairs of base nouns, we constructed three targets. Each target differs in its level of phonological similarity to the base form in terms of place and manner of articulation. The first and second members of the trio differed from the base in one phoneme represented by a single sound. In the first trio member, the changed phoneme shared the same place and manner of articulation with the base, whereas in the second trio member, the changed phoneme shared only the manner of articulation. The third member of the trio differed from the base in all three consonants corresponding to its root, but maintained its word template. To maintain systematicity, the trios constructed to the regular and irregular bases were matched for the position of the changed letters within the word second consonant for the dissimilarity in both place of articulation and the whole consonant while all the consonants (initial, middle and final) were changed in the third trio for the two groups. The resulting120 targets (20 pairs x 3 levels of similarity) were randomized and presented in a written list.

3.3 Procedure

Participants were tested in a group. They were presented with the following written instructions in JA and here is the translation for them:

In this experiment the researchers aim to investigate how JA speakers produce the plural form of new words. For this purpose, they invented new JA words. The researchers aim to find out what the preferred plural form for these words is. In the following pages, you will find a word in the singular form. We request you to pronounce silently the word several times. Then, please write down next to it the plural form that sounds best to you.

Examples:

*d*a:r*du:r*

masa:rmasara:t

Thank you for participating in the experiment.

To ensure its validity, the data were presented to a panel of experts who are faculty members in the Department of Arabic Language and Literature to make sure that they conform to the proper phonotactics of the Arabic lexicon. To ensure the word list reliability, it was run twice with a one-month interval. Reliability was confirmed by both descriptive and referential statistics as indicated by Cronbach alpha.

4. Results

A Paired Sample ***t*** test was used to measure the effects of similarity of new words to existing words in JA on agreement with the base inflection. Twenty regularly inflected base nouns were introduced with three trios for each target word (20 targets x 3 targets= 60 responses). In Arabic, generally, one of the most dominant regular markers is the affixation of the /*–a:t/* to the end of some base nouns regardless of whether it is a feminine noun or not. Thus, the responses ending with the /*–a:t/* are considered correct. On the other hand, the irregularly inflected responses were considered correct if they correspond to the proper inflection of their target words. According to Table (2) below, the responses for the regular base plural nouns with consonants sharing the manner and place of articulation (pattern 1) have the highest average (mean=.9125 SD=.08867).On the other hand, pattern(3) with the difference in voicing showed the lowest rates (mean=.8375, SD =.02291) and finally regarding the forms having second consonants sharing neither place nor manner of articulation (pattern 2) the results displayed a moderate ratio (mean=.9100, SD =.02291). In contrast, the irregularly inflected nouns include the lowest mean marked with the third pattern for words containing totally dissimilar consonants and having the same template with a mean (.4850, SD =.02949) which is even lower than the similar category for the regularly inflected nouns. Similarly, irregular nouns having only the first consonant sharing manner of articulation have the highest mean (.7325) and (SD=.07993).

Table 2: Descriptive statistics for study variables

(**Paired Samples Statistics)**

		Mean	N	Std. Deviation	Std. Error Mean
Pattern 1	Regular	.9125	20	.08867	.01983
	Irregular	.7325	20	.07993	.01787
Pattern 2	Regular	.9100	20	.11309	.02529
	Irregular	.6350	20	.13089	.02927
Pattern 3	Regular	.8375	20	.10244	.02291
	Irregular	.4850	20	.13189	.02949

As shown in Table (3) below, the overall regular and irregular base targets reveal that there are statistically significant responses (sig. =.000, SD =.11359, SEM =.02540). This is supported by the statistically significant result given for all responses in the three patterns (Pattern one: sig.= 000,SD =.15166, SEM=.03391), (Pattern 2: sig. 000,SD=18317,SEM=.04096) and finally (Pattern 3: sig. 000,SD=.18387,SEM=.04112). It is important to note that the irregular base nouns have dissimilar target inflection depending upon the phonological distance, i.e., whether the dissimilarity occurs in the manner of articulation only, both manner and place of articulation in one consonant only or in all the consonants of the target word. This is reflected in the correct and incorrect responses made by the subjects on the irregular

base nouns compared to the correct and incorrect responses made by the subjects on the regular base nouns as shown in table (3):

