The Formation of Nominal Derivatives in the Arabic Language

With a View to Computational Linguistics

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Dedication

I dedicate this thesis with love to my dear parents.

Declaration

I declare that this thesis was the result of my own work. No portion of the work covered in this thesis has been submitted in support of any application for another degree or qualification at this or any other university or institution of higher learning.

Abstract

This study investigates the formation of nominal derivatives in Arabic by providing a multi-level analysis in the light of state-of-the-art theories and approaches in modern linguistics. Six types of nominal derivative are described and analyzed: the active participle, the passive participle, the form of exaggeration, the instrumental noun, the qualificative adjective, and the locative noun. The study considers the Form I verb stem as input for forming the six types of nominal derivative (the output). A multi-level approach is employed, involving semantics, syntax, morphology and prosodic phonology.

The study establishes an Arabic verb classification in which 980 Form I verbs are divided into 44 classes from which nominal derivatives are derived. Verbs are allocated to classes according to their semantic features and syntactic behaviour. Semantically, the verbs in each class share related meanings and semantic functions. In addition, semantic relations such as synonyms, antonyms, polysemy and hyponym are taken into consideration. Syntactically, the verbs in each class share syntactic behaviour in terms of their transitivity and syntactic frames (in which all the verbs of a class can be used alternatively).

Morphologically, the word formation of nominal derivatives is analyzed and described using the stem-based approach where the input stem is a Form I verb and the output stem is a nominal derivative. Prosodically, the analysis describes the word formation processes and prosodic structures of the nominal derivatives.

The valid nominal derivatives are derived from each of the 44 verb classes based on the compatibility between their semantic features and the semantic features of each class. The derivation of an invalid nominal derivative causes an overgeneration problem that is involved in computational linguistic applications. This study has determined that the overgeneration problem is found only in three types of nominal derivative: the instrumental noun, the qualificative adjective, and the locative noun, where there is no compatibility (agreement) between the semantic features of a given verb and the semantic features of a nominal derivative. Only four or five valid nominal derivatives can be derived from a given verb, not all six types.

Chapter One

Introduction

1.1 Introduction

This chapter begins with a description of the Arabic linguistic tradition, from its place within Semitic language family, to its development and rapid spread, its status over the centuries, the traditional grammatical schools and prominent scholars within this tradition. The chapter then turns to the research topic, discussing the research problem, research questions, research motivation and contribution, and thesis structure.

1.2 The Arabic language and its linguistic tradition

The Arabic language belongs to the Semitic language family. All languages within this family descend from Proto-Semitic. The family has two main branches: the east Semitic languages that include the extinct languages, Eblaite and Akkadian; and western Semitic languages, divided into southern Semitic – Ethio-Semitic and Modern South Arabian – and central Semitic – Arabic, Aramaic, Canaanite, Phoenician, Hebrew and Ugaritic. Arabic is the most widespread of the living Semitic languages (Hetzron 1992: 412-413; cf. Watson 2002: 1).

At the end of the sixth century CE, a rapid development of Arabic occurred through the emergence of Islam, when Arabic became the official language of the new Islamic state. As in other religions, the prophets are associated with miracles, in this case the miracle of Mohammad, the prophet of Islam, and the Qur'an that is the sacred book of Islam. In Islamic belief, the Qur'an is the speech of Allah, conveyed through the Archangel Gabriel to the Prophet Mohammad. Muslims consider the Qur'an to be a literary and linguistic miracle.

Within a hundred years, the Islamic state had spread outside the Arabian Peninsula to reach the Levant in the north, Iraq, Khuzistan and Persia in the east, and North Africa and Spain in the west. Native Arabs from the Arabian Peninsula then settled in the conquered countries. Over subsequent centuries there was further expansion of the borders of the state, through three continents: in Europe, Spain and Portugal (Andalusia); in Africa, the central

African countries; and in Asia, Turkestan, Pakistan, Indonesia, Malaysia, and the west of China. The non-Arab Muslims seized on learning the Arabic language for their prayers and religious rituals.

According to Watson (2002: 6) "the rise and expansion of Islam was not only a religious and hence cultural conquest, but also a linguistic conquest, and within a few hundred years Arabic became both the official and the vernacular language of all Islamicized countries". However, with the demise of the Islamic Ottoman Empire in 1916, several nations regained their original national tongue, such as the Turks, Kurds, Berbers, and Persians.

Currently, Arabic is one of the six official languages of the United Nations; it is also the official national language of twenty-two countries in the Middle East and North Africa, from the Arabian Gulf countries in the east to North African countries in the west. At the same time, Arabic is the liturgical and religious language of approximately one billion Muslims around the world (Chon & Arzt 2005: 246).

Arabic grammar has a long-standing linguistic tradition. Since the eighth century CE, Arabic has received continuous attention from researchers. Medieval Arab grammarians classify Arabic grammar into two main categories: *ṣarf* and *naḥw*, which are the closest Arabic terms to morphology and syntax respectively. However, the boundaries between them are distinct from their counterparts in Western linguistics. In Arabic, the category of *ṣarf* (morphology) covers many aspects of derivational morphology (e.g. the forms of the verb, verbal and nominal derivatives) as well as inflectional morphology (e.g. tense/aspect paradigms, number marking in nouns, number-gender marking in adjectives), but does not encompass grammatical case and mood which are considered under *naḥw* (syntax) (Ryding 2005).

The first linguistic treatises on Arabic to appear were written by two influential scholars: Al-Khalīl ibn Ahmad (d. 791 CE) and Sibawaih (d. 793 CE). Al-Khalīl ibn Ahmad produced the first Arabic dictionary *Muᶜjam Al-ᶜayn* (1967) (ed. by Abdallah Darwīsh), while Sibawaih (1966) (ed. by Abd al-Salām Hārūn) is considered to be the father of Arabic grammar; his work *Al-Kitāb* ('The Book') provides a comprehensive descriptive

analysis of Arabic. Sibawaih deals mainly with syntactic issues, but also discusses the structure of Arabic words through the description of morphological and phonological structures which determine the surface form of the word.

Thereafter, research activities in the discipline of Arabic grammar appeared in the form of grammatical schools. Al-Baṣrah and al-Kūfah were the most famous schools of medieval Arabic grammatical analysis (Daif 1983). Some of these scholars have enriched the literature of Arabic morphology by devoting portions of their works to describing the morphological aspects (Az-Zajjāji 1984; Al-Jurjāni 1984; Al-Istarabādi 1983). Al-Māzini (d. 863) was the first Arab grammarian to devote a whole work, *Kitab At-Taṣrīf*, to morphological issues. The grammarian Ibn Jinnī (d. 1002) commented on Al-Māzini's work in his book *Al-Munṣif* (1960), which is considered to be one of the most valuable books on Arabic morphology.

The rapid expansion of the Arab-Islamic Empire during the seventh and eighth centuries CE meant that by the Abbasid era classical Arab linguistic study had reached maturity. Although the Arabs of the Arabian Peninsula were a minority in this sprawling multi-ethnic and multi-lingual civilization, the supremacy of Arabian tribes in governance and administration and the central position of the Qur'an in Muslim liturgy meant that Arabic became the lingua franca. The incorporation of non-Arabs into the cultural life of the times aroused significant interest in the study of Arabic linguistics, particularly on the part of the Persians (cf. Daif 1983). Thus, medieval grammarians were encouraged to provide their representation of the internal structure of Arabic words.

Furthermore, the Holy Qur'an is believed to be a literary miracle in Islam, and therefore the linguistic mistakes made by non-Arabs who converted to Islam (such as incorrect assignment of case and mood markings) were criticised by native Arabic speakers. Sibawaih was born c. 750 in Persia. His father converted to Islam and became a client of the Arab tribe of the Banī l-Hāriṯ ibn Kaᶜb. His mother tongue was Persian and he never completely lost his Persian accent in Arabic. On arriving in Basra his original intention was to study Islamic law, but when he was ridiculed by people for the grammatical

mistakes he made in Arabic he decided to study Arabic grammar instead (Versteegh & Versteegh, 1997).

The traditional study of morphology is known in Arabic linguistics as *Al-Mīzān Aṣ-Ṣarfī* الميزان الصّرفي 'the balance of morphology/the morphological measure'. In theory, it seems highly systematic since it organizes the relationship between the root and templatic patterns by representing Arabic words within a limited number of patterns, considered to be templates to which consonants and vowels are associated.

The rules of this traditional account *Al-Mīzān Aṣ-Ṣarfī* الميزان الصّرفي 'the balance of morphology/the morphological measure' were set down early on by the Arab grammarians Sibawaih (1966) (ed. by Abd al-Salām Hārūn) and Ibn Jinnī (1960) (ed. by Ibarhem Mustafa). They abstracted the Arabic consonants (*f*, ᶜ , and *l*) (فعل) to distinguish the different morphological processes that a word form may undergo. Thus for the most frequently attested triliteral roots, (*f* ف) represents the first radical of the root,(ᶜ ع) represents the second radical of the root, and (*l* ل) represents the third radical of the root. Furthermore, they used the pattern (*f*, ᶜ , *l*, and *l*) (فعلل) to represent quadriliteral roots, where the third letter (*l* ل) is duplicated. Augmented radicals and/or vocalisms are then inserted within the morphological pattern.

Sibawaih (1966) dealt sporadically with many morphological issues related to derivation; he discussed the morphological patterns of verbs and nouns in some detail, while also considering the functional meaning of these patterns. In addition, he discussed the origins of derivation in Arabic, considering the verbal noun to be the origin from which to derive the verb. This issue was later debated by the Basran and Kūfan schools of medieval Arabic grammatical analysis, which debated whether the verbal noun or the verb itself was the input of derivatives. The Basran grammarians considered the verbal noun to be the input of derivation, whereas the Kūfan grammarians considered the verb to be the input of derivation (Al-Anbāri 1961).

Within modern Arabic literature on Arabic grammar, a number of books have appeared which deal with particular areas of Arabic morphology. These books draw on the

traditional literature of the medieval Arab grammarians. Modern Arab grammarians (Al-Ḥamalāwi 1957; Ḥasan 1969; Al-Rājḥi 1973; Al-Sayyid 1998; Al-Ḥalawāni 1978; Nahir 2001) attempt to provide an authoritative description of Arabic morphology, organizing and disambiguating morphological topics that were scattered in traditional references.

1.3 Research problem

This study aims to investigate nominal derivative formation in Arabic by providing a comprehensive analysis of nominal derivatives in view of state-of-the-art theories and approaches in modern linguistics. A multi-level approach is employed, involving semantics, syntax, morphology and prosodic phonology. Semantically, Arabic verbs[1] are classified in order to determine variation in deriving their valid nominal derivatives. Furthermore, the semantic compatibility (agreement) between the verbs and the nominal derivatives is taken into consideration in order to determine the validity of deriving nominal derivatives from a given verb. Morphologically, root-based and word- or stem-based approaches to word formation will be reviewed in the light of variation in the linguistic data. Phonologically, the prosodic structures of the nominal derivatives will be represented to determine realizations of each nominal derivative. In this study, the nominal derivatives (six types) in Arabic are categorized as: the active participle (agent noun), the passive participle, the form of exaggeration, the instrumental noun, the qualificative adjective, and the locative noun.

The Semitic languages, to which Arabic belongs, essentially have highly nonconcatenative (non-agglutinative) morphological systems. This means that word formation is not created through the concatenation (i.e. linking together) of morphemes, as is the case in largely concatenative morphological systems such as English. Semitic languages employ nonconcatenative word-formation processes including template change, infixation and gemination to create further stems. The stems in Arabic are governed by canonical patterns (templates) that include vowels and consonants, conveying particular functional meanings as well as grammatical and syntactic information. This feature has attracted the attention of scholars of modern linguistics. Varying theoretical frameworks have been proposed to

1. The verbs are dealt with as the input of the derivation process, while the nominal derivatives are dealt with as the output, i.e the nominal derivatives are derived from the verbs.

approach nonconcatenative morphology. Within the literature, Arabic is treated as a prime example, alongside Hebrew, of a nonconcatenative morphological system.

The current study aims to explore the characteristics of formation of the nominal derivatives (derived nouns) in Arabic by providing a new comprehensive analysis of nominal derivatives. It focuses on the six nominal derivatives mentioned above derived from Form I verbs.[2] The formation of each type of nominal derivative will be analyzed from its base (the input) to its final form (the output).

Recent literature on Semitic morphologies has focused on Hebrew and Arabic. The literature on Arabic morphology is mainly dedicated to verbal morphology and the formation of broken plurals, despite the extensive use of nominal derivatives in the language. For this reason, the current study selects nominal derivatives as the linguistic data which will undergo a multi-level analysis that deals with different aims and various data from the literature.

The study employs a multi-level approach involving semantics, morphology and prosodic phonology. At the semantic level, it establishes 44 semantic classes of Form I Arabic verbs (the base form), from which the nominal derivatives are derived. The study proposes that the semantics shows why some nominal derivatives cannot be formed from some verbs while they can be formed from other verbs. For example, a locative noun and an instrumental noun cannot be derived from verbs of emotion, verbs of colouring, or verbs of bodily qualities. Addressing this question through considering the semantic classification of verbs will contribute to filling a gap in the literature.

Dichy and Farghaly (2007) emphasized that there is a problem resulting from considering the morphological patterns (including the nominal derivative patterns) as applicable to any verb to generate word forms. According to Dichy and Farghaly (2007) and to the best of the author's knowledge, no attempt has hitherto been made to provide linguistic solutions to determine which patterns can be applied to particular verbs. Therefore, the current study

2. Form I verb is the base form of the verbal system in Arabic, from which other verbal and nominal forms are derived.

aims to address this problem based on the semantic classification of Arabic verbs, and then explore the interaction between the semantic features of a class of verbs and the semantic features of each nominal derivative type in order to determine eventually which nominal derivatives can be validly derived from a given verb, as well as which nominal derivatives cannot so be derived.

At the morphological level, the word-formation processes of the nominal derivatives will be described and analyzed in view of appropriate assumptions presented in the literature. Morphologically, the current study aims to review the two main approaches in Semitic templatic morphology: one approach that supports a root-based analysis, and one that supports a word- or stem-based analysis, in an attempt to determine whether a word-formation derivative is root-based, stem-based, or both. At the prosodic phonological level, the current study intends to analyze and describe the prosodic structures of the nominal derivatives by providing a prosodic representation which determines realizations of each nominal derivative.

1.4 Research questions

The study aims to address the following main research question and sub-questions:

- What are the characteristics of the formation of nominal derivatives in the Arabic language semantically, morphologically and phonologically (prosodically)?
- What are the semantic restrictions of the formation of valid nominal derivatives? Why can nominal derivatives be formed from some verbs but not from others? From a computational linguistic perspective, the question is, how to prevent overgeneration in deriving nominal derivatives?
- What are the morphological characteristics of nominal derivatives in terms of morphological processes, and the input of their formation (is it the root, the stem, or both?)?
- What is the prosodic structure of the nominal derivatives?

1.5 Research motivation and contribution

The motivations behind this research initially came from the field of computational linguistics. Computationally, nominal derivatives (the output) can be generated from given verbs (the input); however, the problem is that some potential nominal derivatives are not valid semantically and not in use. This problem is described as overgeneration. Here, the question that arises is how we can avoid overgeneration. I hypothesize that the solution may lie in the semantics and syntax of verb classes.

This study involves the semantics–morphophonology interface. In the literature, much work has addressed the interface between morphology and phonology; however the semantic–morphology interface has not been examined in depth within the literature on Semitic languages. The study proposes that the semantics shows why some nominal derivatives cannot be formed from some verbs while they can from other verbs. Addressing this question through considering the semantic classification of verbs will contribute to filling a gap in the literature.

In terms of the data, the literature on Arabic morphology focuses principally on verbal morphology and the formation of broken plurals, despite extensive use of nominal derivatives. Therefore, the current study selects nominal derivatives as linguistic data for analysis. It conducts a comprehensive approach that deals with various aspects (semantic, morphological and prosodic) and different data from the literature. In this study, six different types of nominal derivatives are examined. This variety of data will help to address the question as to whether derivation is from the root or the stem.

The findings of this study will be particularly beneficial to morphologists and prosodic phonologists. Furthermore, by seeking to address the overgeneration problem, it will interest people concerned with computational linguistics and corpus linguistics, where it could be useful in developing wordNet databases and automatic generators.

