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Inflectional Regularity in Modern Standard Arabic Broken Plural Nouns

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الملخص

تهدف الدراسة لمعرفة التنظيم التصريفي في جمع التكسير في اللغة العربية، وذلك لما وصل إليه هذا الموضوع من أهمية في علم اللغويات حديثاً، وتعتمد الدراسة على بيانات جُمعت بشكل وصفي من المراجع الإنجليزية العربية حول موضوع جمع التكسير وأكثر من القواميس والمعلومات التي جمعت من الناطقين باللغة العربية. ويُعرّف التنظيم التصريفي باستخدام قواعد اللغة لتكوين الكلمات المستخدمة في السياقات النحوية، ولوحظ بأن التنظيم الدلالي ثابت في الجمع في اللغة العربية، ولا يتغير معناه سواءً كان في الجمع السالم أو جمع التكسير، ويصنف الجمع في اللغة العربية جمع سالم وجمع تكسير، ويشكل الجمع السالم بإضافة زوائد تصريفية، بينما يشكل جمع التكسير بتغيير داخل الجذر وإضافة زوائد تصريفية، وعليه فقد لوحظ وجود أشكال متعددة لجمع التكسير في اللغة العربية، ولكن هذه الأشكال المتعددة تتبع قواعد صوتية و صرفية في اللغة، ولذلك فهي منتظمة وإنتاجية.

Abstract

This study aims to investigate the inflectional regularity in Modern Standard Arabic broken plural nouns because Arabic broken plurals have recently attracted the attention of many linguists. It is based on data qualitatively collected from English and Arabic materials on Arabic broken plurals, reference dictionaries and supplemented by data obtained from native speakers' competence. Inflectional regularity refers to the use of the rules of a language to form new forms of a lexeme used in a grammatical context. In Arabic plural nouns, semantic regularity is the norm even where forms differ. The Arabic plural nouns are morphologically classified into two types: sound plurals formed by the addition of affixes and broken plurals formed by modifying the stem. It has been observed that Arabic broken plurals show a large number of variation in forms because of stem changes. However, these changes are not random or arbitrary. They are regular and productive. This result processes lines to further research on regularity in Arabic broken plurals and the relationship between phonology and morphology in forming broken plurals.

Keywords: concatenative, nonconcatenative, root, pattern, broken plural, allomorphy

Introduction

Regularity is the potential of a morphological process to generate repetitive noncreative morphological coining on the basis of the existing rules used in a language. Bauer (2001, pp. 54-56) argues that ‘regular’ has several meanings as applied to morphological processes:

For some scholars ‘regular’ seems to mean transparent that is ‘without any morphophonemic irregularities of form.’... The second meaning of ‘regular’ is that a process is regular if and only if it is the process used to create the majority of appropriate forms in the language ... A third meaning of regular is the etymological one of working by rule ... A fourth meaning of regular is found in the psycholinguistic literature. Here regular seems to mean freely generalizable.

Carstairs-McCarthy (2002, p. 85) confirms that “productivity is closely tied to regularity, but regularity in shape has to be distinguished from regularity in meaning.” Inflectional morphology deals with the creation of the inflected forms of lexemes, that is the kind of variation that lexemes exhibit on the basis of their grammatical context. In inflection, semantic regularity is the norm even where formal processes differ. For example, no plural form of a noun has any unexpected extra meaning or function whether it is formally regular or irregular.

Carstairs-McCarthy (2001) states that the markings introduced by inflectional rules may be affixal or nonconcatenative; a rule’s applicability to a stem is conditioned by the set of morphosyntactic properties associated with the stem, by the stem’s phonological form, by the stem’s membership in morphological class, or by combination of such factors.

Morphological productivity refers to the extent to which a morphological process or pattern applies to new forms. Coining must be repetitive in the speech community to be productive. Baayen & Lieber (1991), Bybee (1985, 1988) and MacWhinney (1978) claim that productivity is directly related to the type of frequency of the pattern. Bybee (1988, 1995) notes that a pattern with no phonological or semantic restriction is more likely to be or become more productive than one with such a restriction

Regularity is lack of arbitrary allomorphy. “Allomorphy is often lexically or morphologically governed” (Aronoff cited in Spencer, 1992, p. 82). Regular forms are formed by a rule whereas irregular ones are learned by rote (Berko, 1958, and Mackay, 1978). A regularization process indicates that any novel form is more likely to resemble a regular form than an irregular one (Rumelhart & McClelland, 1986). Regularization is the tendency to drive out exceptions by replacing them with a form that fits with a more general pattern (O’Grady, 2008, p. 10). The exceptions have all been changed to comply with a more regular pattern.

Bybee (1994, p. 251) also states that “often the terms ‘regular’ and ‘productive’ are used interchangeably and ‘Regular’ is contrasted with ‘irregular’, where ‘irregular’ indicates that a pattern is characterized by lexical idiosyncrasies.” According to Bybee, lexical idiosyncrasies are measured in degrees on two dimensions: the extent to which the pattern is applicable only to arbitrary lexical classes and the extent to which it deviates from the regular pattern. For example, despite phonologically conditioned allomorphy in the English past tense morpheme represented by {-ed}, it is more regular than the same morpheme represented by a vowel change and the addition of a suffix (such as *kept, slept, left*, etc.) which is more regular than the same morpheme represented by a vowel change only (such as *bit, done, struck*) which is more irregular than those represented by both vowel and consonant changes (such as *thought, taught, brought*). Thus, irregularity is defined language-internally in relation to the most regular pattern (Bybee, 1994, p. 252). According to Bybee, regularity and productivity are equated. In Arabic, there are sub-regularities among broken nouns and generalization of them to phonologically similar nonce forms (Bybee & Moder, 1983).

In Arabic, nouns are morphologically inflected for gender (i.e. masculine or feminine), state (definite, indefinite or construct), case (nominative, genitive, or accusative), and number (singular, dual or plural). Haywood and Nahmad (2004, p. 40) argue that “there are three numbers in Arabic: singular (مفرد *mufrad*), dual (مثنى *muθanna*), and plural (جمع *Jam*).” In Arabic, the number system is trifold: singular (unmarked), dual (the suffixes: {-*aani*} or {-*iini*}) and the plural {-*uuna*} or {-*iini*} for masculine sound plurals and {-*aat*} for feminine sound plurals.

The plural forms are usually treated under two large headings with a number of irregularities under each i.e. sound (or external) plurals and broken (or internal) plurals. In the sound plurals, the basic word remains intact, but an affix (a suffix) is added. In the broken plurals, the changes are primarily internal. For example, the trilateral root *k t b* in كتاب *kitaab* ‘book’ remains unchanged, but the vowels are changed in the plural كُتُب *kutub* ‘books’. Aronoff (1976) states that processes which are transparent, in that they involve no allomorphy, tend to be more productive and more predictable than those which do induce allomorphy. Bauer (2001, p. 66) points out that “the more predictability there is, the more general the specific statements that can be made about the pattern of innovation as a whole, and the closer the innovation is to being productivity”. This study deals with the inflectional regularity in the Modern Standard Arabic broken plural nouns. It focuses on this process in Modern Standard Arabic because it is the widespread language nowadays.

Problem of the Study

Arabic broken plural nouns show a large number of variants in forms which may impose constraints on their inflectional regularity because of stem changes. This study attempts to give an account to the following question:

How does inflectional regularity work in Modern Standard Arabic broken plural nouns? We limit our attention to ‘trilateral nouns’ although there are biliteral, quadrilateral and quinilateral.

Significance of the Study

The study of the relationship between morphology and phonology has played an important role in recent linguistic investigations (McCarthy, 1990; McCarthy and Prince, 1986, 1988)

- a) Providing information on this area might help learners and researchers understand the basic characters of phonological structure and its consequence on morphology.
- b) Arabic has some uniqueness in its plural marking system.
- c) Being well informed on all these might pave the way for second and foreign language learners to comprehensively understand the plural marking system in Arabic.

Objectives of the Study

The study focuses on inflectional regularity in Modern Standard Arabic broken plural nouns. It aims at achieving the following objectives:

General Objectives:

To examine how inflectional regularity works in Modern Standard Arabic broken plural nouns.

Specific Objectives

- To analyze the paradigms of Modern Standard Arabic broken plurals.
- To indicate the morphosyntactic categories and their markers.
- To identify stem changes.
- To investigate the interaction between phonology and morphology in forming broken plurals.

Hypothesis of the Study

It is hypothesized that Arabic broken plurals are regular and productive.

Methodology of the Study

This study is based on data qualitatively collected from English and Arabic materials on Arabic broken plurals, reference dictionaries and supplemented by data obtained from native speakers’ competence.

Literature Review

Much work has been done on Arabic morphological analysis and generation in a variety of approaches and at different degrees of linguistic depths (Al-Sughaiyer and Al Kharashi, 2004). Furthermore, the structure and productivity of the Arabic broken plural system have been the subject of research in morphological theory over the past fifteen years, and considerable progress has been made in developing theories to identify and account for the underlying structure in the Arabic broken plural system, the most prominent of those theories being templatic morphology and prosodic morphology (Ryding, 2005, p. 145).