Table 3: Paired samples **t**-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pattern 1	Regular - Irregular	.18000	.15166	.03391	.10902	.25098	5.308	19	.000
Pattern 2	Regular - Irregular	.27500	.18317	.04096	.18927	.36073	6.714	19	.000
Pattern 3	Regular - Irregular	.35250	.18387	.04112	.26644	.43856	8.573	19	.000
Overall	Regular - Irregular	.26917	.11359	.02540	.21600	.32233	10.597	19	.000

It is interesting to observe (as seen in Appendix B) that the responses to (11) base words score a mean (1.000) in each of the three trios (1, 2 or3) when inflected for the plural. This can be explained by the fact that all subjects provided the correct inflection. These (11) words contain (9) target words with the regular inflection and (2) target words with the irregular inflection such as *ħu:t* 'whale' (pl. *ħi:ta:n* 'whales') and *ta:dʒir* 'merchant' (pl. *tudʒdʒa:r* 'merchants'). Note that 11 of the regularly inflected words have the mean (1.000) in trios (1+2) while the two irregularly inflected targets have this average mean in the first trio only. Eleven words are not sensitive to similarity effects regardless of the phonological distance whether it is in place of articulation, both place and manner of articulation or totally dissimilar. The word *ħu:t* 'whale' has only two consonants belonging to only one syllable with the second consonant being changed into the sound /d/ instead of the phoneme /t/ with a different voicing quality, so one of the accounts is that the respondents classify this changed consonant as if it is totally similar to the one in the target word with no differences between the target word and the invented word in the first trio. Similarly, the word *ta:ʃir* has a similar phoneme /ʃ/ which has similarity to the one in the target word.

All base words of the mean less than (.5000) (as seen in Appendix C) have irregularly inflected targets which fall into trio three. Of these 10 target words, there are nine trios falling in trio three with an average mean (.6923) out of the overall trios, one response in the first trio and three in the second one. This means that all responses not matching the correct inflection are falling in trio three which is the least similar to the target word. Based upon this evidence, words with the least similarity to their targets are good candidates for the default pattern in the language. This is supported by the fact that only one response in trio one has low average mean (.5000), while most of these incorrectly inflected fall in the third trio, i.e. they are regularly inflected with the *–a:t* default suffix.

5. Discussion

In this study, we investigated a clear contradiction between the sensitivity of regular and irregular sounding targets to similarity effects. The results showed that the inflection of irregular targets was highly sensitive to the degree of similarity to their base. For example, the words that have high similarity to the

base form (e.g. *batan*, similar to the base *badan*) with voicing difference were more likely to take its inflection than moderately similar targets that differ from their base in only place and manner of articulation (e.g.*baʃan*). Targets that show high and moderate similarity were both more likely to take the base inflection than dissimilar targets, sharing none of its root consonants (e.g. *faʕam*). Moreover, there is more evidence that supports the idea that the regular default is available as the phonological distance of irregular targets from their base increased. More precisely, highly dissimilar irregular targets were more likely to take the regular /–a:t/ inflection than their base's irregular inflection.

The similarity effects for irregular JA targets support research by Bybee and Moder (1983), Prasada, and Pinker (1993) with irregular English verbs. These findings are consistent with the view that an associative process achieves irregular inflection, an idea that is strongly supported by the single memory and the dual mechanism approaches. On the other hand, the inflection of regular sounding nouns was not significantly affected by their similarity to their base, i.e., this fashion marks a contrast to the sensitivity of irregular sounding targets to similarity effects. Prasada and Pinker's findings (1993) provide ample evidence on this investigation of the lack of sensitivity of default inflection to similarity effects on English. These results are consistent with the view that regular inflection is achieved by the symbolic mechanism.

The idea of regular inflection as a default inflection predicts that its application is general, regardless of the similarity of the target to existing regular tokens. It is triggered by an 'elsewhere condition' upon the failure to activate a similar irregular token in associative memory (Kiparsky 1973). This research has provided evidence that regular inflection applies to non-word targets that are phonologically distant from their base nouns.

6. Conclusion

The research findings support the notion that the default inflection is necessary and can be considered the last resort manifested in the elsewhere condition (Kiparsky 1973). The problem that still needs further inquiry is how we can measure the sensitivity of the irregular inflections towards the default level. Moreover, we need to know more about the role of the initial consonants (Cohort Model) in determining the degree of the default inflection with the irregular forms. Having varying degrees of default based on the similarity levels existing between the base forms and the target forms minimizes the possibility of the semantically blind labels attributed to the regular forms. Thus, more prominent role is given to the semantic features when inflecting irregular forms.