1.6 Transliteration

In the current study, Arabic characters are represented by the transliteration system (phonetic symbols) given in Table 1:

Table 1: Arabic characters and transliteration symbols

Arabic characters	Transliteration
ء	ʾ
ب	*b*
ت	*t*
ث	*t̲*
ج	*j*
ح	*ḥ*
خ	*x*
د	*d*
ذ	*d̲*
ر	*r*
ز	*z*
س	*s*
ش	*š*
ص	*ṣ*
ض	*ḍ*
ط	*ṭ*
ظ	*ẓ*
ع	ʿ
غ	*ġ*
ف	*f*
ق	*q*
ك	*k*
ل	*l*
م	*m*
ن	*n*
هـ	*h*
و	*w*
ي	*y*

The short vowels in the Arabic language are represented as *a*, *i*, *u*, while the long vowels are represented as *ā*, *ī*, *ū*.

1.7 Thesis structure

Chapter One presents a background to the Arabic language and its linguistic tradition, covering historical aspects of Arabic within Semitic languages, the development of Arabic and its rapid spread, the status of Arabic over the centuries, and traditional linguistic schools and prominent scholars. The chapter then discusses the topic of the present study, the research problem, research questions, research motivation and contribution, and the overall structure of the thesis.

Chapter Two examines the literature on Arabic phonology and morphology, as well as other literature relevant to the study. It starts with a discussion of nonconcatenative templatic morphology, the templatic structure in Arabic, and the phenomena that characterize nonconcatenative templatic morphology, including infixation, gemination, circumfixation, and melodic overwriting. Thereafter, the chapter deals with two theoretical frameworks which have been applied to Arabic: autosegmental theory, and prosodic theory. The chapter argues for different approaches to word-formation in Arabic, including the root-based approach and the word- or stem-based approach. Additionally, three types of verb classification, philosophical, syntactic, and semantic, are presented. The chapter ends with a review of the computational literature on Arabic morphology that includes morphological analysis and morphological generation.

Chapter Three introduces the research methodology. It starts with demonstrating our criteria for classifying Arabic verbs, based on semantic descriptions, transitivity and syntactic frames. The selected data comprise 980 verbs (Form I) divided into 44 classes. Thereafter, the chapter demonstrates the multi-level analysis of nominal derivative formation that involves the semantic restrictions/constraints of driving the nominal derivative from its input (Form I verb), the morphological formation of the nominal derivatives, and the prosodic templatic representation of the nominal derivatives. This chapter ends with the computational application of this research where a computational system of the nominal derivatives will be implemented.

Chapter Four presents our Arabic verb classification. 980 Arabic verbs are presented in 44 classes. Each class includes a semantic description, their relation to Levin's classes and Vendler's classes, transitivity tests, class members, the syntactic frame of transitives and intransitives, the nature of the subject and the object, and examples of the syntactic frame of each listed verb.

Chapter Five provides a multi-level analysis (semantics, morphology, prosodic phonology) of the six types of nominal derivatives. It starts with analyzing and describing the morphological and prosodic structure of the six selected types of the nominal derivatives, namely: the active participle (agent noun), the passive participle, the form of exaggeration, the instrumental noun, the qualificative adjective, and the locative noun. The chapter provides a semantic analysis of the nominal derivatives in order to determine semantic restrictions/constraints on the formation of nominal derivatives based on the semantic compatibility between the semantic features of the verb classes and the semantic features of the nominal derivatives.

Chapter Six deals with the formation of the nominal derivatives from a computational linguistic perspective. It discusses the morphological analysis and morphological generation. Morphological generation problems are taken into consideration, specifically the overgeneration problem. The chapter then deals with overgeneration in the formation of nominal derivatives, as well as our solution to the overgeneration problem. The computational application of generating nominal derivatives is presented. The chapter ends with an evaluation of the performance and accuracy of our model.

The study ends with a conclusion that summarizes the stages of the research. The conclusion presents the research findings throughout the study within the semantic, morphological and prosodic phonology levels of analysis, and ends with recommendations for future research.

Chapter Two

Theoretical background and research context

2.1 Introduction

This chapter presents the theoretical background and research context to the study. It starts with a discussion of nonconcatenative templatic morphology, templatic structure in Arabic, and the characteristic features of Arabic nonconcatenative templatic morphology, including infixation, gemination, circumfixation, and melodic overwriting. Thereafter, the chapter deals with two theoretical frameworks which have been applied to Arabic: autosegmental theory and prosodic theory. The chapter considers different approaches to word-formation in Arabic, including the root-based approach and the word- or stem-based approach. Three types of verb classification are presented: philosophical, grammatical, and semantic. The chapter ends with a discussion of some computational literature on Arabic morphology that includes morphological analysis and morphological generation.

2.2 Morphology

Morphology deals with word structure and word formation processes. In terms of word formation, morphology is categorized into derivational morphology and inflectional morphology. The distinction between these two types is attributed to the function of affixes involved in word formation. Essentially, derivational affixes produce a new word: a word that differs either in semantics or in word class. For example, adding the affix *-al* to the noun *information* in English creates the adjective *informational*. Affixation of -*ship* to *friend* creates an abstract noun with differing semantics from the stem. In contrast, affixation of inflectional affixes does not create a new word, but gives a different form of the same word, for example adding -*s* to the noun *home* gives the plural form *homes*, and adding -*ed* to the verb *walk* gives the past tense form of the verb. Arabic morphology traditionally covers derivational morphology (e.g. the ten[3] forms of the verb, verbal and nominal derivatives) as well as inflectional morphology (e.g. verbal paradigms), but it does not encompass grammatical case and mood which are considered under *naḥw* (syntax) (Ryding 2005).

3. There are actually 15, but only 10 are in common use today.

2.3 Nonconcatenative morphology

The morphological structure of languages of the world can be categorized into concatenative and nonconcatenative. Concatenative word formation, which is widespread, is based on prefixation and suffixation. In concatenative morphology, a series of continuous morphemes (morphemes linked to one another in a linear manner) can form a new word. For instance, the English word *unacceptable* comprises three morphemes: the negative prefix *un-*, the stem *accept* and the adjectival suffix *-able*. By contrast, nonconcatenative morphology involves infixation and/or prosodic template change. In the case of Arabic, phenomena that should be highlighted in this context include templatic structure, infixation, gemination (reduplication), and circumfixation.

Watson (2002) defines the boundaries between different categories in the application of morphology to Arabic. Watson (2002: 132) assumes that "Arabic has two morphological levels. Level one, which affects the stem of the word predominantly, can be said to correspond roughly to the nonconcatenative (or infixal) morphology; and level two, which does not affect the stem of the word, works predominantly by adding affixes to the beginning and end of the word stem. As a working hypothesis, level-one morphology is roughly equivalent to derivational morphology, and level-two morphology to inflectional morphology. However, some level-two affixes change the class membership of the word from adjective to noun, or from noun to adjective and therefore appear to be part of the derivational morphology".

Inflectional morphology in Arabic most commonly uses prefixation or suffixation, while derivational morphology characteristically involves infixation and/or templatic change. For example, the inflectional suffix *-at* ـة can be added to the stem *qātil* قاتل 'killer' to obtain the feminine form *qātilat* قاتلة 'female killer'. In the derivational morphology, the active participle *qātil* قاتل 'killer' of the Form I verb *qatal* قتل 'to kill' is derived through a different prosodic template.

In the templatic structure of Arabic, the structure of a word (verb and noun) is dependent on a pattern (template) and a root. In Arabic, each stem[4] is governed by a canonical templatic pattern that includes vowels and consonants, conveying particular functional meanings, grammatical and syntactic information, and an indication of word class (grammatical category). In other words, the templatic pattern comprises three components: a series of discontinuous consonants, a series of discontinuous vowels, and a templatic pattern. For instance, the templatic pattern $C_1VVC_2VC_3$ together with the vocalic melody -a-i- represents the active participle in Arabic, and can be applied to any valid root to derive the active participle of Form I verbs, as shown in Table 2.

Table 2: Form I active participle

Root	Active participle
k-t-b كتب 'to write'	*kātib* كاتب $C_1VVC_2VC_3$ 'writer'
l-ᶜ-b لعب 'to play'	*lāᶜib* لاعب $C_1VVC_2VC_3$ 'player'
q-t-l قتل 'to kill'	*qātil* قاتل $C_1VVC_2VC_3$ 'killer'
q-r-ʾ قرأ 'to read'	*qāriʾ* قارِئ $C_1VVC_2VC_3$ 'reader'

At the derivational level, there are two types of templatic pattern: verbal stem patterns and nominal stem patterns. Verbal stem patterns in Arabic are more restricted than the nominal stems (Watson 2002: 133). There are ten frequently encountered verb forms (see Table 3 below), where Form I is the base form from which the other nine forms (Forms II–X) are derived. According to Watson (2006b: 432), "Forms II, III, and IV are derived from Form I by extension of the stem; Forms V and VI are derived by prefixation of *ta-* to Forms II and III, respectively. Forms VII, IX, and X involve various types of prefixation, and Form VIII is derived from Form I by infixation of /t/ after the leftmost root consonant. No consonantal root in Modern Standard Arabic has all ten verb forms, and a few verbs have one or more derived forms but lack the basic form".

4. The stem is the basic form of the word before adding inflectional affixes.

Table 3: The ten derived verb forms in Arabic

Form	Root	Pattern	Example	Gloss
Form I	*k-t-b* ك ت ب	*C1aC2aC3*	*katab* كتب	'to write'
Form II	*k-t-b* ك ت ب	*C1aC2C2aC3*	*kattab* كتّب	'to dictate'
Form III	*k-t-b* ك ت ب	*C1aaC2aC3*	*kātab* كاتب	'to correspond with'
Form IV	*j-l-s* جـ ل س	*ʾaC1C2aC3*	*ʾajlas* أجلس	'to seat'
Form V	*ᶜ-l-m* ع ل م	*taC1C2C2aC3*	*taᶜallam* تعلّم	'to learn'
Form VI	*k-t-b* ك ت ب	*taC$_1$aaC$_2$aC$_3$*	*takātab* تكاتب	'to correspond'
Form VII	*k-t-b* ك ت ب	*ʾinC$_1$aC$_2$aC$_3$*	*ʾinkatab* انكتب	'to subscribe'
Form VIII	*k-t-b* ك ت ب	*ʾiC$_1$taC$_2$aC$_3$*	*ʾiktatab* اكتتب	'to register'
Form IX	*ḥ-m-r* ح م ر	*ʾiC$_1$C$_2$aC$_3$aC$_3$*	*ʾiḥmarar* احمرّ	'to become red'
Form X	*x-r-j* خ ر ج	*ʾistaC$_1$C$_2$aC$_3$*	*ʾistaxraj* استخرج	'to extract'

* C_1, C_2, and C_3 represent the first, second, and third consonantal root letters respectively.

Infixation, gemination, melodic overwriting, and templatic change are phenomena that characterize nonconcatenative morphology. Infixation is a very common morphological process in Arabic, in which an infix is inserted between the root or word-stem letters. The infix is a dependent bound morpheme; it can consist of vowels or consonants. For example, Form VIII is derived from Form I by infixing *t* after its first root consonant, such as *ʾiktatab* اكتتب 'to register' that is derived from Form I verb *katab* كتب 'to write'.

Gemination involves reduplication of a root consonant. Form I might involve gemination when the second and third root consonants are the same, as in the verb *dall* د ل ل 'to indicate'. The formation of the Form II verb is based on the gemination of the medial Form I consonant, for example, *qattal* قتّل (Form II) is formed by duplicating the *-t-* of the Form I verb *qatal* قتل 'to kill'. Orthographically, the geminated consonant is represented using a symbol called ّ *shadda* شدّة which appears above the geminated consonant.

Melodic overwriting is a morphological process in which the vocalic melody is overwritten with another vocalic melody to form a new stem. More specifically, this kind of morphological process occurs only at the stem level. For example, the passive of Form I verbs is formed by overwriting the vocalic melody *a-a*, *a-u*, or *a-i* with vocalic melody *u-i*, as in the passive verb *fuhim* فهم 'it is understood', whose active form is *faham* فَهَم 'he understood'.

Templatic change involves associating the root consonants with a different template, and often also melodic overwriting. For example, the active participle *qāriʾ* قارئ 'reader' in Arabic is formed by associating the consonants of the Form I verb *qaraʾ* قرأ 'to read' with the template $C_1āC_2iC_3$ (*CVVCVC*) and overwriting the vocalic melody *-a-* with the melody *-ā-i-*.

2.4 Autosegmental phonology

In generative phonological theory, there are two contrasting approaches: segmental and autosegmental. Within the segmental approach, the representation of morphological and phonological operations is based on the notion of linearity: i.e. a linear string of elements that interact with each other in one-to-one behaviour according to morphological and syntactic rules. This theory has been applied to languages whose morphology is based on the linear concatenation of morphemes through prefixation or suffixation. For example, the English word *unhelpfully* is formed by concatenation of four lexical morphemes *un* - *help* - *ful* - *ly*. Concatenative theory does not, however, serve languages which exhibit significant nonconcatenative (nonlinear) morphology, such as Arabic, Hebrew, Amharic, Syriac, Dakota, Tagalog, Terena, Tiv and Ulwa. To exemplify the difference between concatenative and nonconcatenative morphologies, the English active participle word *writer* is formed by suffixing the morpheme *-er* to the verb *write*, whereas the Arabic active participle word *kātib* كاتب 'writer' is formed from the verb *katab* 'write' كتب by templatic change and melodic overwriting .

The first linguistic framework adopted to describe nonconcatenative (nonlinear) morphologies was produced by John Goldsmith in his PhD dissertation in 1976. Goldsmith (1976) developed autosegmental theory, which was applied to tone languages (tonal

phenomena) in which the phonemic elements cannot be represented or analyzed by a linear approach. Since then, the autosegmental framework has been extended to handle other features that involve multiple segments. Building on the autosegmental framework, McCarthy (1979, 1981) developed a templatic approach to Semitic languages (McCarthy's works will be discussed later in this chapter).

Within autosegmental theory, the phonological structure of a word comprises several tiers, each tier consisting of a linear arrangement of components; these tiers are connected to each other by means of association lines that show how the tiers are coarticulated (Crystal 2008: 45-46). In this theory, each linguistic feature can be represented on its own separate autosegmental tier that allows it to act independently in different morphophonological operations. Features are associated to tiers through Association lines. These association lines vertically link segments that are placed on separate autosegmental tiers.

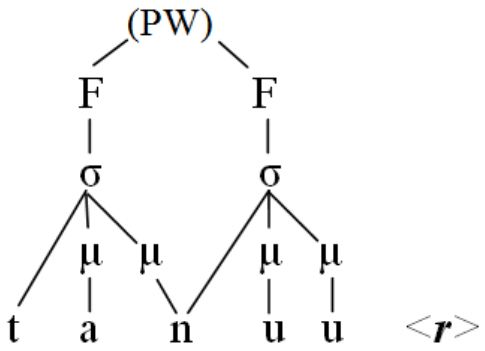
According to Kager, van der Hulst et al. (1999), the *Well-Formedness Condition* is universal. They claim that the *Well-Formedness Condition* cross-linguistically has the following form: "(a) all vowels are associated to at least one autosegment, (b) all autosegments are associated to at least one vowel, (c) association lines may not cross, and (d) association of unassociated autosegments precedes drawing lines from associated autosegments" (Kager et al. 1999: 5).

2.5 Prosodic phonology

The term prosody is used to indicate phonological phenomena which are related with the phonological elements at a level larger than an individual sound, such as syllables and syllabification, word stress and intonation (Plag 2002). The theory of prosodic structure was developed by Selkirk (1980) and Nespor & Vogel (1982,1986). McCarthy and Prince (1990a, 1990b, 1993, 1995, 1996, 1999) then recognised that prosodic structure could usefully be applied to analyses of morphology, and presented a prosodic theory that benefits from autosegmental phonology and templatic morphology; the notion of the prosodic template has also been adapted here. They suppose that words are identified not as sequences of consonants and vowels, but consist of four prosodic units: mora, syllable, foot, phonological word. In the view of Ussishkin (2005), the advantage of prosodic theory over templatic theory is that: "under prosodic morphology, templates are no longer viewed

as extra-theoretical structures that the language happens to make use of under certain phonological or morphological circumstances. Rather, their existence is motivated by the fact that their prosodic make-up is independently necessary" (Ussishkin 2005: 172).