A large part of traditional Arabic morphology, including the description of broken plurals, dates back to Sibawayh, a grammarian of the 8th century (Sibawayh, ed. Haarun, 1977), since then, his representation has been generally approved and transmitted by grammarians without major improvements. Sibawayh's (d.circa 791) *kitaab* is the first comprehensive account of the Arabic language. Sibawayh's analysis of Arabic covered the entire structure of language *qiyaas* 'analogy'. This system is essentially unchanged since Sibawayh, and has incorporated loanwords harmoniously. This traditional view describes how broken plurals are produced from singular nouns. This path from a singular form to a broken plural form passes through a root. The essential steps in this operation are: analyzing the singular into a root and existing singular pattern, selecting the broken plural pattern and combining the root with the broken plural pattern. In the first step, the singular shifts from a surface form to the root and pattern level, then, it shifts back to surface. For example كتاب *kitaab* 'book' is analyzed into the root *k t b* and the singular pattern *fiʕaal* and then the plural pattern *fuʕul* is selected and combined with the root *k t b* to get كُتُب *kutub* 'books'. The analysis of an Arabic word into a root and a pattern is not a deterministic operation and can a priority produce several results, even after discarding these results that violate any constraints about roots or patterns.

In Arabic, it is observed that a root is usually stable across all the forms in a lexical item; grammatical distinction between these forms correspond to different patterns. Thus, lexical items are classified into biliteral e.g. أم *ʔum*, trilateral فعل *faʕal*, quadrilateral e.g. ضفدع *dʕifdaʕ* 'frog', quinquilateral e.g. حديقة *ħadiiqah* 'garden' depending on the number of letters in their root. The slots for root letters in a pattern are traditionally noted by the consonants ل ع ف ʔ instead of the digits 1, 2, 3.

The traditional morphology model of broken plurals is precise enough to define taxonomies: two nouns are assigned the same class if they produce their broken plural in the same way. However, traditional morphology does not explicitly enumerate classes. Traditional morphology also integrates inflection with derivation. This model has two major drawbacks. First, rules are not very adequate to explain phenomena such as lexical dependency and broken plurals. The few authors who formalized the rules of traditional morphology (such as Beesley, 1996; Habash & Rambow, 2006; Smrř, 2007) did not publish them in a readable updatable way. Second, deep roots are not directly observable, which complicates decisions about what their exact value should be.

There have been a variety of theoretical approaches to understanding these processes and varied attempts to produce systems of rules that can systematize these plural forms. The Arabic grammarians' approach to the problem of variation is to list the possible patterns البنية *ʔalbunyah* 'building' or الأوزان *ʔalaawzaan* 'measure or balance' or الميزان الصرفي *ʔalmiizaan ʔalŠarafi* 'morphological balance' of the broken plural and then to try to determine which-singular patterns

are most usually associated with each. For each broken plural pattern, they list a series of possible singular forms – source or literally causes *علل* *ʿilal* and conditions *shuruut* which determine or limit the association of the broken plural forms with particular singular forms. The conditions are of two types, phonological and semantic. However, the phonological conditions accepted by the grammarians relate only to the phonology of the consonantal root – whether a root has a weak consonant (i.e. a glottal stop or glide), for example. Other factors, such as the quality of the singular stem vowel and whether a form is basic or derived, are not explicitly included in the traditional analysis. The semantic conditions include such criteria as the referent of the noun is animate or inanimate. There are actually several different functional categories, such as “the plural of animate nouns” vs “plural of inanimate nouns”, “plural of multiplicity” vs “plural of paucity”.

Root-and-pattern morphology is known as ‘Semitic morphology’. A surface root is a morphemic abstraction, a sequence of radical letters, which can only be consonants or long vowels; for example, *ك ت ب* *k t b* ‘writing’. A pattern is a template of characters surrounding the slots for the root letters. These slots are shown in the pattern of indices like *f v ʿ v l* or *1 v 2 v 3*. Between and around the slots, patterns contain short vowels and sometimes consonants or long vowels. Once affixes are stripped off the surface form of a word, the remaining stem is analyzed as the interdigitation (Beesley, 1996) of a root with a pattern. For example, the stems *كتاب* *kitaab* ‘book’ and the broken plural *كُتُب* *kutub* ‘books’ are represented by the root *k t b* and respectively by the singular pattern *f v ʿ v l* or *1 i 2 aa 3* and the broken plural pattern *f v ʿ v l* or *1 u 2 u 3*. Root and Pattern systems pose serious problems for traditional theories based on the linear agglutinative approach to morphology. Nonconcatenative morphology and approaches shed light on a phenomenon known as ‘echo words’ e.g. *ولد* *walad* ‘boy’, *أولاد* *ʾawalaad* ‘boys’, *ورقة* *waraqah* ‘paper’, *أوراق* *ʾawaraaq* ‘paper’. In the framework of traditional morphology, the analysis of broken plurals is systematically consistent with the roots traditionally used for the practical purpose of indexing dictionaries.

Semitic root and pattern morphology in which the CV pattern of a word could constitute a separate morpheme since the shape of the word is a crucial component of the meaning. In Arabic, all lexemes linked by derivational morphology share a common root: the root to derivational morphology is what the lexeme is to inflectional morphology; the root is a more abstract morphological notion than the lexeme. Arabic traditional dictionaries are root-based, rather than lexeme-based. The rich nonconcatenative morphology of Semitic languages frequently requires innovative solutions that standard approaches do not provide. The root is the traditional notion from Arabic grammar, a sequence typically of three or (rarely) four consonants, that abstracts over derivation morphology. The lexeme is the set of all related inflectional variants. The lemma is a chosen representative of a lexeme. For Arabic nominals, it is the singular masculine nominative definite without any clitics.

Subsequent work by McCarthy and Prince (1986, 1990) introduced a constrained theory of templatic shapes in morphology, which maintained that morphological templates always constitute authentic units of prosody such as a syllable or a foot. This became known as the ‘Prosodic Morphology Hypothesis’, and it gave rise to a research program that was especially active in the 1980s and 1990s and continues today though under different guise while McCarthy’s early work focused on the root and pattern morphology of Semitic in which the prosodic template itself contributes to the meaning of the word. Templatic morphology is pervasive in both nouns and verbs of Semitic languages.

McCarthy’s original work offered an autosegmental analysis of Semitic root and pattern morphology in which the **CV** pattern of a word could constitute a separate morpheme since the shape of the word is a crucial component of the meaning. The principles of Autosegmental phonology were applied by McCarthy (1979) to the problem of Semitic root and pattern morphology to produce what is often called a theory of nonconcatenative morphology, that is a nonagglutinative theory.

In order to provide a systematic analysis of how standard Arabic employs these templates in the creation of the Arabic broken plural nouns, McCarthy and Prince (1990) apply the theory of prosodic morphology to the Standard Arabic broken plural formation. This process is divided into two phases: vowel deletion and vowel epenthesis. McCarthy and Prince observe that Arabic broken plurals are best analyzed as prosodic feet. The iambic pattern of the form **cvcvv** with stress falling on the second syllable is far the most common, it is also the only productive pattern. The other major noniambic pattern is the trochaic foot **cvvcv** with stress falling on the first syllable (Katamba, 2001, pp. 272-274). Thus, the majority of the broken plural templates fall into two categories: the iambic template **cvcvv** or the trochaic template **cvvcv**.

There are two nonconcatenative processes: autosegmental phonology (Goldsmith, 1976) and prosodic morphology (McCarthy, 1984, McCarthy and Prince, 1986). Autosegmental phonology offered a formal means to analyze morphological processes in which the exponence is partially subsegmental as in mutation or umlaut (Lieber, 1987, 1992). Prosodic morphology introduced a way to deal with morphological processes that are characterized by invariant templatic shape. While languages with nonconcatenative morphology have long been known, the theoretical constructs of autosegmental phonology and prosodic morphology allowed researches in the 1980s and 1990s to focus on nonconcatenative processes, leading to new formal approaches.

MORPHE is based on the notion of a morphological form hierarchy or tree that acts in generation as a discrimination network. MORPHE (Leavitt, 1994) is a tool that compiles morphological transformation rules into either a word parsing program or word generation program. MORPHE is written in common lisp functions. While MORPHE’s computational engine is a general one, the

morphological rules must be developed for each language. At present, MORPHE is fully functional as a morphological generator, but not as a morphological analyser. The enhanced version of the MORPHE system (Cavalli-Sforza, and Soudi, 2007) adds allomorph rules and node equivalencing to the original system (Leavitt, 1994).

This study focuses on the lexeme as a central morphological concept which can be comparable to efforts by Soudi *et al*, 2007; Habash, 2004; Smrž, 2007; Dichy and Farghaly, 2007. So this study is based on lexeme-based morphology (Aronoff, 1994; Beard, 1995) which gives priority to stems and store broken plural stems in the lexicon beside the singular stem. The multiple-stem approach is promising because nouns with a broken pattern commonly display two major stem alternants: the singular/dual allostem and the plural allostem. Computer systems for the morphological analysis and generation of Arabic words have been implemented. They can be classified into two approaches. The root-pattern approach is based on traditional morphology. During analysis a stem is analyzed into a deep root and a deep pattern which are looked up among the roots. The multi-stem approach seeks to avoid heavy computation during analysis. A stem is looked up among the stems stored in a dictionary. The term multi-stem alludes to the fact that a lexical entry a broken plural noun has at least two stems. This approach has a variant in which the stems are generated from root and patterns during a dictionary compilation phase. Beesley (1996, 2001) argues that the system's rules deal with root alternations, morphological analysis, these rules are applied regressively i.e. they take surface forms as input and they output deep forms.

The generation direction of inflected nouns tiers is that:

- Tier 1: pattern and affixational morphemes
- Tier 2: Root
- Tier 3: Vocalism
- Tier 4: phonological representation
- Tier 5: orthographic representative

In the generation direction, tiers 1, 2, 3 are always input tiers. Tier 4 is first an output tier and subsequently an input tier. Tier 5 is always an output tier. All tiers are read or written at the same time, so that the rules of the multi-tier automation are rules that scan the input tiers and depend on the output tier.