أثر التشابه في ظهور الصيغ الافتراضيّة في اللهجة الأردنيّة

صبري الشبول، أنس حنيطي، باسل مشاقبة، وائل زريق، محمد العمري
قسم اللغة الإنجليزية، الجامعة الهاشمية، الأردن

الملخص

بحثت هذه الدراسة في الدور المنوط بعوامل التشابه الموجودة في النظام الاسمي في اللغة العربيّة الأردنيّة. وبناءً على فرضية الأنماط المترابطة، فإنه يمكن تفسير العمليات الذهنية من خلال عمليات التشبيك والربط الموجودة في رموز وشيفرات لغوية معينة. وفي المقابل فإن فرضية المسار الثنائي (المزدوج) تركز على فكرة أن الصيغ القياسيّة والمنتظمة يمكن تخزينها ومعالجتها في نظامين مستقلين ومتوازيين. استُخدِمَ اختبار تي للعينات المزدوجة (Paired *t* test) لقياس مدى تأثير عوامل التشابه بين الصيغ الصرفيّة وحالاتها الأصليّة. وقد استخدم الباحثون أربعين عينةً ثلاثيّةَ العناصر مكونة من مجموعتين، كل عينة تتكون من عشرين عنصراً، وُزِّعَتْ على عشرين طالباً. بينت نتائج البحث أن متحدثي اللغة العربيّة المستخدمة في الأردن قد أظهروا تجاوباً في حال التعامل مع الصيغ القياسية، في حين لم يظهروا الدرجة نفسها من التجاوب فيما يتعلق بالصيغ المنتظمة. وبناءً على ذلك يمكن القول إنّ نتائج البحث تعزز نظرية الصيغة الإفتراضيّة التي تتمتع بها الصيغ المنتظمة في المعجم الذهني، ومن ثمّ قدرة هذه الصيغ على الظهور بغض النظر عن درجة التشابه بينها وبين الصيغ الأصلية في المعجم الذهني. وتستمد هذه النتائج قوتها في ظل انسجامها مع فرضية الصيغ الأخرى المتغيرة، والناتجة عن عدم وجود صيغة محتملة للصيغ القياسيّة، ومن ثمّ ظهور ما يسمى بالصيغة الافتراضيّة. وأخيراً فإن نتائج هذا البحث تشكل مهاداً لإمكانية تطبيق الصيغ الافتراضية على الكلمات التي لا تحمل أي معنى وذات تباين في أصواتها.

الكلمات المفتاحية: العربيّة الأردنيّة، صيغ افتراضيّة، تشابه، مؤنث سالم، صيغ منتظمة.

References

Aljenaie, Khawla, Fauzia Abdalla, and Mohammad Farghal. 2011. Developmental changes in using nominal number inflections in Kuwaiti Arabic. *First Language* 31 (2): 222-239.

Al-Shboul, Sabri, Wael Zuraiq, Moh'D Al-omari, Anas Huneety and Bassil Mashaqba. 2020. Expanding the default forms in the lexicon: the sound masculine plural inflection. OPCION 36 (26): 3042-3058.

Alshboul, Sabri, Yousef Al-Shaboul and Suhail Assasfeh. (2012). The elsewhere Inflection: Evidence from Nominal Patterns in Modern Standard Arabic. SKASE *Journal of Theoretical Linguistics* 9: 11-20.

Benmamoun, Elabbas, Abdulkafi Albirini, Silvina A. Montrul, and Eman Saadah. 2014. Arabic plurals and root and pattern morphology in Palestinian and Egyptian heritage speakers. *Linguistic Approaches to Bilingualism* 4 (1): 89-123.

Berent, Iris, Steven Pinker, and Joseph Shimron. 1999. Default nominal inflection in Hebrew: Evidence for mental variables. *Cognition* 72 (1): 1-44.

Bybee, Joan L., and Carol Lynn Moder. 1983. Morphological classes as natural categories. *Language* 59: 251–270.

Bybee, Joan. 1995. Regular morphology and the lexicon. *Language and Cognitive Processes* 10: 425–455.

Clahsen, Harald, Monika Rothweiler, Andreas Woest, and Gary F. Marcus. 1992. Regular and irregular inflection in the acquisition of German noun plurals. *Cognition* 45: 225–255.

Clahsen, Harald, Sabrina Gerth, Vera Heyer, and Esther Schot. 2015. Morphology constrains native and non-native word formation in different ways: Evidence from plurals inside compounds. *The Mental Lexicon* 10: 53-87.