The principles of the prosodic units were inspired by Selkirk (1980). In this theory, McCarthy and Prince (1986, 1990ab, 1993a, 1995, 1999, 2004) established a prosodic representation that is based on a hierarchy within a metrical tree comprising the phonological word, the foot, the syllable, and the mora. These four prosodic units are symbolized as (PW), (F), (σ), and (μ) respectively (McCarthy and Prince 1990; cf. Selkirk 1980). For example, the prosodic representation of the Arabic word *tannuur* تنّور 'clay oven' (*CVCCVVC*) is:

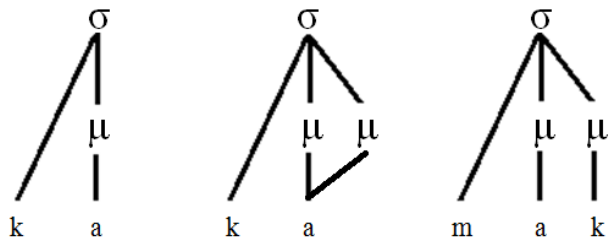


In the prosodic hierarchy, each prosodic unit occupies a separate level within the prosodic-phonological representation. Here, the hierarchy is read from the upper level to the base, i.e. the phonological word (PW) is located in the upper level above the foot level (F). Below the foot level is the syllable level (σ) that is above the mora level (μ) (McCarthy and Prince 1990). Watson (2002: 129) and others argue for minimality in the prosodic hierarchy where each higher unit includes minimally one unit from the units that come below; therefore, the phonological word (PW) contains at least a single foot (F), the foot contains at least a single syllable (σ), and the syllable contains at least a single mora (μ). Potentially, the phonological word (PW) can match a syntactic or a function word, as in: *tannūr* 'clay oven' given above, or involve the concatenation of a syntactic and one or more function words, as in San'ani Arabic: *galliš* [said3m-to-2fs] 'he said to you f.s.'.

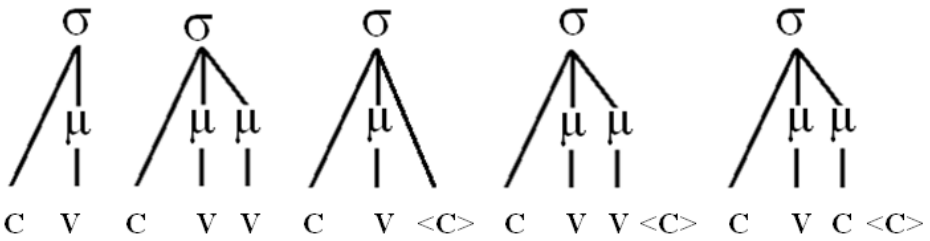
Languages differ as to whether they allow sub-minimal or degenerate feet, that whether syllables that are left over at the beginning or end of a phonological word after the foot parse surface as feet. Therefore, degenerate feet are "[s]ub-minimal feet which survive to

the surface" (Watson 2002: 88). Degenerate feet can receive stress in prosodic strong positions. Thus in a language in which stress is assigned to the right-most foot, the final monomoraic syllable in a word of the structure *CVCCVC* will be assigned word stress in a language that allows degenerate feet, but not in a language which does not permit degenerate feet. Most documented dialects of Arabic, including Modern Standard Arabic, have a strong prohibition on degenerate feet, and thus monomoraic syllables left over at the end of the foot parse remain unparsed.

The determination of syllabification patterns plays a major role in prosodic analysis. In this context, it is worthy of mention that standard Arabic has two salient features in the architecture of syllables. First, no syllable can begin with two consonants. Second, no syllable can begin with a vowel (cf. Ryding 2005: 35). As explained by McCarthy and Prince (1990a, 1990b), Arabic has three core syllables (*CV*, *CVV*, *CVC*): the light syllable which consists of a consonant followed by a short vowel, represented by *CV* such as *ka* كَـ in *katab* كَتَب 'to write'; and the heavy syllable, which has two shapes: *CVV* such as *kā* كا in *kātib* كاتب 'writer', and *CVC* such as *mak* مك in *maktab* مكتب 'office'. In terms of prosodic representation, the light syllable *CV* takes one mora (μ), whereas heavy syllables take two moras (μμ), as shown below:



The first mora in all syllables refers to a vowel (*u, a, i*), while the second mora in the heavy syllable refers to the second part of a long vowel or diphthong *CVV*, or the coda consonant *CVC*. The last consonant of the *CVC* syllable is regarded as extrametrical if this syllable comes as the final syllabe in a word (word-final position) (cf. Watson 2002: 57). McCarthy and Prince (1990a) argue for two further types of syllable, called super-heavy. These syllables are *CVVC* and *CVCC* and are limited to word-final position. Both can be regarded as a heavy syllable followed by an additional consonant (*CVV-C* and *CVC-C*). This consonant is therefore an extra-prosodic consonant that does not interact in the prosody of the word. The prosodic representation of word-final syllables in Arabic is illustrated below:



In Arabic, the final consonant that occurs in a final heavy syllable *CV<C>* is considered extrametrical, while the final consonant that occurs in final superheavy syllables such as *CVV<C>* and *CVC<C>* is considered extrasyllabic (Watson 2002: 58, 90). According to Watson (2002: 58) the extrametrical consonants are incorporated into "the syllable node of the final syllable", while the extrasyllabic consonants are "not incorporated into the adjacent syllable at any stage in the derivation".

2.6 Theoretical approaches to Arabic morphology

In modern theoretical literature dealing with phonology and morphology, various approaches to nonconcatenative templatic morphology have been proposed. Alongside Hebrew, Arabic is treated as a prime example of a nonconcatenative morphological system which requires special theoretical consideration. Many languages of the world exhibit predominantly concatenative morphologies, whereby morphemes are linked linearly, as in the English word *un-happi-ly*. Languages such as Arabic and Hebrew present a challenge because most of their derivational morphology and some of their inflectional morphology does not consist of strings of independently identifiable morphemes. As we have seen, the agent noun in English *writer* is formed by attaching the suffix *-er* to the verb *write*, whereas the Arabic equivalent *kātib* is formed by inserting a series of vowels (*– ā – i –*) within the triliteral root (*k-t-b*).

In Arabic, a particular sequence of vowels may signify a particular grammatical category. For example, the root *k-t-b* with *a-a* vowels signifies the perfective active *katab* 'he wrote', the root *k-t-b* with *u-i* vowels signifies the perfective passive *kutib* 'it m. was written', the root *k-t-b* with *a-u* vowels signifies the imperfective active *aktub* 'I write', and the root *k-t-b* with *u-a* vowels signifies the imperfective passive (*y*)*uktab* 'it m. was written' Accordingly, it is necessary to make sure that the series of consonants and vowels appear in the correct order (Spencer 1991).

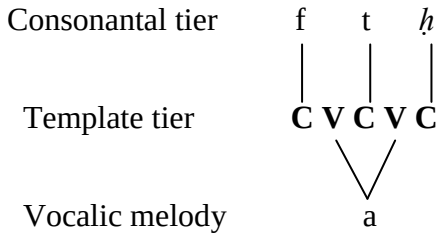
The modern morphological analysis of Semitic languages today is categorized into two opposing approaches: the root-based approach, e.g. McCarthy (1981); Prunet, Béland et al. (2000); Davis and Zawaydeh (2001); and the word- or stem-based approach, e.g. Heath (1987); Darden (1992); Bat-El (1994, 2001); McOmber (1995); Ratcliffe (1998); Gafos (1999); Ussishkin (1999, 2000, 2003, 2005).

2.6.1 The root-based approach

Proponents of the root-based approach argue that the consonantal root is the input (source), from which semantically related words are derived by combining the root consonants (often three) with a canonical templatic pattern that includes consonant positions and vocalic affixes. Within this approach, the root is regarded as a morpheme. The notion of the root may involve cognitive reality where native speakers rely on the root in forming words within their mental lexicon.

Within the domain of autosegmental phonology (Goldsmith 1976), the earliest influential attempt to address Semitic structure within a formal linguistic framework was carried out by McCarthy (1979, 1981), who presented a root-based approach to the types of nonconcatenative morphology exhibited by Arabic and Hebrew. Before McCarthy's work (1979), there had been no elegant theoretical framework to describe and analyze the word formation processes of Semitic languages in the modern linguistic literature (Katamba 1993).

According to McCarthy, the templatic representation of a stem is composed of three separate levels called autosegmental tiers: the root tier (consonantal tier), the template tier (*CV* skeleton), and the vocalization tier (vocalic melody). The morphemic tier representation of the stem *fataḥ* فتح 'to open' is shown below:



According to McCarthy (1979, 1981), the three autosegmental tiers (root, template and vocalic melody) are considered independent morphemes. The consonantal root is a base morphological unit, conveying the core lexical meaning. In Arabic, the root normally consists of three consonants, and less frequently of two or four consonants. From a root-based perspective, the majority of Arabic words (nouns and verbs) are derived from triliteral consonantal roots, uncommonly from two- or four-consonantal roots. For instance, the consonantal root *d-r-s* د.ر.س has the basic lexical meaning of 'studying', from which these words are derived: *darsun* دَرْسٌ 'lesson', *mudarris* مُدَرِّس 'teacher', *dirāsah* دِرَاسَة 'study', *madrasah* مَدْرَسَة 'a school', and *dāris* دَارِس 'a student'. In all of these derived words, the same consonants *d-r-s* remain constant with the same orthographic order.

The templatic tier represents "a sequence of empty timing tier entities [typically] notated as Cs and Vs" (Watson 2002: 126). In Arabic, the grammatical category of a word (such as active participle, passive participle, and instrumental noun) has its particular templatic patterns. For example, the active participle of Form I verbs has the templatic pattern $C_1āC_2iC_3$, as in *kātib* 'writing; writer m.'. A template may involve a particular affix, as in *ma-* of the Form I passive participle template: *ma-*$C_1C_2ūC_3$: *maftūḥ* مفتوح 'it m. is open' has the consonantal root *f-t-ḥ* ف ت ح 'to open', the vocalic melody *a-u* indicating passive voice, and the prosodic template *ma-*$C_1C_2ūC_3$.

The vocalic melody is the third morpheme in the templatic representation. It consists of vowels which are inserted between the root consonants. It plays a major role in making variations in "the voice (active or passive) in verbs, agentive relations in nouns derived from verbs, and singular–plural relations in nouns" (Watson 2002: 126). The vocalic melody plays an important role in pronouncing Arabic words and indicating particular grammatical properties of a word. Table 4 exemplifies how applying various vocalic melodies to a particular root leads to changing the word class.

Table 4: Examples of various vocalic melodies applied to the root k-t-b

Root	Vocalic melody	Example	Word class
k-t-b ك ت ب	-a-a-	*katab* كَتَبَ	Active voice of the Form I verb
k-t-b ك ت ب	-u-i-	*kutib* كُتِبَ	Passive voice of the Form I verb
k-t-b ك ت ب	-a--a-	*kattab* كَتَّبَ	Active voice of the Form II verb

k-t-b ك ت ب	-u--i-	*kuttib* كُتِّبَ	Passive voice of the Form II verb
k-t-b ك ت ب	-u-u-	*kutub* كُتُبٌ	Plural noun of the word *kitāb* 'book'

Besides the three autosegmenal tiers (consonantal, template and vocalic), Arabic words may have affixes that are not part of the word stem, each of which is represented by a fourth separate tier (an affixal tier) that functions as an independent morpheme. The term 'melodic elements' is used by McCarthy to indicate the components of these multiple autosegmental tiers (root, vocalic melody, *CV* template, affixal tier). These autosegmental tiers are linked by a process of association (mapping lines) based on universal association conventions (McCarthy 1981).

Association takes place as follows: melodic elements (vowels and consonants) are linked with melody-bearing elements (V and C slots) one-to-one from left to right, i.e. vowels are linked to V slots, and consonants are linked to C slots. This convention is illustrated in the following chart (McCarthy 1981: 382); capital letters represent melody-bearing elements and small letters represent melodic elements:

The second convention comes after applying the first convention where there is "one unassociated melodic element and one or more unassociated melody-bearing elements." In this case, the unassociated melodic element is associated with all of the unassociated melody-bearing elements (McCarthy 1981: 382). The following diagram illustrates the second convention:

In the third convention, McCarthy states that "If all melodic elements are associated and if there are one or more unassociated melody-bearing elements, all of the latter are assigned the melody associated with the melody-bearing element on their immediate left if possible"

(McCarthy 1981: 382). This process causes what is described as automatic spreading as shown in the following diagram:

Furthermore, there is another convention that must be taken into consideration: the Well-Formedness Condition, which operates according to two rules. First, each C slot or V slot in the templatic tier should be linked with at least one melody element. Second, the association lines (mapping) should not cross each other (McCarthy 1981).

Following McCarthy's (1979, 1981) work, other linguists have presented various evidence in favour of the root-based approach. These works provide experimental evidence based on how native speakers create words. The root-based approach has also been adopted to analyze other (non-Semitic) languages, such as Spanish (Piñeros 1998). The proponents of this approach claim that the consonantal root serves as an independent morpheme that has psychological reality. Following McCarthy (1979, 1981), Prunet, Béland et al. (2000) found the consonantal root to be an independent morpheme. To support this view, they provided external evidence from a psycholinguistic perspective, which is based on the status of the lexical units embedded in the native speakers' mental lexicons. They also provide other external evidence in favour of the templates' morphemic status based on language games, slips of the tongue, and aphasic errors. Their analysis of metathesis errors made by ZT[5] supports the argument for the root as a lexical unit, thus supporting the morpheme-based analysis of morphology. Nevertheless, this argument does not deny output-to-output word-formation processes.

In an article dealing with the formation of hypocoristics in colloquial Arabic, Davis and Zawaydeh (2001) present evidence in favour of considering the consonantal root as an independent morpheme. They argue that word formation of hypocoristics is based on output-to-output processes, which nonetheless need to make reference to the consonantal root. Furthermore, they claim that the argument of the formation of a word from another independent word does not counter the morphemic status of the consonantal root, as it is

5. ZT is 'a bilingual Arabic-French aphasic patient' (Prunet, Béland et al. 2000: 642).

an "output-to-output word formation process". Thus, it is still possible to make reference to the consonantal root (Davis and Zawaydeh 2001: 514).

2.6.2 The stem-based approach

By contrast, a word- or stem-based approach to Semitic morphology has been proposed by a number of researchers. In this approach, a word is derived from an independent word, and the template act as a constraint to filter the compotation of vowels and consonants. The proponents of this approach claim that word formation is based on a whole word or stem input rather than the consonantal root. Heath (1987) adopts the stem-based approach in analyzing Moroccan Arabic, and Darden (1992) adopts it in analyzing Cairene Arabic.

In addition, McOmber (1995) argues that full words in Arabic can be analyzed and represented through *CV* templatic representation without reference to the consonantal roots. Both Bat-El (1994) and Ussishkin (1999) analyzed the formation of denominal verbs in Hebrew, arguing that a stem-based analysis can only account for the morphophonological regularities attested. Likewise, Ratcliffe (1998: 50) argues in favour of the morphological status of consonantal roots, claiming that "(phonologically possible) words rather than three-consonant roots are the primitive lexical entries of the Arabic lexicon".

Their arguments emphasize that there is no need to make reference to the consonantal root in word-formation processes. This is because they consider that the consonantal root does not act as an independent morpheme. According to Davis and Zawaydeh (2001: 518), the deniers of the morphemic status of the consonantal root claim "that units smaller than the word cannot be the object of a morphological strategy. Clearly, the consonantal root is the object of a morphological strategy in Arabic hypocoristic formation".

McCarthy's (1992) affixational theory is considered a distinct change from his earlier theory embodying the root-based approach (templatic analysis). Here, McCarthy downplays the notion of combination between templates and roots to form new words. He argues that "the core of the Arabic nominal system is templatic in character, with templates that conform to prosodic Morphology Hypothesis, i.e. templates are defined in terms of the authentic units of prosody" (McCarthy 1992: 2). However, he also argues that "the Arabic and Akkadian verb system is even more radically non-templatic; just a single template underlies all verb forms, and other morphological regularities are derived by rules of

affixation, sometimes via prosodic circumscription" (McCarthy 1992: 2). In other words, there is only one template (Form I verb *C1VC2VC3*, like *katab* كتب 'he wrote') from which the other verb forms are derived by affixational processes and prosodic circumscription; thus, a derived form here does not have its own template.