The implementation using Finite State Morphology (FSM) is comparable to early work on Arabic morphology, most notably (Kiraz, 1994; Beesley, 1996) and more recent efforts following the multi-tier approach by the authors (Habash *et al*, 2005; Habash and Rambow, 2006). Finite-state morphology implementation naturally handles analysis and generation.

More recent approaches to Arabic morphology are done with an eye to syntactic processing. Arabic morphology is addressed in the framework of

functional morphology. Elixir-FM extends the original functionality of the framework by addressing the specific needs of Arabic morphology.

Elixir-FM functional morphology system for Arabic (Smrž, 2007) and MAGEAD (Morphological Analyzer and Generator for Arabic Dialects) are both functional morphology systems compared to BAMA (Buckwalter Arabic Morphological Analyzer) (Buckwalter, 2004) and SAMA (Standard Arabic Morphological Analyzer) which are form-based morphology. These systems also differ in how they model their form-based components. BAMA does not explicitly model templatic morphology or morphological interactions instead it uses a simple break up of words into prefixes, stems and suffixes that already collapse all templatic morphophonemic and orthographic decisions. In contrast, Elixir-FM models templatic morphology and orthographic rules; however, some of these are handled by spelling out the allomorphs of a morpheme. For example, the pattern for ميزان *myzaan* 'scale' is represented as its allomorph *m12aa3* which consolidates a weak radical rule with the pattern. MAGEAD uses a morphemic representation for all morphemes and explicitly defines morphophonemic and orthographic rules to drive the allomorphs. Despite these differences, the BAMA lexicon was heavily used in the creation of Elixir-FM, which extended it to handle functional morphology. BAMA combines wide coverage with detailed linguistically informative analysis. It is based on a large-scale lexicon of base form, along with lists of prefixes and suffixes. It includes a list of compatibility rules, which govern the combination of stems with affixes. BAMA is most recently called SAMA. It is the official morphological analyzer used by the linguistic Data Consortium for the Penn Arabic Treebank a language resource used by most practitioners interested in Arabic disambiguation and parsing BAMA and SAMA take the stem as the base form and root information is provided.

In all layers of Arabic, the bulk of the vocabulary is built on the principle of root and pattern. To express certain semantic terms (i.e. words) a purely consonantal root carrying the basic semantic information is combined with a limited set of patterns using a fixed sequence of consonants, vowels, and optional prefixes and suffixes. Most of the roots consist of three consonants called radicals. Those with four consonants are by no means rare, but are often merely extensions of triconsonantal roots. A few words of the most elementary vocabulary have only two radicals, for example أب *ab* 'father', أخ *akh* 'brother', يد *yad* 'hand'.

The root pattern system of derivation is responsible for the remarkable uniformity of the Arabic lexicon. Only a very few types of roots, above all those containing the two weak consonants *w* and *y*, cause changes in most patterns, but because even these follow certain rules, Arabic is almost completely free of irregularities.

Studies of Ratcliffe (1992, 1998), Levy (1971) and Murtonen (1964) on the productivity in the Arabic broken plural system demonstrate that while the association between singular and plural forms is not random, there is no way to

predict exactly which plural pattern a singular will take. A broken plural pattern has in general complex stem alternants.

Arabic Inflectional Morphology

Arabic is by far the largest living representative of the Semitic language family. Semitic languages are characterized by complex productive morphology, with a basic word formation mechanism, root and pattern, that is unique to languages of this family. Daya, Roth, Wintner (2007, p. 143) state that the morphology of Semitic languages is unique in the sense that major word formation mechanism is an inherently nonconcatenative process of interdigitation, whereby two morphemes a root and a pattern are interwoven. In Semitic languages, words are combination of two morphemes: a root and a pattern. Arabic is a language of rich and complex morphology. The peculiarity and nature of this language make its morphological and phonological rules confusing for second language learners. The form of Arabic under investigation is Modern Standard Arabic. It is by far the largest living representative of the Semitic branch of Afro-Asiatic languages. Arabic morphology is a concatenative and nonconcatenative system (i.e. an agglutinative and nonagglutinative system), that is, one which depends on the addition of affixes and manipulation of radical or root letters using processes such as elision, insertion, epenthesis, metathesis, mutation, gemination, etc. Arabic morphology has many aspects of regularities, subregularities and irregularities.

Understanding Arabic requires the treatment of the language constituents at all levels: phonology, morphology, syntax and semantics. Each component requires extensive study and exploitation of the associated linguistic characteristics.

Arabic traditional dictionaries are root-based, rather than lexeme-based. The rich nonconcatenative morphology of Semitic languages frequently requires innovative solutions that standard approaches do not always provide.

In Arabic, words are constructed or partially constructed not through the concatenative of linearly separable morphemes (e.g. English *un-accept-able*), but by the interdigitation of morphological forms which individually do not constitute self-standing phonological wholes (e.g. Arabic كاتب *kaatib* 'writer'). This type of morphology is variably termed in the literature introflexional, nonconcatenative (McCarthy, 1981), or transfixing (Bauer, 2001). It is a pervasive feature of the Semitic languages, and is particularly highly developed in Arabic. A simple example of introflexion in Arabic is provided by كُتُب *kutub* 'books' consisting of the root *k t b* {writing} the template *CVVCV* {noun} and the vocalic melody *u-u* {plural}. Although introflexion is a central feature of Arabic, most inflectional and some derivational categories are expressed through affixation; many derivational categories, which are expressed principally by introflexion, take complementary prefixes, or, less commonly, suffixes.

Basic noun stems in Arabic comprise a consonantal root and a pattern. The pattern can be further divided into two elements: a prosodic template and a vocalic melody.

Most consonantal roots are trilateral. The root prototypically expresses the content meaning of the word and the pattern expresses the functional meaning. The association of the consonantal root and vocalic melody with the prosodic template makes the word. The consonantal root is always fully independent of the prosodic template; the vocalic melody, by contrast, shows independence for relatively few morphological categories, such examples include كتاب *kitaab* 'book' vs كُتُب *kutub* 'books' in which the vocalic melody alone expresses number. However, in the word علاج *ʔilaaJ* 'healing / treatment' which comprises the consonantal root ʔ-ل-ج (heal / treat), the prosodic template **CVVCVC**, and the vocalic melody *i-aa*, the combination of the latter two expresses the category of verbal noun, rather than either the prosodic template or the vocalic melody independently.

Consonants are regarded as the basic carriers of lexical meaning: words consist of two, three, four or five radicals, brought together in a pattern consisting of additional consonants and vowels. These patterns are denoted with a scheme, devised by earlier grammarians, which encodes the three radicals of a word with the help of the letters *f ʔl*. In most, but not all, Arabic dictionaries, the main entries are roots, which consist of basic consonants without affixes. Patterns (vowels between the consonants) give the roots different meanings in different contexts.

In Arabic inflectional morphology, the core meaning of the word remains intact and the extensions are always predictable. For example, the semantic relationship between كتاب *kitaab* 'book' and كُتُب *kutub* 'books' maintains the sense of 'book', but only varies in the number. The change in number is accomplished by using templatic morphemes (pattern and vocalism change). This form of plural construction in Arabic is called 'broken plural' to distinguish it from 'sound plural' which is formed by the addition of suffixes. For example, مُعَلِّم *muʔalim* 'male teacher' has the plural form مُعَلِّمُونَ *muʔalimuun* 'male teachers'.

Bauer (1983, p. 18; 2001, p. 4), Spencer (1992, p. 49) and Plag (2002, p. 55) argue that productivity leads to new coinages on a systematic basis. It is rule-governed because it exploits the rules of the language applied on already existing patterns found across at least two items. So, productivity means that some word-formation processes are regularly and actively used in the creation of new words while others have fallen into desuetude with the passage of time, or have been borrowed from elsewhere, and are only used in restricted circumstances.

Bauer (2001, pp. 126-143) and Plag (2006, pp. 125-127) argue that productivity can be constrained by structural factors, i.e. phonology, morphology, syntax, or semantics or by pragmatic factors. According to Plag (2006) structural constraints ... play an important role in restricting productivity. Possible words, of a given morphological, semantic and syntactic requirements impose limits on productivity." In addition to these rule-specific restrictions, there are also general

principles which affect all processes: the general mechanism of token blocking which prevents complex words from being formed if a synonymous word is already available in the speaker's mental lexicon.

Booij (2006, p. 658) points out that inflectional processes are said to be fully productive and argues that this is not completely true. Irregular inflectional forms must be stored in the lexicon. This study attempts to identify inflectional regularity in Modern Standard Arabic broken plural nouns because it has been noticed that Arabic broken plural nouns may also exhibit some degree of regularity. In Arabic, for example, the plural morpheme, whether sound or broken, has the same semantic effect from one to the next. No plural form of a noun has any unexpected extra meaning or function so in Arabic inflectional morphology, semantic regularity is the norm even where formal processes differ. Bauer (2001, pp. 82-84) argues that "the irregularity of some inflected forms shows paradigm pressure and it may not be considered to be in rule-governed part of morphology ... clearly, it is not easy to state a rule, since there is so much variation ... Of course, it is true that morphophonemic variation is not totally regular." "The more constraints there are, the less productive the process is." (Bauer, 2001, p. 125). However, although Arabic broken plural nouns have more variant forms and more constraints than sound ones, this study indicates the regularity and productivity in Arabic broken plural nouns.