Cowie, Anthony P. 1994. Agreement. In R. E. Asher (ed.). *Encyclopedia of Language and Linguistics*, vol. 1, Oxford: Pergamon Press: 54-60.

Daugherty, Kim, and Mark Seidenberg. 1992. Rules or connections? The past tense revisited. *Proceedings of the14th Annual conference of Cognitive Science Society*. Erlbaum, Hillsdale, NJ: 259–264.

Elman, Jeffrey. 1993. Learning and development in neural networks: the importance of starting small. *Cognition* 48: 71–99.

El-Yasin, Mohammad. 1985. Basic Word Order in Classical Arabic and Jordanian Arabic. *Lingua* 65: 107-122.

Fodor, Jerry and Zenon Pylyshyn. 1988. Connectionism and cognitive architecture: A critical analysis. *Cognition* 28: 3–71.

Hare, Mary, and Jeffrey Elman1995. Learning and morphological change. *Cognition* 56: 61–98.

Hare, Mary, Jeffrey L. Elman, and Kim G. Daugherty. 1995. Default generalization in connectionist networks. *Language and Cognitive Processes* 10: 601–630.

Huneety, Anas. 2015. *The phonology and morphology of Wadi Mousa Arabic* (Doctoral dissertation, University of Salford).

Jacob, Gunnar, Elisabeth Fleischhauer, and Harald Clahsen. 2013. Stem allomorphy and affixation in morphological processing: A cross-modal priming study with late bilinguals. *Bilingualism: Language and Cognition* 16**:** 924-933.

Jaensch, Carol, Vera Heyer, Peter Gordon, and Harald Clahsen. 2014. What plurals and compounds reveal about constraints in word formation. *Language Acquisition* 21: 319–338.

Kim, John J., Gary F. Marcus, Steven Pinker, Michelle Hollander, and Marie Coppola. 1994. Sensitivity of children's inflection to grammatical structure. *Journal of Child Language* 21: 179–209.

Kim, John J., Gary F. Marcus, Steven Pinker, Michelle Hollander, and Marie Coppola. 1994. Sensitivity of children's inflection to grammatical structure [*]. *Journal of Child Language* 21 (1): 173-209.

Kim, John, Steven Pinker, Alan Prince, and Sandeep Prasada. 1991. Why no mere mortal has ever flown out to center field. *Cognitive Science* 15: 173–218.

Kiparsky, Paul. 1973. 'Elsewhere' in phonology'. In: Anderson, S., Kiparsky, P. (Eds.), *A Festschrift for Morris Halle*. Holt, Rinehart and Winston, New York: 93–106.

MacWhinney, Brian, and Jared Leinbach. 1991. Implementations are not conceptualizations: Revising the verb learning model. *Cognition* 40: 121–171.

Marcus, Gary F., Ursula Brinkmann, Harald Clahsen, Richard Wiese, and Steven Pinker.1995. German inflection: The exception that proves the rule. *Cognitive Psychology* 29: 189–256.

Marcus, Gary. 1998a. Can connectionism save constructivism? *Cognition* 66: 153–182.

Marcus, Gary. 1998b. Rethinking eliminative connectionism. *Cognitive Psychology* 37 (3): 243–282.

Marcus, Gary. 2001. *The Algebraic mind: Integrating connectionism and Cognitive Science*. MIT Press, Cambridge, MA.

Mashaqba, Bassil. 2015. *The phonology and morphology of Wadi Ramm Arabic* (Doctoral dissertation, University of Salford).

Mashaqba, Bassil and Anas Huneety. 2017. Morpho-phonological structure of sound feminine plural: Revisited. *International Journal of Applied Linguistics and English Literature* 6 (6): 115-122.

Mashaqba, Bassil and Anas Huneety. 2018. Emergence of iambs in Eastern Arabic: Metrical iambicity dominating optimal nonfinality. *SKASE Journal of Theoretical Linguistics* 15 (3): 15-36.

Mashaqba, Bassil, Nisreen Al-Khawaldeh, Hussein AlGweirien, and Yasir Al-Edwan. 2020. Acquisition of broken plural patterns by Jordanian children, *Linguistics* (published online ahead of print). doi: https://doi.org/10.1515/ling-2020-0024.

McCarthy, John and Alan Prince. 1990. Foot and word in prosodic morphology: The Arabic broken plural. *Natural Language and Linguistic Theory* 8 (2): 209-283.