As a third approach, in a paper that considers the formation of verbal and nominal diminutives in San ᶜāni Arabic, Watson (2006a) argues that both types of word formation (root-based and stem-based) can be found in Arabic, where native-speaker judgements confirm the two approaches depending on the semantics of the derivative. Watson (2006a: 189) finds that "semantic similarities between certain stems can only be accounted for by derivation from a fully vocalised stem". For example, diminutive verb stems, such as *twayzar* 'to pretend to be a minister' and *tmaydar* 'to pretend to be a manager', are derived from the fully vocalized stems (base noun) *wazīr* 'minister' and *mudīr* 'manager', respectively (Watson 2006a: 195).

Watson (2006a) also claims that some verbal diminutives must be formed from the root as the basic morphological unit. Evidence in favour of the root as the input to some diminutive formation includes:

(i) The existence of several base forms that share the same consonantal root with the diminutive verb, to explain particular formations, suggesting both that the tCayCaC form, from which the basic consonants are extractable, and that the consonantal roots (triliteral) are identified by native speakers as independent morphological units. To support this evidence, Watson (2006a: 193) presents the following examples:

> *txaybal* 'to act as if stupid' was explained as *xabal* 'stupidity', *axbal* 'stupid', *xabaalih* or *mixbaalih* 'acting stupidly' (root /x-b-l/); *tlaygan* 'to bicker' as *lagaanih* and *layganih* 'bickering' (root /l-g-n/); *tbaylah* 'to act stupid' as *balah* 'stupidity' (root /b-l-h/); and *txayda9* 'to act to deceive' as *xada9* and *xadaa9ah* 'deceit; deception' (root /x-d-9/).

(ii) There are synonyms and near-synonyms which fall into specific abstract semantic fields. Among these, there are shared consonants (two or three) or there are consonantal roots of synonyms and semi-synonyms that share place of articulation features. Watson (2006a: 193) states that:

> Most verbs describing ‘to be stupid/daft/naive’ have root consonants with the features [guttural]/[labial]/([lateral]) in various orders, as in: /h-b-l/, /b-l-h/, /x-b-l/, /x-w-sh/, /x-j-f/, /x-b-S/. Verbs describing ‘to cling/stick’ have the initial root consonants /l- [sibilant]/, as in: /l-z-g/, /l-z-T/, /l-z-m/, /l-s-y/.

In contrast to previous literature, Watson’s (2006a) work is open to consideration of both approaches (root-based and stem-based), and not restricted to adopting only one of them. Therefore, the input (root or stem) may differ depending on the linguistic data, the output, and how native speakers describe the data.

In this respect, it should be emphasized that each of the ten verbal forms in Arabic has different nominal derivatives. For example, *kātib* كاتب, *mukattib* مُكَتِّب, and *mukātib* مُكاتِب are the active participles for the Form I *katab* كَتَب, Form II *kattab* كتّب, and Form III *kātab* كاتَب, respectively. In Arabic, Form I is the base form from which the other nine forms are derived.

Within the word- or stem-based approach the input may differ. The question therefore arises of what the input in a word- or stem-based approach is. McCarthy (1993) considers the perfect verb form to be the input to verb formation, whereas Benmamoun (1999) claims that the imperfective form is the basic stem in both inflectional and derivational morphology. He bases his argument on the fact that the vocalization of the perfective in Form I verbs can be predicted from the vocalic melody of the imperfective, but that the vocalic melody of the imperfective cannot be predicted from the vocalic melody of the perfective.

Benmamoun (1999) also claims that the imperfective form is not specified for tense where this is the only basic form which does not convey temporal properties. At the morphological level, he considers that there is a harmony between the unmarked case of the imperfective and its essential role in word formation. According to Benmamoun (1999: 175):

> This role will be shown to be more pervasive than previously thought. This, in turn, allows for a unified analysis of nominal and verbal morphology. The implication then is that important parts of Arabic word formation are word-based rather than root-based. The special syntactic status of imperfectives therefore makes them better candidates as input forms.

Ussishkin (1999) regards the base nominal form as the input to denominal verb formation in Modern Hebrew. For example, the base nominal forms *dam* 'blood', *xam* 'hot', and *xad* 'sharp' are the inputs of *dimem* 'to bleed', *ximem* 'to heat', and *xided* 'to sharpen', respectively. He also claims in a recent work (2005) that *paʕal* forms in Hebrew (equivalent to Form I in Arabic), themselves fully vocalized words, serve as the base of affixation in forming other binyanim.

2.7 Verb classifications

Verb classification can be viewed from many perspectives. In the literature on English, there are philosophical, syntactic and semantic classifications. The interest in verb classifications serves various research fields in theoretical and computational linguistics. In recent years within the field of computational linguistics, verb classifications have been utilized in many applications such as word sense disambiguation, information access tasks (query generalization), question answering, machine translation, psycholinguistic modelling, and statistical lexical acquisition (Čulo, Erk et al. 2008).

2.7.1 The philosophical classification

Historically, the philosopher Aristotle was interested in categorizing words into their parts of speech in general. His basic notions inspired modern scholars in classifying verbs, and corresponded with what they presented. In modern literature, Ryle (1949), who was inspired by Aristotle, argues that verbs are classified into performance, achievement and activity. Similarly, Kenny (1963) classifies them into state, performance and activity verbs. Based on time, Kenny (1963: 171) distinguishes the three verb classes as "states may 'last for' a time, and activities 'go on for' a time; only performances 'take' time". Furthermore, Kenny (1963) utilizes syntactic (grammatical) tests to characterize his three classes. For example, he argues that "only performance verbs have a true passive voice" (Kenny 1963: 178) and "all performance verbs have imperatives; no static verb has an imperative" (Kenny 1963: 188). Table 5 shows some examples of the three classifications of verbs presented by Kenny (1963: 175):

Table 5: English examples of Kenny's verb classification

Verb class	Examples
State verbs	to be able, to be blue, to fear, to know how, to love, to mean, to perceive, to understand
Performance verbs	to convince, to cut, to discover, to find, to kill, to lift, to learn, to wash
Activity verbs	to enjoy, to keep a secret, to laugh, to listen, to talk

Since then, Vendler's classification has become the most widely recognized classification of verbs in terms of lexical aspect (aspectual classification of verbs). Vendler (1968) established four basic classes: states, activities, accomplishments and achievements. Within this classification, state contrasts with the three process predicates: accomplishment, achievement and activity (Dowty 1979). These classes have been described by Crystal (2008) as follows:

> - The *state verbs* "represent events which last for a period of time without evident change", such as believe, belong, need and know (Crystal 2008: 451).
>
> - The *activity verbs* "represent a type of process event which need not reach a culmination point: walk, for example, is of this type, being dynamic and atelic in character" (Crystal 2008: 9).
>
> - The *accomplishment verbs* "represent a type of process event which extends in time but reaches a culmination point: build, for example, is of this type, being both durative and telic" (Crystal 2008: 6).
>
> - The *achievement verbs* "represent a type of process event which takes place instantaneously: arrive, for example, is of this type, being punctual in character" (Crystal 2008: 7).

In terms of staticity, durativity and telicity, the aspectual features of Vendler's classification have been characterized and schematized by Smith (1991). In his argument, the basic oppositions are punctual vs. durative events, telic vs. atelic (or bounded vs. unbounded), and static vs. dynamic, as illustrated in Table 6.

Table 6: Aspectual features of Vendler's classes

	Static	Durative	Telic
States	+	+	—
Activities	—	+	—
Accomplishments	—	+	+
Achievements	—	—	—

2.7.2 The semantic classification

Levin (1993), largely considered a pioneering work in the literature, provides a semantic classification of English verbs based on the correspondence between their semantics of the verbs and their syntactic behaviour. Levin (1993: 1) assumes that "the behaviour of a verb, particularly with respect to the expression and interpretation of its arguments, is to a large extent determined by its meaning. Thus verb behaviour can be used effectively to probe for linguistically relevant pertinent aspects of verb meaning". Levin's classification relies on using syntactic frames (diathesis alternation) to identify the ability of group verbs to occur in certain syntactic contexts. In other words, a class of verbs is assumed to have common semantic features and certain syntactic alternations.

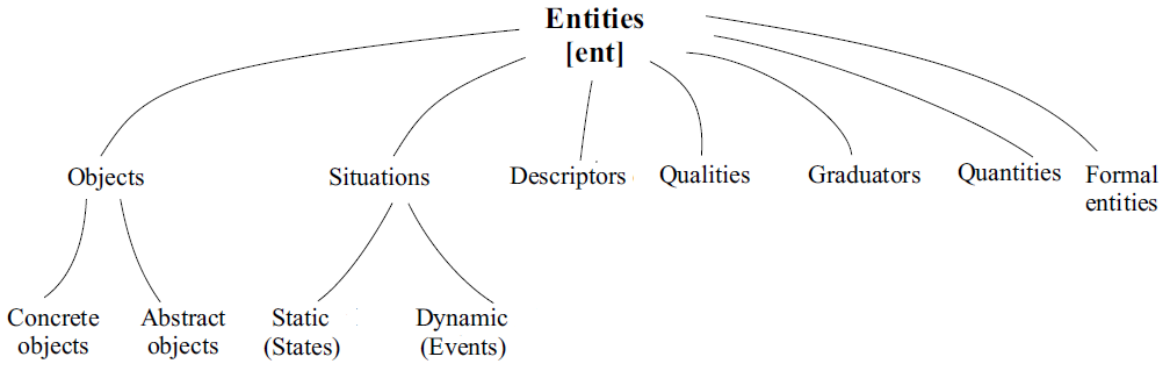
Levin (1993) identifies 78 diathesis alternations and classifies the 3,104 most common English verbs into 49 semantic classes, sub-divided into 192 sub-classes based on their syntactic alternations. She focuses on the relationship between the verb meaning and its syntactic behaviour. Thus, the verbs that share the same behaviour can be classified within a certain semantic class. Semantic classes are created from the verbs that undergo a certain number of alternations. Levin's classes can be classified within Vendler's; for example, Levin's perception and psychological state classes can be viewed as sub-classes of Vendler's state class, as below:

- Verbs of perception (Levin 1993):
(*detect, discern, hear, notice, see)* can be classified within Vendler's state verb class.
- Verbs of psychological state (Levin 1993):
(*fear, enjoy, scare, shame, shock)* can also be classified within Vendler's state verb class.

Furthermore, the semantic classification of verbs can utilize the framework of the ontology of semantic entities. Within this framework, nouns and verbs can be classified semantically. Helbig (2006) provides a classification of semantic entities. The notion of entities, according to Helbig (2006: 409), "comprises all things about which something can be stated". The entities in this classification refer mainly to two categories of entity: concrete objects and abstract objects. In addition, he (2006: 45) argues that "entities, which can be thought of as objects, are called conceptual objects (or "objects" for short). This category comprises concrete objects as well as abstract objects (e.g. house, leg, or theory, law, respectively)". In the same way, any verb and its arguments can be classified whether it involves concrete objects or abstract objects. For example, the verb ضرب *ḍarab* 'to hit'

involves a concrete entity, while the verb كره *karih* 'to hate' involves an abstract entity. The following figure illustrates the ontology of entities as presented by Helbig (2006: 410):

Figure 1: Helbig's ontology of entities



Within this framework of entities, a given semantic relation can be defined based on a number of categories, including: objects, situations, descriptors, qualities, graduators, quantities, and formal entities. These entities are based on dualism, within which the semantics of a language can be represented.

2.7.3 The syntactic classification

As universal classifications, verbs can be syntactically classified according to their tense (past, present and future), voice (passive and active), regularity (regular and irregular), and transitivity (transitive and intransitive). In this respect, it is worth noting that the interest of the present study is mainly confined to the classification of verbs in terms of transitivity, as well as the syntactic frames that can be used as a linguistic test.

The syntactic classification of verbs is not a target in itself; however, the semantic classification of verbs can benefit from syntactic tests to include or exclude verbs within a certain verb class as well as to determine the valid nominal derivatives of each class of verbs. An investigation of the link between the syntactic behaviour of verbs and their semantics can help in establishing semantic classes of verbs.

The semantic classification of verbs can also be informed by the notion of thematic roles. Initially, the notion of thematic role was introduced by Fillmore (1968), in which the relationship between the verbs and their arguments is labelled semantically. Fillmore (1971: 42) suggests nine types of thematic roles: agent, experiencer, instrument, object,

source, goal, location, time and path. These thematic roles can be utilized to describe the syntactic frame components of a class of verbs, and to test the semantic similarities between the arguments of a class of verbs to examine if the verbs of a semantic class can be alternatively used in specific syntactic frames.

2.8 The literature of computational linguistics on Arabic morphology

The field of computational linguistics is an outcome of the combination of language science and computer science. Morphology is fundamental in working on Arabic computational applications in view of its essential interactions with both orthography and syntax. The computational morphology techniques are not an end in themselves. They are the basis of other natural language processing (NLP) systems as they are very useful for many NLP applications, such as part-of-speech (POS) tagging, information retrieval (IR), dictionary automation, root extraction, text compression, data encryption, automatic diacritization, machine translation (MT), and automatic speech recognition (ASR) (Habash, 2010).

Most computational treatments of Arabic morphology have focused on morphological analysis rather than morphological generation. The most referenced works were done, in the form of morphological analyzers, by Beesley (1990, 1996, 2001), Buckwalter (2004), and Smrž (2007). In addition, there are more recent works such as Altantawy et al.'s (2010) and Gridach and Chenfour's (2011). In an early attempt, Beesley (1990) provides a description of a system that analyzes Arabic words based on Koskenniemi's (1983) two-level morphology. For example, the root *k-t-b* ب-ت-ك 'to write' can be presented as ?*k?*t?*b?* which can be represented with the pattern *CaCaC* as *katab* 'he wrote'.

In addition, Beesley provides an important system for Arabic morphology, based on finite-state technology, called the Xerox Arabic Morphological Analyzer (XAMA) (Beesley 1996, 2001). This system contains 5,000 consonantal roots and 400 morphological patterns, with a capacity to generate up to 90,000 stems. This system offers a number of advantages: firstly, a capacity of huge coverage; secondly, it is based on rules and also provides an English glossary for each word. However, this system suffers from problems such as the overgeneration of word derivation, i.e. the derivation of non-existant words of the classical Arabic dictionary (Darwish 2002).

One of the most referenced analyzers in the literature is Buckwalter's Arabic Morphological Analyzer (BAMA) (Buckwalter 2004). It consists of three parts (i) a dictionary, (ii) compatibility tables, and (iii) an analysis engine. This analyzer employs an interesting approach where the orthographic and morphotactics rules are designed into the lexicon rather than in general rules which interact to identify the output. This approach is described as concatenative lexicon-driven. The system comprises 38,600 lemmas which are used in different systems such as the Penn Arabic Treebank, the LDC Arabic POS-tagger, and the Prague Arabic Dependency Treebank. It was designed as a word-form database that interacts with concatenative databases in which words are processed separately, where the stem of each word is taken as the base form, and presents other information about the root (Attia, 2008).

Smrž (2007) provided a computational model of the Arabic inflectional morphological system seeking the working interface between morphology and syntax. He presented a morphological Arabic functional theory. He also developed the ElixirFM system that acts at a highly functional level as well as being an interactive implementation. The system is written in the Haskell programming language. According to Smrž, this NLP system is able to generate and inflect full words; it analyzes the word-form structure which identifies its grammatical functions. Furthermore, Smrž's work is concerned with the Arabic inflectional aspect of Arabic morphology.

Recently, Altantawy et al. (2010) presented a Morphological Analyzer and Generator for Arabic Dialects (MAGEAD). This system identifies general rules of the orthographic and morphophonemic scheme in order to derive allomorphs. The lexicon of this system was developed using the Elixir-FM's lexicon (Smrž 2007). This analyzer was helpful in processing word-forms depending on dialects' morphology. However, it still needs a comprehensive lexicon to deal with Arabic dialects.