For many morphologists, the prototypical word formation processes have been (linear) affixation, of the kind found in agglutinating languages. However, many processes do not conform to this Item and Arrangement ideal. There are cases in which morphology is not realized affixally, where the phonological form of stem is the principal exponent of some morphological property. Quite frequently it appears as though it is a phonological alternation which expresses the morphological category and a morpheme proper: stress, tone, vowel length, and other prosodic characteristics as well as processes affecting the phonological make up of a root such as the initial consonant mutations, apophony (ablaut and umlaut) in which the vowel of a root changes. Sapir (1921, cited in Spencer, 2000, p. 1) "holds that morphology should be regarded as a set of processes acting on stems or words to produce new stems, words or word forms. In this 'Item-and-Process (IP)' framework (Hockett, 1958), *men* is derived from *man* by a vowel-changing process, while *cats* is derived from *cat* by a process of attaching a formative or phoneme (sequence) *-s*".

Classification of the Arabic Nouns on the Basis of the Root letters

Ryding (2005, p. 49) states that most Arabic nouns are analyzed as consisting of two morphemes, a root and a pattern, interlocking to form one word. Neither an Arabic root nor a pattern can be used in isolation, they need to connect with each other in order to form actual words. For example, a word such as *كاتب* *kaatib* 'writer' consists of two bound morphemes: the lexical root *k t b* and the

active participle pattern *-aa-i*. When the root *k t b* is mapped onto the pattern *-aa-i*. They together form the word *kaatib* ‘writer’. This word can then act as a stem for grammatical affixes such as gender, number, case or state.

Most of Arabic nouns are derived from trilateral or quadrilateral lexical roots, however, a few of them have only two radical consonants in their singular and some have five ones. Yet others have solid stem, unanalyzable into roots and patterns. This can be illustrated in the table 1.

Table 1.a: Biliteral Root Nouns

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
أب	?ab	cvc	father	آباء	?abaa?	cvcvvc	fathers
أم	?um	cvc	mother	أمهات	?umhaat	cvcvcvc	mothers
عم	?am	cvc	uncle	أعمام	?a?maam	cvcvcvc	uncles
دم	dam	cvc	blood	دماء	dimaa?	cvcvvc	bloods
يد	yad	cvc	hand	أيادي	?ayaadii	cvcvcvcv	hands
جد	Jad	cvc	grandfather	أجداد	?aJdaad	cvcvcvc	grandfathers

Table 1.b: Trilateral Root Nouns

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
جيش	Jayf	cvcc	army	جيوش	Juyuuf	cvcvvc	armies
ملك	malik	cvcvc	king	ملوك	muluuk	cvcvvc	kings
حق	haqq	cvcc	right	حقوق	huquuq	cvcvvc	rights
حلم	hilm	cvcc	dream	أحلام	?ahlaam	cvcvcvc	dreams
بنك	bank	cvcc	bank	بنوك	bunuuk	cvcvvc	banks

Table 1.c: Quadrilateral Root Nouns

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
ضفدع	ḍifdaʕ	cvcvcvc	frog	ضفادع	ḍafaadiʕ	cvcvcvcvc	frogs
خنجر	xanJar	cvcvcvc	dagger	خناجر	xanaaJir	cvcvcvcvc	daggers
فندق	funduq	cvcvcvc	hotel	فنادق	fanaadiq	cvcvcvcvc	hotels
مكان	makaan	cvcvvc	place	أماكن	?amaakin	cvcvcvcvc	places

Table 1.d: Quinquiliteral Root Nouns

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
حديقة	<i>hadiiqah</i>	<i>cvcvvcvc</i>	garden	حدائق	<i>hadaa?iq</i>	<i>cvcvvcvc</i>	gardens
قصيدة	<i>qaSiidah</i>	<i>cvcvvcvc</i>	ode	قصائد	<i>qaSaa?id</i>	<i>cvcvvcvc</i>	odes
برنامج	<i>barnaamaJ</i>	<i>cvccvvcvc</i>	program	برامج	<i>baraamiJ</i>	<i>cvcvvcvc</i>	programs
عنكبوت	<i>ʔankabuut</i>	<i>cvccvvcvc</i>	spider	عنكب	<i>ʔankib</i>	<i>cvccvc</i>	spiders

The great majority of Arabic roots are trilateral, that is, they consist of three radical letters. The combination of these three letters gives a basic meaning. If the root is modified by the addition of affixes or modification of the internal vowels, whether long or short, a large number of word patterns are formed from each root.

Classification of the Arabic Nouns on the Basis of Morphology

Arabic nouns are morphologically classified into primitive and deverbal derived nouns. Primitive nouns are not verbal derivatives. These primitive nouns can be illustrated in table 2.

Table 2: Primitive Nouns

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattem	Translation
رجل	<i>raJul</i>	<i>cvcvc</i>	man	رجال	<i>riJaal</i>	<i>cvcvvc</i>	men
عين	<i>ʔayn</i>	<i>cvcc</i>	eye	اعين	<i>?a ʔyun</i>	<i>cvccvc</i>	eyes
ماء	<i>maa?</i>	<i>cvvc</i>	water	مياه	<i>myaah</i>	<i>ccvvc</i>	water
بيت	<i>bayt</i>	<i>cacc</i>	house	بيوت	<i>buyuut</i>	<i>cacvvc</i>	houses

Primitive nouns have broken plural patterns that cannot be predicted from the shape of their singulars (Holes, 2004). Some of them have more than one plural. This can be shown in table 3.

Table 3: Primitive Noun

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
عين	ʔayn	cvcvc	eye	عيون	<i>ʔuyuun</i>	<i>cvcvvc</i>	eye
				أعين	<i>?a ʔyun</i>	<i>cvccvc</i>	
بيت	bayt	cvcc	house	بيوت	<i>buyuut</i>	<i>cvcvvc</i>	house
				أبيات	<i>?abiyaat</i>	<i>cvcvvcvc</i>	
باب	baab	cvvc	door	أبواب	<i>?abuwaab</i>	<i>cvcvvcvc</i>	doors
				بيبان	<i>biyibaan</i>	<i>cvcvvcvc</i>	

However, deverbal nouns are much more predictable. Certain patterns always, or almost always, pluralize in a fixed way. This is demonstrated in table 4.

Table 4.a

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
مركز	<i>markaz</i>	<i>cvccvc</i>	center	مراكز	<i>maraa'kiz</i>	<i>cvccvvcvc</i>	centers
مطعم	<i>maTa'aam</i>	<i>cvccvc</i>	restaurant	مطاعم	<i>maTaa'aim</i>	<i>cvccvvcvc</i>	restaurants
منجم	<i>manjam</i>	<i>cvccvc</i>	mine	مناجم	<i>manaajim</i>	<i>cvccvvcvc</i>	mines

Table 4.b

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
منشفة	<i>minshafah</i>	<i>cvccvvcvc</i>	towel	مناشف	<i>manaajif</i>	<i>cvccvvcvc</i>	towels
مكنسة	<i>miknasah</i>	<i>cvccvvcvc</i>	sweeper	مكائس	<i>makaanis</i>	<i>cvccvvcvc</i>	sweepers
مصعد	<i>miS'aad</i>	<i>cvccvc</i>	lift	مصاعد	<i>maSaa'id</i>	<i>cvccvvcvc</i>	lifts

Classification of the Arabic Broken Plurals on the Basis of Meaning

There are two kinds of broken plural جمع القلة *Jam'u al-qillaah* 'plural of paucity' and جمع الكثرة *Jam'u al-kiθrah* 'plural of multiplicity'. Plural of paucity denotes three to ten items and plural of multiplicity denotes more than ten items. This can be illustrated in table 5.

Table 5.a: Plural of Paucity

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
نهر	<i>nahr</i>	<i>cvcc</i>	river	أنهر	<i>?anhur</i>	<i>cvccvc</i>	rivers
شهر	<i>fahr</i>	<i>cvcc</i>	month	أشهر	<i>?afhur</i>	<i>cvccvc</i>	months

Table 5.b: Plural of Multiplicity

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
نهر	<i>nahr</i>	<i>cvcc</i>	river	أنهار	<i>?anhaar</i>	<i>cvccvvc</i>	rivers
شهر	<i>fahr</i>	<i>cvcc</i>	month	شهور	<i>fuhuur</i>	<i>cvccvc</i>	months

Arabic Nominal Inflectional Morphology

Arabic inflectional morphology deals with the variation that words exhibit on the basis of their grammatical contexts. Arabic nominal system is very rich in forms and variation because Arabic is a rich inflectional language. Clark (2007,

p.181) argues that Arabic morphology is concatenative and nonconcatinative. Habash *et al* (2007, p. 263) point out that Arabic has a very rich morphology characterized by a combination of templatic and affixational morphemes. Traditional morphology integrates inflectional with derivational morphology, which also involves roots and patterns. When the word is the output of a derivational process and the input of an inflectional process, it is traditionally implied that it is the root and pattern analysis.

Ryding (2005, p. 47) defines a root in Arabic morphology as “a relatively invariable discontinuous bound morpheme, represented by two to five phonemes, typically three consonants in a certain order, which interlocks with a pattern to form a stem and which has a lexical meaning.” Ryding (2005, p. 48) states that “a pattern is a bound discontinuous morpheme which consists of one or more vowels and slots for root phonemes, which either alone or in combination with one to three derivational affixes, interlocks with a root to form a stem, and which generally has grammatical meaning. Stump (2001, p. 1) points out that:

The notion of inflection rests on the more basic notion of lexemes. A lexeme is a unit of linguistic analysis which belongs to a particular syntactic category, has a particular meaning or grammatical function, and ordinarily enters into syntactic combinations as a single word; in many instances, the identity of the word which realizes a particular lexeme varies systematically according to the syntactic context in which it is to be used

Bybee (1994, p. 252) argues that “morphological or allomorphic processes that are productive tend also to be lexically regular and exhibit a relatively low degree of fusion (the use of a stem-change to express the grammatical category, or the interweaving of lexical and grammatical morphemes or allomorphic changes conditioned in the stem by the affix or the reverse, allomorphic changes conditioned in the affix by the stem, as well as actual phonological fusion at the boundary between the two) while unproductive ones tend to be irregular and characterized by higher fusion”. Spencer (1992, p. 9) points out that “traditional grammarians usually distinguish between two main types of morphological operation, inflection (or inflexion) and derivation.” Inflectional processes deal with the inflected words or variants of one and the same lexeme. “Inflection cannot cause a word to change its syntactic category” (Spencer, 1992, p. 9). The inflected forms or variants depend on the grammatical context of the lexeme, whereas derivational processes deal with the creation of new lexemes. It “induces a change in syntactic category” (Spencer, 1992, p. 9).