Pinker, Steven and Alan Prince. 1988. On language and connectionism: Analysis of parallel distributed processing model of language acquisition. *Cognition* 28: 73–193.

Pinker, Steven and Alan Prince. 1994. Regular and irregular morphology and the psychological status of rules of grammar. In S. Lima, R. Corrigan, & G. Iverson (Eds.). *The Reality of Linguistic Rules*. Amsterdam: John Benjamins

Pinker, Steven, and Michael T. Ullman. 2002. The past and future of the past tense. *Trends in Cognitive Sciences* 6 (11): 456-463.

Pinker, Steven. 1991. Rules of language. *Science* 253 (2): 530–535.

Pinker, Steven. 1994. *The Language Instinct*. Morrow, New York.

Pinker, Steven. 1997. Words and rules in the human brain. *Nature* 387: 547–548.

Pinker, Steven.1999. Words and Rules: The ingredients of language. Basic Books, New York.

Plunkett, Kim, and Virginia A. Marchman. 1996. Learning from a connectionist model of the English past tense. *Cognition* 61: 299–308.

Plunkett, Kim, Virginia Marchman, and Steen Ladegaard Knudsen. 1991. From rote learning to system building: acquiring verb morphology in children and connectionist nets. *Cognition* 48: 21–69.

Prasada, Sandeep, and Steven Pinker. 1993. Generalization of regular and irregular morphological patterns. *Language and Cognitive Processes* 8: 1–56.

Ratcliffe, Robert. 1998. The broken plural problem in Arabic and comparative Semitic: allomorphy and analogy in nonconcatenative morphology. Amsterdam: John Benjamins.

Ravid, Dorit, and Lubna Hayek. 2003. Learning about different ways of expressing number in the development of Palestinian Arabic. *First Language* 23 (1): 41-63.

Ravid, Dorit, and Rola Farah. 1999. Learning about noun plurals in early Palestinian Arabic. *First Language* 19: 187–206.

Ravid, Dorit, Steven Gillis, Wolfgang U. Dressler, Bracha Nir, Katharina Korecky-Kröll, Agnita Souman, Katja Rehfeldt, Sabine Laaha, Johannes Bertl, and Hans Basbøll. 2008. Core morphology in child directed speech: Cross-linguistic corpus analyses of noun plurals. In: Behrens, Heike, (Ed.) Corpora in language acquisition research. Amsterdam/Philadelphia: John Benjamin Publishing Company.

Rumelhart, David E., and James L. McClelland. 1986. On learning the past tense of English verbs: implicit rules or parallel distributed processing? In: McClelland, J.L., Rumelhart, D.E. The PDP Research Group (Eds.), *Parallel Distributed Processing: Explorations in the Microstructure of Cognition*, Vol. 2: Psychological and Biological Models. Bransford Books/MIT Press, Cambridge, MA, pp. 216–271.

Ryding, Karin. 2005. *A reference grammar of Modern Standard Arabic*. Cambridge: Cambridge University Press.

Say, Tessa, and Harald Clahsen 2002. Words, rules and stems in the Italian mental lexicon. In S. Nooteboom, F. Weerman and F. Wijnen (Eds.), *Storage and computation in the language faculty*. Kluwer.

Seidenberg, Mark 1987. Sublexical structures in visual word recognition: Access units of orthographic redundancy? In: Coltheart, M. (Ed.), *Attention and Performance XII: Reading*. Erlbaum, Hillsdale, NJ: 245–263.

Suleiman, Saleh. 1985. *Jordanian Arabic between diglossia and bilingualism*. Amsterdam: John Benjamin Publishing Company.

Ullman, Michael T., Roumyana Pancheva, Tracy Love, Eiling Yee, David Swinney, and Gregory Hickok. 2005. Neural correlates of lexicon and grammar: Evidence from the production, reading, and judgment of inflection in aphasia. *Brain and Language* 93 (2): 185-238.

Wright, William. 1995. *A grammar of the Arabic language*. Cambridge: Cambridge University Press.