More recently, Gridach and Chenfour (2011) presented a new approach to Arabic morphological analysis. It relies on the Arabic Morphological Automaton (AMAUT), which makes it faster and more efficient. Gridach and Chenfour propose a technique which uses the XMODEL language depending on the realization of morphological databases. Since Arabic morphology represents a special type of morphological system, it is based on a schema that represents Arabic words, in an attempt to improve Arabic morphological

automata. This approach has a development standardization feature, exploiting NLP systems such as semantic and syntactic analysis, orthographical correction, information retrieval and machine translation.

In the computational linguistics literature, many researchers believe that the overgeneration problem still requires linguistic solutions to be solved computationally. Darwish (2002) argues that one of the problems in the Xerox Arabic Morphological Analyzer (Beesley 1996, 2001) is overgeneration. He defines overgeneration in this case as the production of words that do not exist, or could not exist in traditional Arabic dictionaries.

Furthermore, Dichy and Farghaly (2007) point out that there is a problem resulting from considering morphological patterns (including the nominal derivative patterns) applicable to any verb or root to generate word forms. According to Dichy and Farghaly (2007) and the author's knowledge, no attempt has hitherto been made to provide linguistic solutions to determine which patterns can be applied to particular roots or verbs.

With respect to morphological generation, El-Affendi (1999) argues that there are many types of generation algorithms for Arabic. Some are classified as sliding window algorithms that use a matching approach to input Arabic words against roots' lists, prefixes, suffixes and morphological patterns. Others are algebraic algorithms (El-Affendi 1991) which use binary values in considering the morphological patterns of given words and then decompose these words into stem, prefix and suffix. Al-Shalabi and Evens (1998) developed permutation algorithms that operate on the word's letters in order to produce all possible sequences of triliteral or quadriliteral features without changing the original order of the given letters, and then compare them against the roots' lists. Furthermore, linguistic algorithms extract letters from a given word that is related to a list of prefixes and suffixes, then place the rest of the word into a list and test these components in order to find a match with a dictionary of morphological patterns that determine the stem form of a given word (Thalouth and Al-Dannan, 1990; Yagi and Harous, 2003).

Chapter Three

Research Methodology

3.1 Introduction

This chapter discusses the research methodology employed in the study. It highlights the research topic and research questions, and then details the data collection, data analysis framework, and research methods used. It describes our Arabic verb classification, involving semantic arguments and syntactic tests. The multi-level analysis of the nominal derivatives, involving semantics, morphology, and prosodic phonology is presented. Finally, the computational application for the nominal derivative system and the overgeneration problem are described.

3.2 Background to the study

The research relies largely on analytical descriptive methods throughout. The linguistic data consists of two parts, Form I verbs and their nominal derivatives, which are treated as inputs and outputs respectively. The nominal derivatives are divided into six types as follows:

1) The active participle (agent noun) اسم الفاعل *ism al-fāᶜil*,
2) The passive participle اسم المفعول *ism al-mafᶜūl*,
3) The form of exaggeration صيغة المبالغة *ṣīġat al-mubālaġah*,
4) The instrumental noun اسم الآلة *ism al-ʾālah*,
5) The qualificative adjective الصفة المشبهة *al-ṣifat al-mušabbahah*,
6) The locative noun اسم المكان *ism al-makān*.

There are three stages of analysis. The first is the collection and classification of verbs; the second is the multi-level analysis which involves morphology, prosodic phonology, and semantics; and the third stage involves a computational application for the nominal derivatives. This computational application prevents the overgeneration problem, by which valid nominal derivatives (output) are generated from their Form I verbs (input).

It is worth recalling here the aim of this study, to address the following research question and sub-questions*:*

- What are the characteristics of the formation of nominal derivatives in the Arabic language semantically, morphologically and phonologically (prosodically)?
- What are the semantic restrictions of the formation of valid nominal derivatives? Why can nominal derivatives be formed from some verbs but not from others? From a computational linguistic perspective, the question is, how to prevent overgeneration in deriving nominal derivatives?
- What are the morphological characteristics of nominal derivatives in terms of morphological processes, and the input of their formation (is it the root, the stem, or both?)?
- What is the prosodic structure of the nominal derivatives?

3.3 Data collection

The first stage in the research involved collecting the data, consisting of Form I verbs, regarded as the basis of the whole verbal derivation system in Arabic. For this stage of research, I took data from contemporary Modern Standard Arabic: 980 Form I verbs from *Al-Mawrid* (Al-Baᶜalbaki 1995). These represent one fifth of the 5,000 Form I verbs actively used in Modern Standard Arabic. *Al-Mawrid* is a bilingual Arabic-English dictionary, the most commonly used dictionary for English language learners, now in its 22nd edition.

The criteria used to select the verbs are as follows. First, they are all attested in Modern Standard Arabic today and listed in the current edition of *al-Mawrid*. Second, they represent identified events, activities, circumstances or states. Third, verbs within a specific semantic class correspond in terms of the nature of the subject, the nature of the object, and the nature of any complementary prepositional phrase. Fourth, verbs within a specific semantic class share the same syntactic behaviour in terms of their transitivity and syntactic frames.

3.4 Our classification of Arabic verbs

Each list of verbs selected from *Al-Mawrid* shares related semantic features, and they occur in a certain syntactic frame. The lists are used to establish 44 semantic verb classes. Each class was described in accordance with the semantic features of the collected verbs. The description of each class led to linking the 44 established classes with Levin's (1993) and Vendler's (1969) verb classes. The 44 class titles are mostly adapted from Levin's (1993) classes for English. However, the classes have their own descriptors, members, and syntactic criteria in a way that suits the peculiarities of Arabic.

The members of each class share a certain semantic function which expresses a certain meaning, such as motions, emotions, colours, and bodily qualities. In addition, the semantic relations play an important role in classifying and choosing the collected verbs. Synonyms, antonyms, polysemy, and hyponym are utilised in establishing the verb classes. For example, the verb حبَّ *ḥabb* 'to love' and the verb ودَّ *wadd* 'to like' are synonyms, so both verbs fall within the same class (verbs of emotions). As an example of the antonymic relation, the verb *karih* كرِه 'to hate' and the verb حبّ *ḥabb* 'to love' fall into the same class.

Syntactically, each class of verb was examined according to two criteria. The first criterion examined whether the verb is transitive or intransitive. After that, a syntactic frame was tested for each class of verbs, within which the verbs of a given class can be used alternately. These syntactic frames are governed by three major components:

- The nature of the subject
- The nature of the object (if available)[6]
- The nature of the complementary prepositional phrase (if available).

In describing and determining the nature of each component to determine whether to include or exclude verbs within a certain class, the current study benefits from the ontology of entities presented by Helbig (2006: 410). Specifically, there are two types of entity:

- Concrete object entity, expressing touchable and tangible objects that occupy physical space, and can be animate or inanimate. An animate object has life, spirit and agency, while an inanimate objects does not.

6. The object here stands for the direct object

- Abstract object entity, expressing non-physical, untouchable and intangible concepts.

3.5 Multi-level analysis of the nominal derivatives

The second stage of this research started with manually deriving the valid nominal derivatives (six types) from their Form I verb inputs. Excel databases were created for the verb classes and their valid nominal derivatives. At this stage of the research, it is clear that some verb classes do not allow certain nominal derivatives (see section 5.3 and 5.4). Table 7 includes brief definitions of the nominal derivatives accompanied by examples.

Table 7: Definitions of nominal derivatives

The nominal derivatives	Definitions	Examples
The active participle	In Arabic *ism al-fāᶜil* اسم الفاعل (agent noun), a derived verbal noun from a verb indicates the doer of the action or the state of a verb	*qāriʾ* قارئ 'reader'
The passive participle	In Arabic *ism al-mafᶜūl* اسم المفعول, a derived verbal noun from a verb indicates the object of the action	*maksūr* مكسور 'broken'
The form of exaggeration	In Arabic *ṣīġat al-mubālaġah* صيغة المبالغة, a derived verbal noun from a verb referring to intensity or regularity of action	*xabbāz* خبّاز 'baker'
The instrumental noun	In Arabic *ism al-'ālah*, a derived verbal noun referring to a tool, machine, or device by which the action of the verb occurs	*miftāḥ* مفتاح 'a key'
The qualificative adjective	In Arabic *al-ṣifah al-mušabbahah* الصفة المشبهة, an adjective, which functions as a noun, describes an agent who does the action inherently	*'alīm* عليم 'knowing'

The locative noun	In Arabic *ism al-makān*, a derived verbal noun referring to a place in which the activity assigned by the verb happens	*maṣnaᶜ* مصنع 'factory'

At the morphological level, this study analyzes and describes the formation of nominal derivatives, starting with defining and describing each of the six selected types of nominal derivative. At this level, it follows the stem-based approach adopted by Heath (1987); Darden (1992); Bat-El (1994, 2001); McOmber (1995); Ratcliffe (1998); Gafos (1999); Ussishkin (1999, 2000, 2003, 2005). By adopting this approach, the stem of a nominal derivative (the output) is analyzed as derived from the stem of Form I verbs (the input).

The rationale for adopting the stem-based approach is that formation of the nominal derivatives relies entirely on the verbal stem rather than the root. To derive some nominal derivatives (such as the instrumental noun, the locative noun, and the qualificative adjective), details are required that can only be taken from the stem, not from the root. Here are three pieces of evidence in favour of the stem-based approach:

(i) Some nominal derivatives can be or cannot be derived based on grammatical features of the stem, such as syntactic features transitive vs. intransitive. There are two cases here:
   - The instrumental noun can only be derived from a transitive verb (Form I stem), such as the instrumental noun *miftāḥ* مفتاح 'key' derived from the stem (Form I verb) *fataḥ* فتح 'to open'. Reference to the root is insufficient.
   - The qualificative adjective can only be derived from an intransitive verb, such as the qualificative adjective *jamīl* جميل 'beautiful' derived from the stem (Form I verb) *jamula* جمُل 'to be beautiful'. Reference to the root is insufficient.

(ii) The formation of some nominal derivatives depends on the vocalic melody of the stem (Form I verb). The locative noun has two templates $maC_1C_2aC_3$ and $maC_1C_2iC_3$. The default template is $maC_1C_2aC_3$; where the Form I verb takes the stem vowel -i- in the imperfective, however, ($yaC_1C_2iC_3$), such as *jalas* جلس - *yajlis* يجلس 'to sit', the locative noun takes the form *maCCiC*, carrying over /i/ from the imperfect stem, as in:

majlis مجلس ‘council, seat’. The root essentially lacks a vocalic melody, therefore, reference to the root would be insufficient in the derivation of locative nouns.

Furthermore, the transitivity of a Form I verb may be reflected in the vocalic melody. Where the vocalic melody of the Form I verb is /u/ in the perfective and imperfective, then the verb is predicted to be intransitive. This is useful in the formation of qualificative adjectives which are only derived from intransitive verbs.

(iii) The nominal derivatives have different templatic patterns based on the verb stem from which they are derived. In Arabic, there are fifteen verb forms, of which ten are common in Modern Standard Arabic. Consider Table 8 where the root *k-t-b* is associated with eight verbal stems, and since no single root associates with all verbal forms, the root *ḏ-k-r* for Form V and *s-w-d* for Form IX. Here we see that each verbal form has its unique nominal derivative templates for the active and passive participles (see table 8) based on the verbal stem, and for all the derived verb forms (II - X), the imperfective verbal stem is the base for the active participle, the perfective verbal stem the base for the passive participle. Derivation of the active participle according to the root-based approach, by contrast, would involve a combination of a root with any of the ten templatic patterns of the active participle; thus, considering the stem reduces the number of nominal derivatives that should be taken into account.

Table 8: The verb Forms and their active and passive participles

Root	Verbal stem		Active Participle	Template	Passive Participle	Template
k-t-b	I	*katab*	*kātib*	$C_1āC_2iC_3$	*maktūb*	$maC_1C_2ūC_3$
k-t-b	II	*kattab*	*mukattib*	$muC_1aC_2C_2iC_3$	*mukattab*	$muC_1aC_2C_2aC_3$
k-t-b	III	*kātab*	*mukātib*	$muC_1āC_2iC_3$	*mukātab*	$muC_1āC_2aC_3$
k-t-b	IV	*ʾaktab*	*muʾaktib*	$muʾaC_1C_2iC_3$	*muʾaktab*	$muʾaC_1C_2aC_3$
ḏ-k-r	V	*taḏakkar*	*mutaḏakkir*	$mutaC_1aC_2C_2aC_3$	*mutaḏakkar*	$mutaC_1aC_2C_2aC_3$
k-t-b	VI	*takātab*	*mutakātib*	$mutaC_1āC_2iC_3$	*mutakātab*	$mutaC_1āC_2a\ C_3$
k-t-b	VII	*ʾinkatab*	*munkatib*	$mun\ C_1aC_2iC_3$	*munkatab*	$munC_1aC_2aC_3$
k-t-b	VIII	*ʾiktatab*	*muktatib*	$muC_1C_2aC_2iC_3$	*muktatab*	$muC_1C_2aC_2aC_3$
s-w-d	IX	*ʾiswadd*	*muswadid*	$muC_1C_2aC_3iC_3$	*muswadad*	$muC_1C_2aC_3aC_3$
k-t-b	X	*ʾistaktab*	*mustaktib*	$mustaC_1C_2iC_3$	*mustaktab*	$mustaC_1C_2aC_3$

At the prosodic level, the current study presents a templatic representation of the nominal derivatives. Following Watson (2002) and McCarthy and Prince (1986, 1990a, 1990b, 1993a, 1995, 1999), prosodic analysis describes the word formation processes and

prosodic strictures of the nominal derivatives, using diagrams (prosodic trees) to illustrate the stages of derivation of the nominal derivatives from their Form I verbs. The prosodic representation of the input stem (Form I verb) is presented, followed by the illustration of the templatic changes that take place to form the output stem of a nominal derivative. The prosodic structure of the templatic patterns of the nominal derivatives is analyzed in terms of these levels: syllabic, moraic and foot levels.

At the semantic level, the current study provides a semantic description of the nominal derivatives in accordance with the thematic roles that were introduced by Fillmore (1968), in which the relationship between the verbs and their arguments is labelled semantically. Fillmore (1971: 42) suggests nine types of thematic role: agent, experiencer, instrument, object, source, goal, location, time and path.

To determine the restrictions/constraints of deriving valid nominal derivatives, this study adapts Helbig (2006) model of the ontology of entities. Two kinds of entities (semantic features) are taken from Helbig (2006) model, namely: the object entity and the situation entity. The object entity is classified into two categories: abstract entities and concrete entities. The situation entity is classified into two categories: state entities and event entities. Each type of nominal derivatives will be described in terms of the object entity whether it refers to concrete entities or abstract entities, and will be described in terms of the situation entity whether it refers to state entities or event entities. In the same way, each class of the 44 verb classes will be described in terms of the object entity whether they refer to concrete entities or abstract entities, and will be described in terms of the situation entity whether they refer to state entities or event entities. Our criteria to detairmine either the verb classes and nominal derivatives refer to concrete or abstract entities as well as refer to state or event entities are detailed in Table 9 below:

Table 9: The semantic features of the object entities and the situation entities

Semantic features	**Verb examples**	**Nominal derivative examples**
Concrete entity refers to an action, event or state which is accessible to one or more of the five senses, i.e. the entity can be seen, heard,	- to go - to sit - to hit	- key - office - plough

touched, smelt, or tasted. It expresses tangible meanings that occupy physical space		
Abstract entity refers to a concept, attribute, quality or state which is not accessible to any of the five senses. It expresses non-physical, unseen and intangible meanings	- to think - to love - to dream	- happy - free (liberated) - generous
State entity refers to a state which is either permanent or will last for a significant length of time	- to know - to hate - to like	- nice - green - noble
Event entity refers to a change from one state to another	- to open - to cut - to dig	- playground - swiming pool - mixer

To determine the validity or invalidity to derive a nominal derivative from a certain verb, this study relies on identifing compatibility between:

- the object entity (concrete or abstract) and the situation entity (state or event) of the type of nominal derivatives. For example, the instrumental noun *miftāḥ* مفتاح 'key' refers to a concrete object entity and an event situation entity.
- the object entity (concrete or abstract) and the situation entity (state or event) of the class of verbs. For example, the class of emotion verbs refers to an abstract object entity and a state situation entity.