This study deals with the inflectional regularity in the Modern Standard Arabic broken plural nouns. The form of Arabic under investigation is Modern

Standard Arabic used by most of the Arabic speakers all over the world and it is the official language used by all the members of the Arab league (Ryding, 2005, p. 5). Modern Standard Arabic is the language of written Arabic media. It is also the language of public speaking and news broadcasts on radio and television.

Arabic plural forms represent Arabic concatenative and nonconcatenative morphology. The broken plural is a canonical example of nonconcatenative morphology. Bosch, Marsi and Soudi (2007, p. 202) point out that Arabic nouns show a comparably rich and complex morphological structure. Larkey, Ballesteros and Connell (2002, p. 221) argue that Arabic is a highly inflected language.

Arabic inflectional morphology is based on the traditional notions of root and pattern of Semitic morphology. Nominal inflection is a crucial part of the inflectional system of Arabic: it takes a large part of the lexicon and “nouns turn out to be far more complex than verbs” (Altantaway *et al*, 2010, p. 851).

Inflectional regularity is closely tied to productivity, but regularity in shape has to be distinguished from regularity in meaning”. In inflection, meaning is the norm even if form is different. So, kinds of inflection that require lexical listing are caused because of unpredictability not of meaning but of shape. Pinker and Prices, cited in Bauer (2001, p. 56), distinguish ‘real’ regularities from ‘apparent’ ones. According to them, the real ones are those which speakers can generalize over and ‘apparent’ regularities appear to refer to unproductive minor patterns. Regularity is related to rule-governedness and productivity whereas listedness of irregularities correlates with lack of productivity.

Bauer (2001, p. 46) confirms that in “some psycholinguistic work there seems to be an assumption that storage is used for derivation and irregular inflection while generation is used for regular inflection.”

Inflection refers to morphological and phonological changes a word undergoes as it is being used in grammatical context. Stump (2001, p.1) states that “the full set of words realizing a particular lexeme constituents its paradigm. The structure of paradigms in a given language is determined by the inventory of morphosyntactic properties available in that language”. Arabic words are marked for more grammatical categories than English words. For example, Arabic nouns are inflected for case, state, gender and number whereas English nouns are inflected for number only. Arabic nouns’ inflectional categories are characterized by a combination of templatic and affixational morphemes. The Arabic noun declensions can be demonstrated by the following tables:

Table 6: Arabic Noun Case

Case			Example	Transliteration	Translation
حالة الرفع	<i>halat-u al-rafaʿ</i>	nominative	معلم	<i>muʿalim-un</i>	teacher-nom
حالة الجر	<i>halat-u alJar</i>	genitive	معلم	<i>muʿalim-in</i>	teacher-gen
حالة النصب	<i>halat-ualnaṣb</i>	accusative	معلم	<i>muʿalim-an</i>	teacher-acc

Table 7: Arabic Noun State

State			Example	Transliteration	Translation
معرفة	<i>mu ʿaraf</i>	definite	المعلم	<i>?al-mu ʿalim-u</i>	the teacher
غير معرفة	<i>ʿir mu ʿaraf</i>	indefinite	معلم	<i>mu ʿalim-un</i>	a teacher
مضاف	<i>mudʿaaf</i>	construct	معلم	<i>mu ʿalim-u</i>	teacher

Table 8: Arabic Noun Gender

Gender			Example	Transliteration	Translation
مذكر	<i>muḍakar</i>	masculine	معلم	<i>mu ʿalim-un</i>	a male teacher
مؤنث	<i>muanaθ</i>	feminine	معلمة	<i>mu ʿalim-at-un</i>	a female teacher

Table 9: Arabic Noun Number

Number			Example	Transliteration	Translation
مفرد	<i>mufrad</i>	singular	معلم	<i>mu ʿalim-un</i>	a teacher
مثنى	<i>muθana</i>	dual	معلمان	<i>mu ʿalim-aani</i>	the teachers
جمع	<i>Jamaʿ</i>	plural	معلمون	<i>mu ʿalim-uuna</i>	teachers

Arabic nouns are inflected for four categories, case, state, gender and number, using affixation and/ or orthographic and phonological modification. This can be illustrated in table 10:

Table 10: Arabic Noun Inflection Markers

Noun	Transliteration	Case	State	Gender	Number	Translation
معلم	<i>mu ʿalim-un</i>	nominative	indefinite	masculine	singular	a male teacher
معلم	<i>mu ʿalim-in</i>	genitive	indefinite	masculine	singular	a male teacher
معلم	<i>mu ʿalim-an</i>	accusative	indefinite	masculine	singular	a male teacher
معلمان	<i>mu ʿalim-aani</i>	nominative	indefinite	masculine	dual	two male teachers
معلمين	<i>mu ʿalim-iin</i>	acc/gen	indefinite	masculine	dual	two male teachers
معلمون	<i>mu ʿalim-uuna</i>	nominative	indefinite	masculine	plural	male teachers
معلمين	<i>mu ʿalim-iin</i>	Acc/gen	indefinite	Masculine	plural	male teachers
معلمة	<i>mu ʿalim-at-un</i>	nominative	indefinite	feminine	singular	a female teacher
معلمة	<i>mu ʿalim-at-in</i>	genitive	indefinite	feminine	singular	a female teacher
معلمة	<i>mu ʿalim-at-an</i>	accusative	indefinite	feminine	singular	a female teacher
معلمتان	<i>mu ʿalim-at-aani</i>	nominative	indefinite	feminine	dual	two female teachers
معلمتين	<i>mu ʿalim-at-iin</i>	acc/gen	indefinite	feminine	dual	two female teachers

معلمات	<i>muʕalim-aat-un</i>	nominative	indefinite	feminine	plural	female teachers
معلمات	<i>muʕalim-aat-an</i>	accusative	indefinite	feminine	plural	female teachers
معلمات	<i>muʕalim-aat-in</i>	genitive	indefinite	feminine	plural	female teachers
المعلم	<i>?al-muʕalim-u</i>	nominative	definite	masculine	singular	a male teacher
المعلمة	<i>?al-muʕalim-at-u</i>	nominative	definite	feminine	singular	a female teacher
المعلمان	<i>?al-muʕalim-aani</i>	nominative	definite	masculine	dual	two male teachers
المعلمتان	<i>?al-muʕalim-at-aani</i>	nominative	definite	feminine	dual	two female teachers
المعلمون	<i>?al-muʕalim-uuna</i>	nominative	definite	masculine	plural	male teachers
المعلمات	<i>?al-muʕalim-aat-un</i>	nominative	definite	feminine	plural	female teachers

It can be observed that Arabic nouns are inflected for three cases i.e. nominative, accusative and genitive, three states i.e. definite, indefinite and construct, two genders i.e. masculine and feminine and three numbers i.e. singular, dual and plural.

From the above table, it can also be observed that before adding the inflectional marker to the singular female noun, the *taaʕ marbuta* is deleted. It can be observed that the case marker is realized in two different positions in the sound plural after the plural marker in the masculine sound plural but after the plural marker in the feminine sound plural.

Case + *na* → masculine sound plural e.g. معلمون *muʕalim-uuna* ‘male teachers’
aat – case → feminine sound plural e.g. معلمات *muʕalim-aat-in* ‘female teachers’

However, there are some nouns which are feminine but unmarked for feminine. Those denote things of the female sex such as أم *?um* ‘mother’, paired parts of the body عين *?ayn* ‘eye’ and some basic concepts of nature such as أرض *?arad* ‘earth’, شمس *fams* ‘sun’ and نار *naar* ‘fire’.

These declension categories are expressed morphologically using both templatic (i.e. *root, pattern, and vocalism*), and concatenative affixes. The combination (interdigitation and affixation) of the various morphemes is further complicated as it involves various orthographical and phonological modification or adjustments. Diab, Hacioglu and Jurafsky (2007, p. 160) state that in Arabic, inflectional affixes are not segmented from the stem. This can be illustrated in table 11.

Table 11: Noun Inflection Modification in Arabic Broken Plural

Number	Example	Transliteration	Pattern	Modification	Translation
singular	ولد	<i>walad-un</i>	cvcvc	change of a vowel and addition of affixes	a boy
plural	أولاد	<i>?awalaad-un</i>	?acvcvc		boys
singular	كتاب	<i>kitaab-un</i>	cvcvvc	change of vowel and elision	a book
plural	كتب	<i>kutub-un</i>	cvcvc		books
singular	قلب	<i>qalab-un</i>	cvcvc	change of vowel and addition of affixes	a heart
plural	قلوب	<i>quluub-un</i>	cvcvvc		hearts

singular	مفتاح	<i>miftaah-un</i>	cvcevvc	Change of vowel and addition of affixes	a key
plural	مفاتيح	<i>mafaatiih-un</i>	cvcvvcvvc		keys

McCarthy and Prince (1990) have carried out research relating to the broken plural nouns in Arabic, in which they do not only provide the issues about the Arabic broken plural in morphological aspects but also attempt to interconnect between morphology and phonology. McCarthy and Prince (1990) propose a computation of broken plural stem from singular stem, “a rule for forming the broken plural” (p. 26). As compared to traditional morphology, this model hypothesizes underlying forms and rules for surface realization too, but they endeavor to lower the number of inflectional classes for broken plural.