Appendix A: The targets employed in the study and their respective regular and irregular bases

1- Regular targets

Base	Similar	Medium	Dissimilar	Gloss
mamar	malar	maʕar	fanatˁ	path
badal	batal	banal	saʕ an	compensation
qara:r	qal a:r	qaf a:l	xat a:k	decision
matˁ a:r	mata:r	maʕa:r	ʃata:f	airport
niza:l	nisa:l	nitˁ a:l	dˁiqa:s	fighting
isˁda:r	isda:r	intha:r	iʃna:m	issue
imda:d	ibda:d	iqda:d	filɣa:dʒ	supply
indʒa:z	iddʒa:z	ihdʒa:z	isˁla:k	achievement
muʕtarak	muħtarak	muntarak	ʃumbaran	interaction
muktasab	muɣtasab	muʕtasab	ʕunkalash	gaining
muntazah	mudtazah	muktazah	ʃunkaraħ	park
musaddas	musˁaddas	muladdas	thufannab	hexagon
mudarradʒ	mutarradʒ	musˁaqadʒ	turannab	auditorium
murabbaʕ	mulabbaʕ	mukabbazʕ	fulatatˁ	square
mustawsˁaf	muztawsˁaf	muntasˁaf	luftawqan	hospital
mustanqaʕ	musˁtanqaʕ	muʃtanqaʕ	hintalaɣ	pond
mustanbat	musˁtanbat	muftanbat	duflamkal	plantation
infiʕa:l	idfiʕa:l	isˁfiʕa:l	iʃnidˁa:m	anger
ittiaħa:d	itˁtiħa:d	iʃtiħa:d	iɣtira:s	mental state
idʒtima:ʕ	iʃtima:ʕ	intima:ʕ	fintilka:l	meeting

2-Irregular targets

Base	Similar	Medium	Dissimilar	Gloss
walad	wanad	washad	jaʕaɣ	boy
nahr	naʕr	nalr	lafn	river
ħadʒar	ħaʃar	ħatˁar	maqaz	stone
dʒamal	dʒawal	dʒakal	masˁan	camel
badan	batan	balan	faʕam	body
markab	malkab	maskab	taʕnak	vehicle
masbaħ	mashbaħ	matbaħ	nasˁbal	pool
qandi:l	qald i:l	qasdi:l	ʃambi:s	light
ʕusˁfu:r	ʕusf u:r	ʕunfu:r	mustu:b	jay
ðira:ʕ	ðilaʕ	ðiqa:ʕ	ʃidʒa:z	arm
mar i:dˁ	mal i:dˁ	mak i:dˁ	ʃasˁ i:f	sick
wisa:m	wiza:m	wiɣa:m	bala:x	
ma:l	ma:n	ma:k	ɣa:ħ	insignia
ħu:t	ħ u:d	ħu:q	θu:k	whale
ðiʔb	ðiħb	ðidʒb	ħiʕ t	wolf
zˁil	zˁir	zˁiθ	fib	shadow
ta:dʒir	ta:ʃir	ta:fir	fa:kil	merchant
ra:kib	ra:qib	ra:mib	ta:miʕ	rider
dʒundi	dʒuldi	dʒuħdi	munsˁiʕ	soldier
maʃfa	madʒfa	makfa	ʃanka	hospital

Appendix B:

1- Base words that are given the mean (1.000) of both regularly and irregularly inflected responses

Word	Trio 1	Trio 2	Trio 3
muktasab	muktasab	muɣtasab	muʕtasab
musaddas	musˤaddas	muladdas	θufannab
mudarradʒ	mutarradʒ	musˤaqadʒ	turannab
murabbaʕ	mulabbaʕ	mukabbazʕ	fulatatˤ
mamarr	malarr	maʕarr	fanatˤ
badal	batal	banal	saʕ an
qara:r	qala:r	qafa:l	xata:k
matˤ a:r	mata:r	maʕa:r	ʃata:f
niza:l	nisa:l	nitˤa:l	dˤiqa:s
Irregularly inflected base words			
ħu:t	cued	ħu:q	θu:k
ta:dʒir	ta:ʃir	ta:fir	fa:kil

2- Base words that are given the mean (.500) or below of irregularly inflected responses

Word	Trio 1	Trio 2	Trio 3
qandi:l	qald i:l	qasd i:l	ʃamb i:s
ʕusˤfu:r	ʕusfu:r	ʕunfu:r	mustu:b
mari:dˤ	mali:dˤ	maki:dˤ	ʃasˤi:f
wisa:m	wiza:m	wiɣa:m	bala:x
ðiʔb	ʃiħb	ʃidʒb	ħiʕ t
zˤil	zˤir	zˤiθ	fib
dʒundi	dʒuldi	dʒuħdi	munsˤiʕ
maʃfa	madʒfa	makfa	ʃanka