If both a class of verbs and a type of nominal derivative share the same entities, then the nominal derivative is valid to be derived from that class of verbs. For example, the

instrumental noun refers to a concrete object entity and an event situation entity; therefore, the verb from which we can derive the instrumental noun must also refer to concrete (object entity) and event (situation entity), such as the class of verbs of combining and constructing. By contrast, we cannot derive an instrumental noun from a verb involving abstract and state entities, such as *karih* كره 'to hate'. Another example is the qualificative adjective, that involves an abstract or a concrete (object entity) and a state (situation entity), so the verb from which it can be derived must involve an abstract or a concrete (object entity) and a state (situation entity), such as *karih* كره 'to hate', whose qualificative adjective is *karīh* كريه 'distasteful' (see sections 5.3 and 5.4).

3.6 Computational application for the nominal derivatives

The computational part of the current study is completely based on the outcome of the findings of the lingusitic analysis (see section 6.5). The aim of the presented application is to retrieve the generated nominal derivatives of Form I verbs. The application is designed using Microsoft Access 2007/2010. The input of the application is Form I verbs which amount to 980 verbs. The application consists of two parts, a retriever and an applicability checker. By inputting a triliteral verb (Form I), the first part executes the querying process to retrieve the required data from the database. The output data can be classified into four types:

- General information, including: the transliteration and the title of the class of verb.
- Syntactic information, including: the imperfective form and transitivity of the verb.
- Semantic information, including the features of the verb (concrete/abstract and state/event) and English meaning.
- Nominal derivatives:
    - the active participle
    - the passive participle
    - the form of exaggeration
    - the instrumental noun
    - the qualificative adjective
    - the locative noun
    - the noun of instance
    - the *mīmī maṣdar*
    - the noun of manner[7]

7. The noun of instance, the *mīmī maṣdar*, and the noun of manner are nominal derivatives that can be generated validly from any Form I verb. They are defined as follows:
    - The noun of instance is called in Arabic *ʾism al-marrah*, a derived verbal noun referring to a single occurrence of the action, such as *raqṣa* رقصة'a dance'.
    - The *mımı maṣdar* is a derived verbal noun that starts with the initial consonant *mīm* as a prefix, such as *maxaḏ* مأخذ 'a defect'.

An evaluation will be conducted to measure quantitatively the accuracy of generating valid nominal derivatives in order to determine the extent to which the overgeneration can be avoided (see section 6.6).

- The noun of manner is called in Arabic *ʾism al-hayʾah*, a derived noun describing the state, condition, or manner in which the action of a verb is accomplished or happens, such as *wiqfah* وقفة 'a stand-up position'.

Chapter Four

Arabic verb classification

4.1 Introduction

This chapter presents a classification of Arabic verbs. The selected 980 Form I verbs are classified into 44 classes (see sections 3.3 and 3.4). The verbs are grouped in each class according to common semantic features as well as common syntactic behaviour. Table 10 shows the titles of our classes and their equivalent classes according to Levin and Vendler:

Table 10: Arabic verb classes and their Levin and Vendler's equivalents

#	Our Arabic verb classes	Levin's classes	Vendler's classes
01	Verbs of the state of the body	Verbs involving the body	State verbs
02	Verbs of body parts	Verbs involving the body	Accomplishment verbs
03	Verbs of diseases	Verbs involving the body	State verbs
04	Verbs of social interaction	Verbs of social interaction	State verbs
05	Verbs of emotions	Psych-verbs (verbs of psychological state)	State verbs
06	Verbs of colouring	Verbs of colouring	State verbs
07	Verbs of bodily qualities	Verbs of change of bodily state	State verbs
08	Verbs of motion	Verbs of motion	Activity verbs
09	Verbs of swimming	Verbs of motion	Activity verbs
10	Verbs of locations/places	Verbs of entity-specific modes of being / Measure verbs	State verbs
11	Verbs of violence and abuse	Hurt verbs / Verbs of killing	Accomplishment verbs
12	Verbs of mental process	Verbs of perception	State verbs
13	Verbs of financial transactions	Cost verbs / Price verbs / Bill verbs	Activity verbs
14	Verbs of agriculture	Grow verbs	Activity verbs
15	Verbs of desire and request	Verbs of desire	State verbs
16	Verbs of intention	Verbs of future having	State verbs
17	Verbs of combining and constructing	Verbs of combining and attaching / Build verbs	Achievement verbs
18	Verbs of sending and carrying	Verbs of sending and carrying	Achievement verbs
19	Verbs of separating and disassembling	Verbs of separating and disassembling	Accomplishment verbs
20	Verbs of removing	Verbs of removing	Accomplishment verbs
21	Verbs of bending	Bend verbs	Accomplishment verbs
22	Verbs of decorating and transcribing	Image creation verbs / Scribble verbs	Achievement verbs
23	Verbs of measurement	Measure verbs	Achievement verbs
24	Verbs of quantity and size	Measure verbs	State verbs
25	Verbs of stability	Lodge verbs	State verbs
26	Verbs of creation	Create verbs	Achievement verbs
27	Verbs of preparing	Verbs of preparing / Cooking verbs	Activity verbs
28	Verbs of ingesting	Verbs of ingesting	Achievement verbs
29	Verbs of the five senses	Verbs of perception	State verbs
30	Verbs of ruling and government	Judgment verbs	State verbs
31	Verbs of the development of life	Verbs of existence	Accomplishment verbs

32	Verbs of uttering	Say verbs	Activity verbs
33	Verbs of accepting		State verbs
34	Verbs of refusing and disobedience		State verbs
35	Verbs of preventing and prohibition	Keep verbs	Achievement verbs
36	Verbs of occurrence and progressing	Verbs of occurrence	State verbs
37	Verb of appearance	Verbs of appearance	Accomplishment verbs
38	Verbs of disappearing and ending	Verbs of disappearance	Accomplishment verbs
39	Verbs of bodily movements	Curtsey verbs	Achievement verbs
40	Verbs of taking and giving	Bring and take verbs / give verbs	Accomplishment verbs
41	Verbs of human sounds	Verbs of manner of speaking	State verbs
42	Verbs of sounds made by animals	Verbs of sounds made by animals	State verbs
43	Verbs of bodily care	Verbs of grooming and bodily care / Verbs of dressing	Achievement verbs
44	Verbs of winning		State verbs

4.2 Arabic verb classes

Each of our 44 classes is presented in a table below, that includes: the title of the class, class description, correspondence with Levin's class, correspondence with Vendler's class, transitivity test, class members with their meaning in English, syntactic frame of transitives and intransitives, nature of the subject, nature of the object (if available), nature of the complementary prepositional phrase (if available), and a sentence example of each verb listed.

4.2.1 Verbs of the state of the body (class 01)

Class Description	These verbs describe a state that affects an animate being (organism) psychologically or physically.
Levin's class	Verbs involving the body Verbs of body-internal states of existence
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *ʾariq* أرِق 'to be sleepless; suffer insomnia' 2. *ʾalim* ألِم 'to feel pain' 3. *bariʾ* برِئ 'to recover' 4. *taʿib* تعِب 'to be or become tired' 5. *ṯamil* ثمِل 'to be (become, get) drunk' 6. *jāʿ* جاع 'to be or become hungry' 7. *ḥabil*(*t*) حبِلت 'to be or become pregnant' 8. *xadir* خدِر 'to be or become numb, benumbed' 9. *xawā* خوى 'to be or become hungry or empty, feel hungry' 10. *dāx* داخَ 'to be or become dizzy' 11. *rawiy* رَوِيَ 'to quench one's thrist' 12. *sakur* سكُر 'to be or become drunk(en), intoxicated, inebriated' 13. *sahid* سهد 'to be sleepless, suffer insomnia' 14. *šāx* شاخ 'to age, grow old' 15. *šabiʿ* شبع 'to eat one's fill, satisfy one's appetite' 16. *ḍamar* ضمر 'to be or become atrophic; to be or become thin' 17. *ẓamiʾ* ظمِئ 'to be thirsty, feel thirsty, suffer thirst' 18. *ʿariq* عرِق 'to sweat' 19. *ʿaṭiš* عطَش 'to be thirsty, feel thirsty, suffer thirst' 20. *ġaṯiy* غثي 'to nauseate, feel nausea, be nauseated, feel sick' 21. *faṭam* فطم 'to wean' 22. *kabir* كبِر 'to grow old, get old(er)' 23. *kall* كلّ 'to be or become tired, fatigued, exhausted' 24. *naʿas* نعِس 'to be (or feel) sleepy, drowsy'

	25. *nafisa*(*t*) (نفِسَ(ـت المرْأة ‘to be in childbed, be confined’ 26. *harim* هرِم ‘to age, grow old; to become decrepit’.	
The syntactic frame of intransitives	Verb + Subject (+ the particle of cause (*fa*-) + subordinate clause (resultative))	
The nature of the subject	The subject is human or animal and involves a change in state to the whole body.	
The nature of the subordinate clause (resultative)	This syntactic frame involves cause and effect, where the effect introduced in the subordinate clause by *fa*- is caused by the action of the verb in the main clause.	
Examples	1. أرق محمدٌ فذهب إلى النوم 2. ألم محمدٌ فذهب إلى الطبيب 3. بَرِئ محمدٌ فخرجَ من المشفى 4. تعب محمدٌ فذهب إلى الطبيب 5. ثَمِلَ محمدٌ فذهب عقله 6. جاع محمدٌ فذهب إلى المطعم 7. حبلَتْ سارة فذهبت إلى الطبيب 8. خدر محمدٌ فذهب إلى الطبيب 9. خوى محمدٌ فذهب إلى المطعم 10. داخ محمدٌ فذهب إلى الطبيب 11. روِي محمدٌ فذهب عطشه 12. سكُر محمدٌ فذهب عقله 13. سهد محمدٌ فذهب النوم	14. شاخ محمدٌ فذهب شبابه 15. شبع محمدٌ فذهب الجوع 16. ضمرتْ يد محمد فذهب إلى الطبيب 17. ظمئ محمدٌ فشرب الماء 18. عرق محمدٌ فتعب جسمه 19. عطش محمدٌ فشرب الماء 20. غثي محمدٌ فذهب إلى الطبيب 21. فطم محمدٌ فتغير حاله 22. كبِر محمدٌ فاتسعت مداركه 23. كلّ محمدٌ فذهب إلى الطبيب 24. نعِس محمدٌ فذهب إلى السرير 25. نفِسَت سارة فذهبت إلى الطبيب 26. هرِم محمدٌ فذهب إلى الطبيب

4.2.2 Verbs of body parts (Class 02)

Class Description	Verbs denote movement involving one or more parts of the body of an animate being.
Levin’s class	Verbs involving the body Verbs of body-internal states of existence
Vendler’s class	Accomplishment verbs
Transitive or intransitive	Intransitive
Class members	1. *bakā* بكى ‘to cry, weep, shed tears’ 2. *xalaj*(*t*) (خلجـ(ـت العين ‘to twitch’ 3. *dama*ᶜ دمع ‘to water, tear, fill with tears, shed tears’ 4. *ḏaraf* ذرف ‘to shed tears, weep, cry’ 5. *raᶜaf* رعف ‘to have a nosebleed’ 6. *ramaš* رمش ‘to blink, wink, bat’ 7. *zafar* زفر ‘to exhale, breathe out’ 8. *saᶜal* سعل ‘to cough’ 9. *šaxar* شخر ‘to snort’ 10. *šariq* شرِق ‘to choke’ 11. *šahaq* شهق ‘to inhale, breathe in’ 12. ᶜ*abis* عبِس ‘to frown, knit or contract the brows’

	13. *ᶜarij* عرِج ‘to limp, hobble, walk lamely, be lame’ 14. *ᶜaṭas* عطَس ‘to sneeze’ 15. *ġamaz* غمَز ‘to wink (at)’ 16. *laṯiġ* لثِغ ‘to lisp’ 17. *lahiṯ* لهث ‘to pant’ 18. *nafaṯ* نفث ‘to expectorate, cough out, spit (out)’.	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	The subject is a specific body part of an animate being, or an animate being where the part affected is a specific part of the body, such as eye, nose, mouth, hand, lungs, leg, brain or heart.	
examples	1. بكى محمد 2. خلجت عين محمد 3. دمع محمد 4. ذرف محمد 5. رعف محمد 6. رمش محمد 7. زفر محمد 8. سعل محمد 9. شخر محمد 10. شرق محمد	11. شهق محمد 12. عبس محمد 13. عرج محمد 14. عطس محمد 15. غمَز محمد 16. لثغ محمد 17. لهث محمد 18. نفث محمد

4.2.3 Verbs of diseases (Class 03)

Class Description	These verbs denote a disease or syndrome that affects the whole or a part of the animate being.
Levin’s class	Verbs involving the body Verbs of body-internal states of existence
Vendler’s class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *bariṣ* برِص ‘to be or become a leper; to be or become leprous’ 2. *bakim* بكِم ‘to be or become dumb’ 3. *jadir* جدِر ‘to have smallpox’ 4. *jaḏim* جَذم ‘to have leprosy’ 5. *jarib* جرِب ‘to be or become mangy; to be or become scabby’ 6. *xabil* خبِل ‘to be or become mentally deranged’ 7. *xaris* خرس ‘to be or become mute, dumb, speechless’ 8. *xarif* خرف ‘to be in one’s dotage, become a dotard, become senile’ 9. *ramid* رمِد ‘to have sore eyes’ 10. *zakim* زكم ‘to catch (or take) a cold’ 11. *saqum* سقم ‘to be or become sick, ill, ailing’ 12. *sull* سُلَّ ‘to have or be affected with tuberculosis’ 13. *šull* شلَّ ‘to be or become paralyzed, paralytic’ 14. *ṭariš* طرِش ‘to be or become deaf’ 15. *ᶜaqur* عقُر ‘to be barren, sterile’

	16. *ᶜaqum* عقم ‘to be sterile, barren’ 17. *ᶜamiš* عمِش ‘to be or become blear(y)’ 18. *ᶜamiy* عمِيَ ‘to be or become blind, lose one’s sight’ 19. *qariḥ* قرح ‘to ulcerate, ulcer, fester; to canker’ 20. *qamil* قمل ‘to be lice-infested, lousy’ 21. *kasiḥ* كسِح ‘to be crippled, become a cripple; to be rickety’ 22. *mariḍ* مرِضَ ‘to be or become sick’ 23. *nazaf* نزَف ‘to bleed, hemorrhage, lose (much) blood’.	
The syntactic frame of intransitives	Verb + Subject (+ the particle of cause (*fa*-) + subordinate clause (resultative))	
The nature of the subject	The subject is an animate being.	
The nature of the subordinate clause (resultative)	This syntactic frame involves a causative structure, where the complement is a result caused by the subject. It starts with the particle of cause (*fa*-) followed by perfect verb that involves a medical treatment.	
Examples	1. برِص محمد فذهب إلى الطبيب 2. بكِم محمد فذهب إلى الطبيب 3. جدِر محمد فذهب إلى الطبيب 4. جذم محمد فذهب إلى الطبيب 5. جرِب محمد فذهب إلى الطبيب 6. خبِلَ محمد فذهب إلى الطبيب 7. خرس محمد فذهب إلى الطبيب 8. خرف محمد فذهب إلى الطبيب 9. رمِد محمد فذهب إلى الطبيب 10. زكم محمد فذهب إلى الطبيب 11. سقم محمد فذهب إلى الطبيب 12. سُلَّ محمد فذهب إلى الطبيب	13. شلَّ محمد فذهب إلى الطبيب 14. طرِش محمد فذهب إلى الطبيب 15. عقُر محمد فذهب إلى الطبيب 16. عقم محمد فذهب إلى الطبيب 17. عمِش محمد فذهب إلى الطبيب 18. عمِيَ محمد فذهب إلى الطبيب 19. قرح محمد فذهب إلى الطبيب 20. قمل محمد فذهب إلى الطبيب 21. كسِح محمد فذهب إلى الطبيب 22. مرِضَ محمد فذهب إلى الطبيب 23. نزَف محمد فذهب إلى الطبيب