McCarthy and Prince (1990, pp. 210-217) view Wright’s (1971) account of broken plural with 31 plural types, corresponding to 11 singular types, as a “poorly understood or perhaps even chaotic process”, and they try to substantiate the informal notion that a singular pattern unites all the classes grouped under iambic rubric.

Classification of Arabic Nouns

Unlike English number which is classified into two categories, singular and plural; Arabic number is classified into three categories: مفرد *mufrad* ‘singular’, referring to one object or person, مثنى *muθana* ‘dual’, referring to two objects or people, and جمع *Jamʿ* ‘plural’, referring to three or more objects or people (Ryding, 2005). The singular number category is unmarked in Arabic whereas the dual number category is marked by the suffixes ان {-*aani*} in a nominative case and ين {-*iin*} in an accusative and genitive case. This is shown in table 12.

Table 12.a: Arabic Singular Noun

Case Gender	Nominative		Accusative		Genitive		Translation
	Example	Transliteration	Example	Transliteration	Example	Transliteration	
masculine	معلم	muʿalim-un	معلم	muʿalim-an	معلم	muʿalim-in	a male teacher
feminine	معلمة	muʿalim-at-un	معلمة	muʿalim-at-an	معلمة	muʿalim-at-in	female teacher

Table 12.b: Arabic Dual Noun

Case Gender	Nominative		Accusative		Genitive		Translation
	Example	Transliteration	Example	Transliteration	Example	Transliteration	
masculine	معلمان	muʿalim-aani	معلمين	muʿalim-iin	معلمين	muʿalim-iin	male teachers
feminine	معلمتان	muʿalim-at-aani	معلمتين	muʿalim-at-iin	معلمتين	muʿalim-at-iin	female teachers

In Arabic, there are two kinds of plural: الجمع السالم *alJamaʿ al-saalim* ‘the sound plural’ and جمع التكسير *Jamaʿ altakasiir* ‘the broken plural’. The sound plural is formed by adding special suffixes to the singular form according to gender and case. It has only a singular form. The singular form remains intact, so it is called the perfect, complete, or entire plural (McCarthy & Prince, 1990; Benmamoun *et*

al, 2014; Albirini, 2015, among others). All the vowels and the consonants of this singular are retained in it. The broken plural is formed by internal changes to the singular form. The broken plural occurs inside the noun stem itself so it is called broken or internal. It has various forms. It is more or less altered forms of the singular by the addition, elision, epenthesis, metathesis and/or modification of vowels. This is demonstrated in table 13.

Table 13.a: Arabic Sound Plural Nouns

Case Gender	Nominative		Accusative		Genitive		Translation
	Example	Transliteration	Example	Transliteration	Example	Transliteration	
masculine	معلمون	<i>mu'alim-uun</i>	معلمين	<i>mu'alim-iini</i>	معلمين	<i>mu'alim-iini</i>	male teachers
feminine	معلمات	<i>mu'alim-at-un</i>	معلمات	<i>mu'alim-aat-in</i>	معلمتان	<i>mu'alim-aat-in</i>	female teachers

Table 13.b: Arabic Broken Plural Nouns

Case Gender	Nominative		Accusative		Genitive		Translation
	Example	Transliteration	Example	Transliteration	Example	Transliteration	
masculine	كتب	<i>kutub-un</i>	كتب	<i>kutub-an</i>	كتب	<i>kutub-in</i>	books
feminine	أوراق	<i>?awaraq-un</i>	أوراق	<i>?awaraq-an</i>	أوراق	<i>?awaraq-in</i>	paper

As observed, masculine sound plurals do not have تنوين *tanween* 'nunation' while feminine sound plurals and broken plurals do have. Furthermore, the broken plurals show no morphological differences in gender even when the singular does. This can be illustrated in table 14.

Table 14.a

Number Gender	Singular			Plural		
	Example	Transliteration	Translation	Example	Transliteration	Translation
masculine	قاضي	<i>qaadīy</i>	male judge	قضاة	<i>quḍāh</i>	judges
feminine	قاضية	<i>qaadīyah</i>	female judge	قضاة	<i>quḍīah</i>	
masculine	دكتور	<i>duktuur</i>	male doctor	دكاترة	<i>dakatira</i>	doctors
feminine	دكتورة	<i>duktuurah</i>	female doctor	دكاترة	<i>dakatira</i>	
masculine	مرضى	<i>mariid</i>	male patient	مرضى	<i>marḍā</i>	patients
feminine	مریضة	<i>mariidāh</i>	female patient	مرضى	<i>marḍā</i>	

They have the same broken plurals.

The broken plural primarily involves internal modification of a singular stem to map into a certain template. It either shifts the arrangement of vowels or inserts extra consonants. To add to this diversity a noun may have two or more alternative plurals. Holes (2004, p. 168) states that "some singular nouns have

more than one plural, although the alternatives are not usually interchangeable in particular sense or collocation.” This is shown in table 15.

Table 15: The Multiplicity of the Broken Plural Forms for the Same Singular Form

Singular			Plural		
Example	Transliteration	Translation	Example	Transliteration	Translation
طالب	<i>Taalib</i>	male student	طلاب	<i>Tulaab</i>	students
			طالبة	<i>Talabah</i>	
عين	ʿayn	an eye	عيون	<i>ʿuyuun</i>	eyes
			أعين	<i>?aʿyun</i>	
أسد	<i>?asad</i>	a lion	أسود	<i>?usuud</i>	lions
			أسد	<i>?usud</i>	
			أساد	<i>?aasaad</i>	
باب	<i>baab</i>	a door	أبواب	<i>?abwaab</i>	doors
				<i>biibaan</i>	
بيت	<i>bayt</i>	a house	بيوت	<i>buyuut</i>	house
			أبيات	<i>?abyaat</i>	

Haywood and Nahmad (2004, p. 50) argue that “for a large number of Arabic nouns, the sound plurals do not exist at all. The broken plurals must be used.” The broken plurals are frequently and mostly used (Abu Chacra, 2007). Most nouns of concrete objects, animals and many technical terms have only broken plurals. This is demonstrated in table 16.

Table 16: Arabic Broken Plurals

Singular			Plural		
Example	Transliteration	Translation	Example	Transliteration	Translation
فلم	<i>film</i>	film	أفلام	<i>?aflaam</i>	films
صورة	<i>Surah</i>	picture	صور	<i>Suwar</i>	pictures
عصفور	<i>ʿusfuur</i>	sparrow	عصافير	<i>?aSafeer</i>	sparrows
فيل	<i>fiil</i>	elephant	أفيال / فيول	<i>?afyaal / fuyuul</i>	elephants
استاذ	<i>?ustaaḍ</i>	teacher	استاذة	<i>?asaatiḍah</i>	teachers
دكتور	<i>duktuur</i>	doctor	دكاترة	<i>dakaatirah</i>	doctors

Many nouns in Arabic, including recent borrowings, have a broken plural, in which both vocalism and the disposition of vowels with respect to consonants may be altered.

McCarthy and Prince (1990, p. 213) argue that “for the lexicon as a whole, then, broken plural formation is by far the norm rather than the exception.” A minority of nouns form their plural by regular processes of suffixation, and the majority of nouns have one or more broken plural forms whose pattern is not predictable from the singular pattern (Holes, 2004, p.168). This is illustrated in table 17.

Table 17: The Multiplicity of the Broken Plural Pattern for the Same Singular Pattern

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
وزن	wazn	cacc	weight	أوزان	?awzaan	?accaac	weight
عين	ʔayn	cacc	eye	أعين	?aʔyun	?accuc	eyes
عين	ʔayn	cacc	eye	عيون	ʔuyuun	cucuuc	eyes
كلب	kalb	cacc	dog	كلاب	Kilaab	cicaac	dogs

Soudi *et al* (2007), cited in Saeed and Fatihi (2011), say that the Arabic broken plural system is highly allomorphic. The range of allomorphy is in general from two to five, as illustrated in the table above.

Aronoff (1994) and Beard (1995) argue that it is the lexeme-based morphology, which gives priority to stem and store the broken plural stem in the lexicon.

The Arabic broken plural is formed by changing the internal structure of the singular. It involves changes in the stem which may or may not include affixation in accordance with thirty-one patterns or templates. This process involves two phases: vowel deletion and vowel epenthesis. McCarthy and Prince (1990) apply the theory of prosodic morphology to Standard Arabic broken plural. They observe that Arabic broken plurals are best analyzed as prosodic feet. The iambic pattern of the form *cvcvvc* with stress falling on the second syllable is by far the most common; it is also the only productive pattern. The other major noniambic pattern is the trochaic foot *cvcvc* with stress falling on the first syllable (Katamba, 2001, pp. 272-274). Thus, the majority of the broken plural templates fall into two categories: the iambic template *cvcvvc* or the trochaic template *cvcvc*. The majority of singulars comprising three or more moras take predictable broken plural patterns. To derive the plural from such nonminimal singulars, the first two moras of the singular are mapped to an iambic template to give mMkMM. The vocalic melody *-a-* associates to the moraic slots to give *makaatib*.

Nouns with a broken pattern commonly display two major stem alternants: the singular / dual allostem and the plural allostem. There are two forms and these forms are systematically distributed. This is presented in table 18.

Table 18: Arabic Systematic Broken Plural Patterns

Singular			Plural		
Example	Transliteration	Translation	Example	Transliteration	Translation
ورقة	<i>waraqah</i>	paper	أوراق	?awraaq	paper
وزن	<i>wazn</i>	weight	أوزان	?awzaan	weights
وطن	<i>waTan</i>	homeland	أوطان	?awTaan	homelands
وثن	<i>waΘan</i>	idol	أوثان	?awΘaan	Idols
وجه	<i>waJuh</i>	aspect	أوجه	?awJaah	aspects
ولد	<i>walad</i>	son	أولاد	?awlaad	sons
وصف	<i>waSaf</i>	description	أوصاف	?awSaaf	descriptions
وتر	<i>watar</i>	sinew	أوتار	?awtaar	sinews
وجع	<i>waJaʕ</i>	pain	أوجاع	?awJaaʕ	pains
وند	<i>watad</i>	tent pin	أوتاد	?awtaad	tent pins
نفس	<i>nafs</i>	soul / spirit	نفوس	<i>nufuus</i>	soul / spirit
قلب	<i>qalab</i>	heart	قلوب	<i>quluub</i>	heart
حظ	<i>haẓ</i>	luck	حظوظ	<i>huẓuuẓ</i>	luck
ورد	<i>warad</i>	flower	ورود	<i>wuruud</i>	flower
وعد	<i>waʕad</i>	promise	وعود	<i>wuʕuud</i>	promise
لحم	<i>laḥam</i>	meat	لحوم	<i>luḥuum</i>	meat
لص	<i>liS</i>	thief	لصوص	<i>luSuuS</i>	thief
لغز	<i>luéuz</i>	puzzle	الغاز	?aléaaz	puzzle
لغم	<i>luéum</i>	bomb	الغام	?aléaam	bombs
لقب	<i>laqab</i>	title	القاب	?alqaab	titles
لحن	<i>lahan</i>	rhyme	ألحان	?alhaan	rhymes

It can be observed that singular nouns which have similar patterns have the same plural pattern. Furthermore there are few instances of nouns having been made into broken plural by the forces of analogy. Ryding (2005) presented some of them. This can be illustrated in table 19.

Table 19

Singular			Plural		
Example	Transliteration	Translation	Example	Transliteration	Translation
بنك	<i>bank</i>	bank	بنوك	<i>bunuuk</i>	banks
فلم	<i>film</i>	film	أفلام	<i>?aflaam</i>	film
بليون	<i>biluun</i>	bilyon	بلايين	<i>balaayiin</i>	bilyons
طن	<i>Tann</i>	clang	أطنان	<i>?aTanaan</i>	clangs
مليون	<i>miluun</i>	million	ملايين	<i>malaayiin</i>	millions
ميل	<i>miil</i>	mille	أميال	<i>?amyaal</i>	milles
متر	<i>mitr</i>	meter	أمتار	<i>?amtaar</i>	meters

So, analogy has increased broken plural forms. Lyons (1981, p. 201) states that “the term ‘analogy’ is from the Greek word ‘analogia’, which meant regularity”. McCarthy and Prince (1990, p. 212) argue that “although the term ‘sound plural’ suggests normality – and indeed its form is entirely predictable from gender and other grammatical information – the sound plural is in no way the regular or usual mode of pluralisation. Essentially, all canonically – shape lexical nouns of Arabic take broken plurals, including loan word, even very recent ones. The sound plural is systematically found only with members of the following short list: proper names, transparently derived nouns such as participles e.g. فاعلون *faa’luun* ‘doers’, deverbal كاتبات *kaatibaat* ‘female writers’ and diminutives كتيبات *kutiibaat* ‘little books’ (Levy, 1971), noncanonical or unassimilated loans such as تلفونات *telifuunaat* ‘telephones’ and the names of the letters of the alphabet, which are mostly noncanonical such as باءات *baa?aat*. Thus, Neme and Laporte (2013, p. 32) argue that “thus, in spite of the fact that broken plurals are irregular, their presence in Arabic text is predominant over suffixed plurals.” Ryding (2005, p. 144) points out that the structure and regularities of the Arabic broken plural system have been the subject of research in morphological theory over the past fifteen years and considerable progress has been made in developing theories to identify and account for the underlying regularities in the broken plural system, most prominent of those theories being templatic morphology and prosodic morphology.

Ratcliffe (1998) states that we refer to sound and broken pluralization regular and irregular inflectional processes respectively, not because we think that the former is rule-based and the latter is not. Rather we use the term ‘regular’ as shorthand for an inflectional process involving little or no allomorphy and the term irregular to describe a process entailing substantial modification of the singular input.

Thus, if the term ‘regular’ is used to denote the systematic or consistent nature of a given morphological process, then, both sound pluralization and at least

some of subclasses of broken plurals can be described as regular by virtue of their consistency (Ratcliffe, 1998). The defining characteristic of fixed pattern morphology is that consistency in such systems is found not in a consistent proportion or relationship between two forms (a base and a derivation; an input and an output, but in a consistent pattern of syllable structure and vocalism) imposed on all derived forms of a particular class regardless of the form of the source word (Ratcliffe, 2001, p. 133). However, the number of broken plural patterns underestimates the complexity of deducing a broken plural from a singular, because it overlooks the problems of finding the root.

“Broken plurals in themselves give an initial impression of chaos” (McCarthy, 1982, p. 292), and are highly allomorphic (Soudi, *et al*, 2002) and practices along centuries do not give the impression of an effort towards a simple and more orderly taxonomy with few classes. A broken plural is by definition a major change in the form of the lexeme. A stem changes to express the grammatical category or the interweaving of lexical and grammatical morphemes.

It is known that the Arabic broken plural involves the vowel pattern shift within the word stem, such as the English words *man / men, goose / geese* (McCarthy & Prince, 1999 and Ryding, 2005). It sometimes involves the addition of extra consonants and the reduction of letters.

The following tables illustrate the modification happening to the singular stems to form the broken plural stems in Arabic.

Table 20.a: Modification of the Internal Vowels

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
قرن	<i>qam</i>	<i>cvcc</i>	century	قرون	<i>quruun</i>	<i>cvccvvc</i>	centuries
جيش	<i>Jayf</i>	<i>cvcc</i>	army	جيوش	<i>Juyuuf</i>	<i>cvccvvc</i>	armies
بنك	<i>bank</i>	<i>cvcc</i>	bank	بنوك	<i>bunuuk</i>	<i>cvccvvc</i>	banks
فن	<i>fann</i>	<i>cvcc</i>	art	فنون	<i>funuun</i>	<i>cvccvvc</i>	arts
حق	<i>haqq</i>	<i>cvcc</i>	right	حقوق	<i>huquuq</i>	<i>cvccvvc</i>	rights
شك	<i>fakk</i>	<i>cvcc</i>	doubt	شكوك	<i>fukuuk</i>	<i>cvccvvc</i>	doubts

Table 20.b: Modification of the Internal Vowel and Gemination of the Consonants

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
حارس	<i>haaris</i>	<i>cvccvc</i>	guard	حراس	<i>hurraas</i>	<i>cvccvvc</i>	guards
راكب	<i>raakib</i>	<i>cvccvc</i>	rider	ركاب	<i>rukkaab</i>	<i>cvccvvc</i>	riders
طالب	<i>Taalib</i>	<i>cvccvc</i>	student	طلاب	<i>Tulaab</i>	<i>cvccvvc</i>	students

عامل	<i>ʔaamil</i>	<i>cvvevc</i>	worker	مُعامل	<i>ʔummaal</i>	<i>cvcevcvc</i>	workers
نائب	<i>naaʔib</i>	<i>cvvevc</i>	deputy	نُواب	<i>nuwaab</i>	<i>cvcevcvc</i>	deputies
قارئ	<i>qaariʔ</i>	<i>cvvevc</i>	reader	قُرّاء	<i>qurraaʔ</i>	<i>cvcevcvc</i>	readers

Table 20.c: Modification of the Internal Vowels and Insertion of an infix ألف *alif* 'aa'

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
رجل	<i>raJul</i>	<i>cvvevc</i>	man	رجال	<i>riJaal</i>	<i>cvcevcvc</i>	men
جبل	<i>Jabal</i>	<i>cvvevc</i>	mountain	جبال	<i>Jibaal</i>	<i>cvcevcvc</i>	mountains
رمل	<i>raml</i>	<i>cvvevc</i>	sand	رمال	<i>rimaal</i>	<i>cvcevcvc</i>	sands
جرة	<i>Jarah</i>	<i>cvvevc</i>	jar	جرار	<i>Jiraar</i>	<i>cvcevcvc</i>	jars
سلة	<i>salah</i>	<i>cvvevc</i>	basket	سلال	<i>silaal</i>	<i>cvcevcvc</i>	baskets

Table 20.d: Modification of the Internal Vowels and the Elision of the *taa marbutah* of the singular form

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
غرفة	<i>ʔurfah</i>	<i>cvcevcvc</i>	room	غرف	<i>ʔuraf</i>	<i>cvcevcvc</i>	rooms
دولة	<i>dawlah</i>	<i>cvcevcvc</i>	country	دول	<i>dawal</i>	<i>cvcevcvc</i>	countries
جملة	<i>Jumlah</i>	<i>cvcevcvc</i>	sentence	جمل	<i>Jumal</i>	<i>cvcevcvc</i>	sentences
صورة	<i>Suwrah</i>	<i>cvcevcvc</i>	picture	صور	<i>Suwar</i>	<i>cvcevcvc</i>	pictures
فرصة	<i>furSah</i>	<i>cvcevcvc</i>	chance	فرص	<i>furaS</i>	<i>cvcevcvc</i>	chances

Table 20.e: Modification of the Internal Vowels and the Elision of the Middle and Last Consonants