4.2.4 Verbs of social and personal behaviour (Class 04)

Class Description	These verbs refer to social interaction between people. They describe the personal behaviour of the person in dealing with others.
Levin’s class	Verbs of social interaction
Vendler’s class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *ʾaṯir* أثِر ‘to be or become egocentric, egoist’ 2. *ʾaṯim* أثِم ‘to be sinner’ 3. *ʾadub* أدُب ‘to be well-mannered, well-bred, polite’ 4. *baxul* بخل ‘to be or become stingy, niggardly, miserly parsimonious’ 5. *barr* برّ ‘to be pious, dutiful, devoted, reverent, faithful, kind’ 6. *basul* بسل ‘to be brave, bold, courageous, fearless, intrepid’ 7. *bašš* بشّ ‘to have a cheerful face; to smile, wear a smile, look happy’

	8. *baṭir* بطِر ‘to be ungrateful’ 9. *baṭal* بَطَل ‘to be or become unemployed, jobless; to be or become idle’ 10. *tarif* ترِف ‘to be or become luxurious, opulent, affluent’ 11. *jār* (على) جار ‘to wrong, oppress, tyrannise, persecute, aggrieve’ 12. *jabun* جبِن ‘to cower, cringe, quail, shrink in fear, recoil in dread’ 13. *jalud* جلُد ‘to be or become patient, tolerant, forbearing’ 14. *ḥazum* حزم ‘to be or become resolute, firm, unwavering, gritty’ 15. *ḥasub* حسُب ‘to be highborn, wellborn, noble, of noble birth or origin’ 16. *ḥašim* حشِم ‘to shame’ 17. *ḥaqur* حقر ‘to be or become low, base, mean, lowly, vile, despicable’ 18. *ḥakum* حكُم ‘to be or become wise, judicious’ 19. *ḥalum* حلم ‘to be or become patient, forbearing, long-suffering, meek’ 20. *ḥamid* حمِد ‘to praise, commend, laud, extol, eulogize’ 21. *ḥamiq* حمق ‘to be or become stupid, foolish’ 22. *xāb* خاب ‘to fail, be unsuccessful, fizzle out, flop, miss the mark’ 23. *xār* خار ‘to weaken, fail languish, droop, flag, slacken’ 24. *xān* خان ‘to betray, sell out, be disloyal or faithless to’ 25. *xabuṯ* خبث ‘to be or become malicious, malevolent, vicious, wicked’ 26. *xatal* ختل ‘to deceive, double-cross, cheat, defraud, dupe, trick’ 27. *xajil* خجل ‘to be ashamed of, be ashamed to face someone’ 28. *xadaᶜ* خدع ‘to deceive, fool, delude, bluff, beguile, mislead; to cheat’ 29. *xaḏal* خذل ‘to let down, fail someone when most needed, disappoint’ 30. *xaziy* خزي ‘to be or become low, lowly, despicable, contemptible’ 31. *xasir* خسِر ‘to lose, forfeit; to suffer or incur a loss’ 32. *xašay* خشي ‘to fear, apprehend, dread, be afraid (of)’ 33. *xaṭur* خطُر ‘to be or become grave, serious, weighty, momentous’ 34. *xafir* خفر ‘to be or become shy, bashful, diffident’ 35. *xanā* خنا ‘to use obscene language; to be obscene, ribald, vulgar’ 36. *xanaᶜ* خنع ‘to cringe before, truckle before’ 37. *dajal* دجل ‘to lie; to quack, play the quack; to be a quack, a charlatan’ 38. *ḏall* ذلّ ‘to be or become low, lowly, humble’ 39. *ḏamm* ذمّ ‘to dispraise, disparage, censure; to vituperate, vilify, slander’ 40. *ḏahil* ذهِل ‘to be or become distracted, absentminded’ 41. *raᵓaf* رأف ‘to have mercy upon, be merciful toward’ 42. *raḥim* رحم ‘to have mercy upon, be merciful toward, pity’ 43. *raḏul* رذل ‘to be or become low, base, vile, despicable’ 44. *raᶜun* رعن ‘to be or become lightheaded, frivolous, thoughtless’ 45. *raġud* رغد ‘to be or become pleasant, comfortable, easy’ 46. *rafiq* رفق ‘to treat with kindness, treat gently’ 47. *rafuh* رفه ‘to be or become luxurious, comfortable’ 48. *zahid* زهِد ‘to abstain (from), to be abstemious’ 49. *saxir* سخِر ‘to mock (at)’ 50. *saxaṭ* سخط ‘to be or become discontented, dissatisfied, indignant’ 51. *saxuf* سخف ‘to be or become silly, absurd, ridiculous’ 52. *saxā* سخا ‘to be or become generous, liberal, openhanded, freehanded’ 53. *sarif* سرِف ‘to waste, squander, dissipate, lavish, spend lavishly’ 54. *saliṭ* سلط ‘to be or become impudent, insolent, pert, saucy’ 55. *samuḥ* سمح ‘to be or become magnanimous, forgiving, tolerant’ 56. *šaruf* شرف ‘to be honorable, noble’ 57. *šarih* شرِه ‘to be greedy’

	58. *šakā* شكا 'to complain, lodge (raise, make) a complaint; to complain, nag' 59. *ṣabar* صبر 'to be patient, forbearing' 60. *ṣadaq* صدق 'to prove to be true or correct, turn out to be true, come true' 61. *ṣarum* صرُم 'to be or become severe, strict, stern, rigorous, hard, harsh' 62. *ṣaᶜir* صعِر 'to be awry, wry (face)' 63. *ṣafaḥ* صفح 'to forgive, pardon, excuse, condone, overlook, remit' 64. *ḍamin* ضمن 'to guarantee, warrant, ensure, secure, sponsor, vouch for' 65. *ṭamiᶜ* طمع 'to be or become greedy, covetous, avid, avaricious' 66. *ẓaruf* ظرُف 'to be or become witty, humorous' 67. *ᶜāb* عاب 'to mar, disfigure, spoil, make defective or faulty; to vitiate' 68. *ᶜadal* عدل 'to act justly, establish justice, be just, be fair, be equitable' 69. *ᶜaḏal* عذل 'to blame, reproach, twit, admonish' 70. *ᶜafā* عفا 'to forgive, pardon, excuse, condone' 71. *ġadir* غدر 'to betray, sell out, be disloyal or faithless to' 72. *ġašš* غشّ 'to cheat, swindle' 73. *ġafar* غفر 'to forgive, pardon, excuse, condone, overlook, remit' 74. *ġanij* غنج 'to coquet, flirt, play the coquette' 75. *fatan* فتن 'to fascinate, charm, enchant, captivate, infatuate, enthrall' 76. *faẓuᶜ* فظع 'to be or become horrible, horrid, ugly, terrible, abominable' 77. *faḥuš* فحش 'to be or become obscene, ribald, dirty, foul, filthy' 78. *faxir* فخر 'to be or become proud, haughty' 79. *fasad* فسد 'to be or become corrupt(ed), depraved, pervert(ed), immoral' 80. *qabuḥ* قبح 'to be or become ugly, unsightly, repulsive, repugnant' 81. *karum* كرم 'to be generous, liberal, openhanded, freehanded' 82. *kasil* كسِل 'to be lazy, idle, sluggish, slothful' 83. *laʾum* لؤم 'to be mean, ignoble, base, vile, sordid, villainous, miscreant' 84. *mazaḥ* مزح 'to joke, jest, make fun, banter, fool, kid (around)' 85. *nabul* نبل 'to be noble, noble-minded, high-minded, magnanimous' *86. waṯuq* وثق 'to trust, have confidence in, confide in' 87. *waduᶜ* ودُع 'to be meek, mild, gentle, peaceable'	
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)	
The nature of the subject	The subject of these verbs is a human being who is characterized by social moral qualities.	
The nature of the prepositional phrase	The prepositional phrase is headed by the preposition *fii* في 'in'. In this context, the prepositional phrase expresses dealing with people.	
Examples	1. أثِر محمد في معاملة الناس 2. أثِم محمد في معاملة الناس 3. أدُب محمد في معاملة الناس 4. بخُل محمد في معاملة الناس 5. برّ محمد في معاملة الناس 6. بسل محمد في معاملة الناس 7. بشّ محمد في معاملة الناس 8. بطِر محمد في معاملة الناس 9. بطُل محمد في معاملة الناس 10. ترِف محمد في معاملة الناس 11. جار محمد في معاملة الناس	45. رغد محمد في معاملة الناس 46. رفق محمد في معاملة الناس 47. رفه محمد في معاملة الناس 48. زهد محمد في معاملة الناس 49. سخر محمد في معاملة الناس 50. سخط محمد في معاملة الناس 51. سخف محمد في معاملة الناس 52. سخي محمد في معاملة الناس 53. سرِف محمد في معاملة الناس 54. سلُط محمد في معاملة الناس 55. سمُح محمد في معاملة الناس

56. شرف محمد في معاملة الناس 57. شره محمد في معاملة الناس 58. شكا محمد في معاملة الناس 59. صبر محمد في معاملة الناس 60. صدق محمد في معاملة الناس 61. صرُم محمد في معاملة الناس 62. صعِر محمد في معاملة الناس 63. صفح محمد في معاملة الناس 64. ضمن محمد في معاملة الناس 65. طمع محمد في معاملة الناس 66. ظرُف محمد في معاملة الناس 67. عاب محمد في معاملة الناس 68. عدل محمد في معاملة الناس 69. عذل محمد في معاملة الناس 70. عفا محمد في معاملة الناس 71. غدر محمد في معاملة الناس 72. غشّ محمد في معاملة الناس 73. غفر محمد في معاملة الناس 74. غنج محمد في معاملة الناس 75. فتن محمد في معاملة الناس 76. فظع محمد في معاملة الناس 77. فحش محمد في معاملة الناس 78. فخر محمد في معاملة الناس 79. فسد محمد في معاملة الناس 80. قبح محمد في معاملة الناس 81. كرم محمد في معاملة الناس 82. كسل محمد في معاملة الناس 83. لؤم محمد في معاملة الناس 84. مزح محمد في معاملة الناس 85. نبل محمد في معاملة الناس 86. وثق محمد في معاملة الناس 87. ودع محمد في معاملة الناس	12. جبن محمد في معاملة الناس 13. جلد محمد في معاملة الناس 14. حزم محمد في معاملة الناس 15. حسُب محمد في معاملة الناس 16. حشِم محمد في معاملة الناس 17. حقر محمد في معاملة الناس 18. حكُم محمد في معاملة الناس 19. حلُم محمد في معاملة الناس 20. حمِد محمد في معاملة الناس 21. حمق محمد في معاملة الناس 22. خاب محمد في معاملة الناس 23. خار محمد في معاملة الناس 24. خان محمد في معاملة الناس 25. خبث محمد في معاملة الناس 26. ختل محمد في معاملة الناس 27. خجل محمد في معاملة الناس 28. خُدع محمد في معاملة الناس 29. خذل محمد في معاملة الناس 30. خزي محمد في معاملة الناس 31. خسر محمد في معاملة الناس 32. خشي محمد في معاملة الناس 33. خطُر محمد في معاملة الناس 34. خفر محمد في معاملة الناس 35. خنا محمد في معاملة الناس 36. خنع محمد في معاملة الناس 37. دجل محمد في معاملة الناس 38. ذلّ محمد في معاملة الناس 39. ذمّ محمد في معاملة الناس 40. ذهل محمد في معاملة الناس 41. رأف محمد في معاملة الناس 42. رحم محمد في معاملة الناس 43. رذل محمد في معاملة الناس 44. رعن محمد في معاملة الناس	

4.2.5: Verbs of emotions (class 05)

Class Description	These verbs denote that the subject is characterized by subliminal conscious, passionate qualities and feelings, whether they are absolute or restricted in a certain matter.
Levin's class	Psych-verbs (verbs of psychological state)
Vendler's class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ḥabb* حبّ 'to love, be (or fall) in love with, to adore, to like' 2. *ḥarij* حرِج 'to be or become embarrassed' 3. *ḥasad* حسد 'to envy, feel envy toward, regard with envy' 4. *dahiš* دهِش 'to be or become astonished'

	5. *ᶜašiq* عشِق ‘to love passionately, adore’ 6. *karih* كرِه ‘to hate, detest, loathe, abhor, abominate’ 7. *maqat* مقت ‘to detest, abhor, abominate, loathe, hate intensely’ 8. *wadd* ودّ ‘to love; to like’ 9. *ʾasif* أسِف ‘to be or become sorry, regretful, sad’ 10. *baʾis* بئس ‘to be or become miserable, wretched, poor, distressed’ 11. *barim* برم ‘to be or become weary (of), bored (with), fed up (with)’ 12. *baġaḍ* بغض ‘to hate, detest, loathe, abhor, abominate’ 13. *jaziᶜ* جزِع ‘to be or become anxious’ 14. *ḥazan* حزن ‘to be or become sad’ 15. *ḥaqid* حقِد ‘to bear a grudge (against)’ 16. *ḥann* حنّ ‘to yearn for, hanker after, crave, miss’ 17. *ḥanaq* حنق ‘to be or become enraged by, furious at, angry with’ 18. *xāf* خاف ‘to fear, apprehend, dread; to be or become afraid (of), scared (of), alarmed (by), frightened (by), terrified (by)’ 19. *xašiy* خشي ‘to fear, apprehend, dread, be afraid (of)’ 20. *zaᶜal* زعل ‘to huff’ 21. *ṭarib* طرِب ‘to be or become delighted’ 22. *ᶜatab* عتب ‘to admonish, reprove mildly, reproach gently, blame’ 23. *ġaḍib* غضِب ‘to be or become angry’ 24. *faziᶜ* فزع ‘to be or become scared (of), alarmed (by), frightened’ 25. *qaliq* قلِق ‘to be or become worried’ 26. *kašir* كشر ‘to grin; to grimace’ 27. *namir* نمِر ‘to lose one’s temper, flame up with, turn into a tiger’ 28. *rahib* رهِب ‘to fear, dread, apprehend; to be or become afraid’ 29. *saʾim* سئم ‘to be or become bored (with), fed up (with), weary (of)’ 30. *ḍajir* ضجِر ‘to be or become bored (with)’ 31. *qarif* قرف ‘to be disgusted (of), be nauseated (by), be sick (of)’ 32. *qazz* قزّ ‘to feel disgust (at, for), revolt (at, against), loathe, detest’ 33. *kaʾib* كئب ‘to be or become sad, grieved, depressed’ 34. *mall* ملّ ‘to be or become weary (of)’ 35. *nakid* نكد ‘to be unhappy, miserable’ 36. *hamm* همّ ‘to worry, trouble, disquiet, upset, make uneasy’ 37. *haliᶜ* هلع ‘to be or become impatient, restless, uneasy, anxious’ 38. *bahij* بهج ‘to rejoice (at), jubilate (at); to be happy (at), glad (at)’ 39. *ḥarij* حرِج ‘to be (become, get) embarrassed’ 40. *sarr* سرّ ‘to be pleased (with), delighted (at), happy (at), glad (at)’ 41. *saᶜid* سعِد ‘to be or become happy, lucky, fortunate’ 42. *šaqiy* شقِي ‘to be or become unhappy, miserable, wretched’ 43. *šaᶜar* شعر ‘to feel, sense; to perceive, notice, realize’ 44. *šuġif* شغف ‘to love, adore, be madly in love with’ 45. *ṣadam* صدم ‘to shock’ 46. *fariḥ* فرح ‘to be or become glad at, happy at, pleased with’ 47. *raghib* رغِب ‘to desire’ 48. *hām* هام ‘to fall in love with, be passionately in love with’
The syntactic frame of transitives	Verb + Subject + Object
The syntactic frame of	Verb + Subject (+ Prepositional phrase)

intransitives		
The nature of the subject	The subject of both transitive and intransitive verbs is a human being who is characterized by emotions.	
The nature of the object (transitive verbs)	The object is also a human being who can exchange emotions.	
The nature of the Prepositional phrase (intransitive verbs)	The subject feels emotions towards the object of the prepositional phrase. The prepositional phrase is headed by one of the following prepositions: ▪ *ᶜalā* على 'on': with this preposition, the subject is emotionally influenced by what happened to the person referred to within the prepositional phrase. ▪ *min* من 'from': with this preposition, the subject is emotionally influenced by what was done by the person referred to within the prepositional phrase. ▪ *ᶜalā* على 'on' or *min* من 'from': both prepositions can be used with the class members; however the meaning is different, when with *ᶜalā* على 'on' the subject is affected by what happens for the person mentioned in the prepositional phrase, whele with *min* من 'from', the person that is mentioned in the preposition affected emotionally on the subject. ▪ *bi* بـ 'by': with this preposition, the subject is emotionally influenced by the person referred to in the prepositional phrase. ▪ *fī* في 'in': with this preposition, the subject is emotionally concerned with the person referred to in the prepositional phrase.	
Examples	Examples of transitive verbs	1. حَبّ محمدٌ صديقه 2. حرَج محمدٌ صديقه 3. حسَد محمدٌ صديقه 4. دهِش محمدٌ صديقه 5. عشِق محمدٌ صديقه 6. كرِه محمدٌ صديقه 7. مقَت محمدٌ صديقه 8. ودّ محمدٌ صديقه
	Examples of intransitive verbs with the preposition *ᶜalā* على 'on'.	9. أسِفَ محمدٌ على صديقه 10. بأِس محمدٌ على صديقه 11. برِم محمدٌ على صديقه 12. بغَض محمدٌ على صديقه 13. جزِع محمدٌ على صديقه 14. حزِن محمدٌ على صديقه 15. حقِد محمدٌ على صديقه 16. حنَّ محمدٌ على صديقه 17. حنِق محمدٌ على صديقه 18. طرِب محمدٌ على صديقه 19. عتَب محمدٌ على صديقه 20. كشِر محمدٌ على صديقه 21. نمِر محمدٌ على صديقه
	Examples of intransitive verbs with the preposition *min* من 'from'.	22. رهِب محمدٌ من صديقه 23. سئِم محمدٌ من صديقه 24. ضجِر محمدٌ من صديقه 25. قرِف محمدٌ من صديقه 26. قزِّ محمدٌ من صديقه