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
مدينة	<i>madiynah</i>	<i>cvvevcvcvc</i>	city	مدن	<i>mudun</i>	<i>cvcevcvc</i>	cities
سفينة	<i>safiynah</i>	<i>cvvevcvcvc</i>	ship	سفن	<i>sufun</i>	<i>cvcevcvc</i>	ships
طريقة	<i>Tariyqah</i>	<i>cvvevcvcvc</i>	way	طرق	<i>Turuq</i>	<i>cvcevcvc</i>	ways
صحيفة	<i>Sahiyfah</i>	<i>cvvevcvcvc</i>	newspaper	صحف	<i>Suhuf</i>	<i>cvcevcvc</i>	newspapers

Table 20.f: Metathesis and Deletion

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
فكرة	<i>fikrah</i>	<i>cvevcv</i>	idea	فكر	<i>fikar</i>	<i>cvevcv</i>	ideas
فتنة	<i>fitnah</i>	<i>cvevcv</i>	appeal	فتن	<i>fitan</i>	<i>cvevcv</i>	appeals

Table 20.g: Modification of the Internal Vowel, Elision and Insertion and a suffix 'aa'

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
ميت	<i>mayjit</i>	<i>cvevcv</i>	dead	موتى	<i>mawtaa</i>	<i>cvecvv</i>	dead
قتيل	<i>qatil</i>	<i>cvevcv</i>	killed	قتلى	<i>qatlaa</i>	<i>cvecvv</i>	killed
جريح	<i>Jarih</i>	<i>cvevcv</i>	injured	جرحى	<i>Jarhaa</i>	<i>cvecvv</i>	injured
مرضى	<i>mariid</i>	<i>cvevcv</i>	patient	مرضى	<i>marḏaa</i>	<i>cvecvv</i>	patient

Table 20.h: Modification of the Internal Vowel and the Addition of an Affix 'aa'

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
حلم	<i>hulm</i>	<i>evcc</i>	dream	أحلام	<i>?ahlaam</i>	<i>?accvvc</i>	dream
برج	<i>burJ</i>	<i>evcc</i>	tower	أبراج	<i>?abraaJ</i>	<i>?accvvc</i>	tower
لون	<i>lawn</i>	<i>evcc</i>	colour	ألوان	<i>?alwaan</i>	<i>?accvvc</i>	colour
باب	<i>baab</i>	<i>evcc</i>	door	أبواب	<i>?abwaab</i>	<i>?accvvc</i>	door
كيس	<i>kiis</i>	<i>evcc</i>	bag	أكياس	<i>?akyaas</i>	<i>?accvvc</i>	bag

Table 20.i: Modification of the Internal Vowels and the Addition of the suffix alif 'aa' and nuun 'n'

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
بلد	<i>bilaad</i>	<i>cvevvc</i>	country	بلدان	<i>buldaan</i>	<i>cvecvvc</i>	countries
جار	<i>Jaar</i>	<i>cvevvc</i>	neighbour	جيران	<i>Jiyyaan</i>	<i>cvecvvc</i>	neighbours
نار	<i>naar</i>	<i>cvevvc</i>	fire	نيران	<i>niyyaan</i>	<i>cvecvvc</i>	fires
ثور	<i>Ṫawr</i>	<i>cvevvc</i>	ox	ثيران	<i>Ṫiyyaan</i>	<i>cvecvvc</i>	oxes

Table 20.j: Modification of the Internal Vowels and the Addition of the suffix *taa marbuTah*

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
أستاذ	?ustaað	cvcvvc	teacher	أساتذة	?asaatiðah	cvcvvcvvc	teachers
دكتور	duktuur	cvcvvc	doctor	دكاترة	dakaatirah	cvcvvcvvc	doctors
فرعون	fir ^h awn	cvcvvc	pharaoh	فراعنة	fara ^h inah	cvcvvcvvc	pharaohs
فيلسوف	faylasuuf	cvcvvc	philosopher	فلاسفة	falaasifah	cvcvvcvvc	philosophers

Table 20.k: Modification of the Internal Vowels and the Addition of circumfixes *hamza ‘a’* at the beginning and end simultaneously

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
طبيب	Tabiib	cvcvvc	doctor	أطباء	?aTibaa?	cvcvvcvvc	doctors
صديق	Sadiiq	cvcvvc	friend	أصدقاء	?aSdiqaa?	cvcvvcvvc	friends
قريب	qariib	cvcvvc	relative	أقرباء	?aqriibaa?	cvcvvcvvc	relatives

Table 20.l: Modification of the Internal Vowels, Elision and Addition of a Suffix *hamza ‘a’*

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
أمير	?amiir	cvcvvc	prince	أمراء	?umaraa?	cvcvvcvvc	princes
رئيس	ra ^h iis	cvcvvc	president	رؤساء	ru ^h asaa?	cvcvvcvvc	presidents
وزير	waziir	cvcvvc	minister	وزراء	wuzaraa?	cvcvvcvvc	ministers
زعيم	Za ^h im	cvcvvc	leader	زعماء	zu ^h amaa?	cvcvvcvvc	leaders

Table 20.m: Modification of the Internal Vowels, Addition of an Infix *alif {-aa-}*

Singular				Plural			
Example	Transliteration	Pattern	Translation	Example	Transliteration	pattern	Translation
مركز	Markaz	cvcvvc	center	مراكز	maraakiz	cvcvvcvvc	centers
مطعم	maTa ^h am	cvcvvc	restaurant	مطاعم	maTaa ^h im	cvcvvcvvc	restaurants
منجم	manjam	cvcvvc	mine	مناجم	manaajim	cvcvvcvvc	mines

It can be observed that the Arabic broken plural involves changing the shape of the singular through various morphological processes such as long vowel

insertion, consonant germination, semivowel insertion and the affixation of consonants additional to those of the root. It lies at the heart of Arabic morphology: the super imposition of templatic consonant-vowel patterns onto traditional roots.

It is also observed that the Arabic broken system is highly allomorphic. For a given singular pattern, two different plural forms may be equally frequent, and there may be no way to predict which of the two a particular singular will take.

The problem of variation exhibited in Arabic broken plural system can be handled in two ways. We can either provide the broken plural pattern in the lexicon and then a series of morphological rules operate on the singular noun to generate the plural noun in the morphological component. These rules would act at the internal level to convert the singular stem to the plural stem and at the external level to add the inflectional affixes (e.g. case, state and gender). The other approach would be to provide the singular and plural stems in the lexicon and these have inflectional morphology action these stems (Souidi *et al*, 2007). The first approach would obviously involve several rules, for nouns with a broken plural pattern have in general complex stem alternant. The multiple stem approach sounds more promising.

Conclusion

Based on the data collected and investigated, it has been found that Arabic morphology is inflectionally rich, and Arabic nouns are morphologically inflected for four categories; number, gender, case, and state. Arabic morphology is concatenative and nonconcatenative so inflectional categories are expressed either by the addition of affixes, modification of the stem or both, so Arabic plural nouns are classified into two types sound and broken. Sound plurals are formed by the addition of affixes new broken plurals are formed by modifier of the stem and/or the addition of affixes. However, in Arabic inflectional morphology, semantic regularity is the norm even where formal processes differ. For example no plural form of a noun has an unexpected extra meaning or function whether it is formally sound or broken. It has been found that Arabic broken plural system is allomorphic. The singular stem changes to express grammatical category of plural. However, the changes happening to the stems are not random or arbitrary. These changes are regular and productive, so Arabic broken plural nouns are morphologically and phonologically rule-governed. They are formed according to the morphological and phonological rules of Arabic so they are predictable. It has been found that the modified segments of a singular stem are the vowels. This is illustrated by presenting some examples such as those presented in table 21:

Table 21

Singular			Plural		
Example	Transliteration	Translation	Example	Transliteration	Translation
وزن	wazan	weight	أوزان	?awzaan	weights
وطن	waTan	homeland	أوطان	?awTaan	homelands
ولد	walad	boy	أولاد	?awlaad	boys
نفس	nafs	sound/spirit	نفوس	nufiūs	sounds/spirits
قلب	qalab	heart	قلوب	quluub	hearts
لحم	laḥam	meat	لحوم	lhuum	meat
علم	?alam	flag	أعلام	?a?laam	flags
قلم	qalam	pen	أقلام	?aqlaam	pens
ألم	?alam	pain	آلام	?aalaam	pain
مصعد	maSʔad	lift	مصاعد	maSaaʔd	lifts
منجم	manjam	mine	مناجم	manaajim	mines

It has been found that a trilateral singular noun which begins with و ‘w’ often has the plural pattern ?awacaac and those which do not begin with و ‘w’ often have the plural pattern cucuuc. Moreover, these rules of broken plurals apply to novel forms which have the same singular patterns such as بنك *bank* ‘bank’ which has the plural form بنوك *bunuuk* ‘banks’ and فلم *film* ‘film’ which has the plural form أفلام *?aflaam* ‘films’. It has been observed that Arabic broken plural nouns are regular and productive. Berko (1958) and Mackay (1978) point out that regular forms are formed by a rule whereas irregular ones are learned by rote.

It has been found that the majority of Arabic nouns have broken plurals. Haywood and Nahmad (2004, p.50) argue that “for a large number of Arabic nouns, the sound plurals do not exist at all. The broken plurals must be used.” Abu-Chacra (2007) asserts that by stating that the broken plurals are frequently and mostly used. McCarthy and Prince (1990) argue that essentially, all canonically shape lexical nouns of Arabic take broken plurals, including loan words, even very recent ones. According to them, broken plural formation is the norm. Neme and Laporte (2013) state that Arabic broken plurals are predominant over suffixed ones.

Consequently, it is hoped that these findings can help scholars as well as learners to alleviate the difficulties in mastering Arabic broken plural nouns. The findings can be used to pave the way for further research on the regularity of Arabic broken plural nouns.

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