		27. كئِب محمدٌ من صديقه 28. ملّ محمدٌ من صديقه 29. نكِد محمدٌ من صديقه 30. همّ محمدٌ من صديقه
	Examples of intransitive verbs with both prepositions *ᶜalā* على ‘on’ and *min* من ‘from’.	31. خاف محمدٌ على/مِن صديقه 32. خشِيَ محمدٌ على/مِن صديقه 33. زعِل محمدٌ على/مِن صديقه 34. غضِب محمدٌ على/مِن صديقه 35. فزِع محمدٌ على/مِن صديقه 36. قلِق محمدٌ على/مِن صديقه 37. هلِع محمدٌ على/مِن صديقه
	Examples of intransitive verbs with the preposition *bi* بـ ‘by’.	38. بهِج محمدٌ بصديقه 39. حرِج محمدٌ بصديقه 40. سرَّ محمدٌ بصديقه 41. سعِدَ محمدٌ بصديقه 42. شقِي محمدٌ بصديقه 43. شعِر محمدٌ بصديقه 44. شغِف محمدٌ بصديقه 45. صدَم محمدٌ بصديقه 46. فرِح محمدٌ بصديقه
	Examples of intransitive verbs with the preposition *fī* في ‘in’.	47. رغِب محمدٌ في صديقه 48. هام محمدٌ في صديقه

4.2.6 Verbs of colouring (class 06)

Class Description	These verbs denote that the subject is characterized by darkness or lightness, or chromatic qualities, whether the subject is an animate or inanimate object.
Levin’s class	Verbs of colouring
Vendler’s class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *baqiᶜ* بقع ‘to be or become spotted, stained, blotted’ 2. *bahit* بهِت ‘to be or become lost brightness’ 3. *ḥāl* حال ‘to be or become bleached, faded, tarnished’ 4. *ḥall* حلّ ‘to fade, dim, pale, wan, blanch, tarnish, faint’ 5. *kaḍib* خضِب ‘to be or become green, verdant’ 6. *xaḍir* خضِر ‘to be or become green, verdant’ 7. *dakin* دكِن ‘to darken or become dark, blackish, dusky’ 8. *ḏahib* ذهِب ‘to be or become golden’ 9. *zariq* زرِق ‘to be or become blue’ 10. *saḥim* سحِم ‘to be or become black’ 11. *samir* سمِر ‘to be or become brown or tan’ 12. *sawid* سوِد ‘to be or become black’ 13. *šaḥub* شحُب ‘to be or become pale’ 14. *šaqur* شقُر ‘to be or become blond, fair’ 15. *ṣabigh* صبِغ ‘to be or become dyed’

	16. *ṣahib* صهب 'to be or become reddish, russet; blond' 17. *ġabir* غبِر 'to be or become dust-coloured, dingy, roan' 18. *ġabiš* غبِش 'to be or become dark' 19. *ġamiq* غمِق 'to be or become bold or dark' 20. *faḥum* فحم 'to be or become blacken' 21. *qatim* قتم 'to be or become darken or darkle' 22. *kaḥil* كحَل 'to be or become blacken with kohl'.
The syntactic frame of intransitives	Verb + Subject
The nature of the subject	The subject is a concrete entity that can exhibit colour
Examples	1. بقع اللَّوْنُ 2. بهت اللَّوْنُ 3. حالَ اللَّوْنُ 4. حلّ اللَّوْنُ 5. خضب اللَّوْنُ 6. خضر اللَّوْنُ 7. دكِن اللَّوْنُ 8. ذَهِبَ اللَّوْنُ 9. زرِق اللَّوْنُ 10. سحِم اللَّوْنُ 11. سمِر اللَّوْنُ 12. سود اللَّوْنُ 13. شحُب اللَّوْنُ 14. شقُر اللَّوْنُ 15. صبِغ اللَّوْنُ 16. صهب اللَّوْنُ 17. غبِر اللَّوْنُ 18. غبِش اللَّوْنُ 19. غمِق اللَّوْنُ 20. فحم اللَّوْنُ 21. قتم اللَّوْنُ 22. كحَل اللَّوْنُ

4.2.7 Verbs of bodily qualities (class 07)

Class Description	These verbs refer to a change in the bodily state of an animate or inanimate object, including their size, weight, appearance, touch and temperature.
Levin's class	Verbs of change of bodily state
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *badun* بدن 'to be or become fat, corpulent, obese, stout, plump' 2. *barad* برَد 'to be or become cold; to cool, cool off, cool down, chill' 3. *baliy* بلِي 'to be or become old, worn, shabby, ragged, tattered' 4. *ṯaqul* ثقل 'to be or become heavy' 5. *jasum* جسم 'to be or become big, large, great, sizable, bulky, gross' 6. *jaʿud* جعد 'to be or become curled, curly, frizzed, frizzly' 7. *jalid* جلِد 'to be or become formed into ice, turn into ice' 8. *jamud* جمُد 'to be or become frozen, frosted' 9. *xašun* خشن 'to be or become coarse, rough, harsh, tough, hard' 10. *xaff* خفّ 'be or become light(er), decrease in weight, lose weight' 11. *daqq* دقّ 'to be or become thin, fine, delicate, slender, tenuous' 12. *ḏāb* ذابَ 'to be or become melt (away), liquefy, deliquesce, thaw' 13. *ḏāb* (جسمه) ذابَ 'to be or become pine away, waste away' 14. *raṭub* رطب 'to be or become humid, moist, damp, wet' 15. *raqq* رقّ 'to be or become thin, delicate, fine, slender, tenuous'

	16. *samuk* سمُك ‘to be or become thick’ 17. *samun* سمُن ‘to be or become fat’ corpulent, stout, obese, plump’ 18. *saxin* سخن ‘to be or become hot or warm’ 19. *ṣaġur* صغُر ‘to be or become small, little, tiny, minute; to decrease’ 20. *ṣalub* صلب ‘to be or become hard, solid, firm, stiff, rigid; to harden’ 21. *ḍaxum* ضخم ‘to be or become huge, big, large, bulky, sizable’ 22. *ṭāl* طال ‘to be or become long; to lengthen, extend, elongate, tall’ 23. *ṭariy* طري ‘to be or become soft, tender, fresh’ 24. *ᶜaruḍ* عرُض ‘to broaden, widen, expand, be or become broad’ 25. *ġazur* غزُر ‘to be or become abundant, copious, plentiful, ample’ 26. *qasā* قسا ‘to be or become hard, solid, rigid, firm, stiff, callous’ 27. *qaṣur* قصُر ‘be or become short’ 28. *kabur* كبُر ‘to be or become great(er), big(ger), large(r); to grow’ 29. *kaṯuf* كثف ‘to be or become thick(er), dense(r), (more) concentrated’ 30. *kariš* كرش ‘to be or become wrinkled, shriveled’ 31. *lān* لانَ ‘to be or become soft, tender, flexible, pliable, supple’ 32. *našif* نشف ‘to be or become dry, dehydrate, desiccate, exsiccate’ 33. *nadiy* ندي ‘to be or become wet, dewy, moist, damp’ 34. *naᶜum* نعُم ‘to be or become soft, smooth, tender, fine’.	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	The subject refers to the bodies and objects that are characterized by a change in their size, weight, appearance, touch, and temperature. The subject may be an animate or inanimate object.	
Examples	1. بدُن الجِسمُ 2. برُد الجِسمُ 3. بلِيَ الجِسمُ 4. ثقُل الجِسمُ 5. جسُم الجِسمُ 6. جعُد الجِسمُ 7. جلِد الجِسمُ 8. جمُد الجِسمُ 9. خشُن الجِسمُ 10. خفَّ الجِسمُ 11. دقَّ الجِسمُ 12. ذاب الجِسمُ 13. ذاب الجِسمُ 14. رطُب الجِسمُ 15. رقّ الجِسمُ 16. سمَك الجِسمُ 17. سمُن الجِسمُ	18. سخُن الجِسمُ 19. صغُر الجِسمُ 20. صلُب الجِسمُ 21. ضخُم الجِسمُ 22. طال الجِسمُ 23. طرِي الجِسمُ 24. عرُض الجِسمُ 25. غزُر الشعر 26. قسا الجِسمُ 27. قصُر الجِسمُ 28. كبُر الجِسمُ 29. كثُف الشعر 30. كرِش الجِسمُ 31. لانَ الجِسمُ 32. نشِف الجِسمُ 33. ندِي الجِسمُ 34. نعُم الجِسمُ

4.2.8 Verbs of motion (class 08)

Class Description	These verbs describe the direction and type of movement of the subject, such as ‘to come’, ‘to go’, ‘to leave’ and ‘to run’.
Levin’s class	Verbs of motion

Vendler's class	Activity verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾatā* أتى 'to come, arrive' 2. *bariḥ* برح 'to leave, depart from, go away from' 3. *jāʾ* جاء 'to come, arrive, show up; to reach, get to' 4. *jāb* جاب 'to travel (through, over), tour, cruise, patrol' 5. *jāl* جال 'to wander about, walk about or around' 6. *jarā* جرى 'to run, race, rush, course' 7. *ḥabā* حبا 'to crawl, creep; to go on all fours' 8. *xaraj* خرج 'to go out, come out, emerge; to walk out' 9. *xaṭar* (في مشيته) خطر 'to strut, prance, swagger, mince' 10. *dār* دارَ 'to turn, revolve, rotate, twirl, spin, gyrate, roll' 11. *daraj* درج 'to toddle, walk with short steps' 12. *ḏahab* ذهَب 'to go, go away, leave, depart' 13. *daxal* دخل 'to enter, come in(to), go in(to), get in(to)' 14. *rāḥ* راح 'to go, go away, leave, depart' 15. *rajiʿ* رجع 'to return, come back, go back; to revert' 16. *raḥal* رحل 'to depart, decamp, leave, go away, part' 17. *zār* زار 'to visit, trip' 18. *zaḥaf* زحف 'to crawl, creep; to go on all fours; to march' 19. *sāḥ* ساح 'to tour, travel, journey, voyage, cruise, rove' 20. *sār* سار 'to walk, tread, go on foot; to pace; to march' 21. *sāq* ساق 'to drive; to pilot, steer' 22. *sarā* سرى 'to travel by night' 23. *saraḥ* سرح 'to go out; to depart, go away' 24. *saʿā* (إلى) سعى 'to proceed to, head for, go to, take to seek' 25. *saqaṭ* سقط 'to fall (down), drop, tumble; to sink (down)' 26. *šarad* شرد 'to run away, flee, escape, break loose' 27. *ṣaʿid* صعد 'to ascend, climb, mount (up), scale; to rise' 28. *ṭār* طار 'to fly; to fly away, take wing' 29. *ṭāf* طافَ 'to circle, circuit, circumambulate' 30. *ʿād* عاد 'to fly; to fly away, take wing' 31. *ʿabar* عبر 'to cross, traverse, go across, pass across' 32. *ʿadā* عدا 'to run, race, course; to jog' 33. *farr* فرّ 'to escape, flee, run away' 34. *qād* قاد 'to drive, steer, pilot' 35. *qadim* قدم 'to come, arrive, show up; to reach, get to' 36. *qafaz* قفز 'to jump, leap, spring, bound, skip, hop' 37. *mašā* مشى 'to walk, tread, go on foot, move on foot' 38. *maḍā* مضى 'to go, go away, leave, depart' 39. *nazaḥ* نزح 'to emigrate, to immigrate (to); to migrate' 40. *nazal* نزل 'to descend, come down, go down, get down' 41. *naṭṭ* نطّ 'to jump, leap' 42. *nafar* نفر 'to flee, run, away, escape, break loose' 43. *harab* هرب 'to flee, run away, take to flight, escape' 44. *waṯab* وثب 'to jump, leap, spring, bound, bounce' 45. *waṣal* وصل 'to reach, arrive at, get to, come to' 46. *wafad* وفد 'to come to, arrive at, get to, reach; to visit' 47. *waqaʿ* وقع 'to fall (down), drop, tumble, sink'.

The syntactic frame of intransitives	Verb + Subject (+prepositional phrase)	
The nature of the subject	The subject is an animate being or an inanimate object that can be moved from one place to another.	
The nature of the Prepositional phrase	An optional prepositional phrase can follow the subject. It can be headed by *min* or إلى *ʾilā* followed by noun expressing place.	
Examples	1. أتَى محمد من السوق إلى المنزل 2. برِح محمد من السوق إلى المنزل 3. جاء محمد من السوق إلى المنزل 4. جاب محمد من السوق إلى المنزل 5. جال محمد من السوق إلى المنزل 6. جرى محمد من السوق إلى المنزل 7. حبا محمد من السوق إلى المنزل 8. خرَج محمد من السوق إلى المنزل 9. خطَر محمد من السوق إلى المنزل 10. دار محمد من السوق إلى المنزل 11. درَج محمد من السوق إلى المنزل 12. ذهَب محمد من السوق إلى المنزل 13. دخَل محمد من السوق إلى المنزل 14. راح محمد من السوق إلى المنزل 15. رجَع محمد من السوق إلى المنزل 16. رحَل محمد من المدينة إلى القرية 17. زار محمد من المدينة إلى القرية 18. زحَف محمد من السوق إلى المنزل 19. ساح محمد من السوق إلى المنزل 20. سار محمد من السوق إلى المنزل 21. ساق محمد من السوق إلى المنزل 22. سرَى محمد من السوق إلى المنزل 23. سرَح محمد من السوق إلى المنزل 24. سعى محمد من السوق إلى المنزل	25. سقَط محمد من المقعد إلى الأرض 26. شرَد محمد من السوق إلى المنزل 27. صعِد محمد من السّلم إلى الطائرة 28. طار محمد من بريطانيا إلى فرنسا 29. طاف محمد من السوق إلى المنزل 30. عاد محمد من السوق إلى المنزل 31. عبَر محمد من السوق إلى المنزل 32. عدا محمد من السوق إلى المنزل 33. فرّ محمد من السوق إلى المنزل 34. قاد محمد من السوق إلى المنزل 35. قدَم محمد من السوق إلى المنزل 36. قفَز محمد من المقعد إلى الأرض 37. مشى محمد من السوق إلى المنزل 38. مضى محمد من السوق إلى المنزل 39. نزَح محمد من سوريا إلى الأردن 40. نزَل محمد من الطائرة إلى المطار 41. نطّ محمد من المقعد إلى الأرض 42. نفَر محمد من السوق إلى المنزل 43. هرَب محمد من السوق إلى المنزل 44. وثَب محمد من المقعد إلى الأرض 45. وصَل محمد من السوق إلى المنزل 46. وفد محمد من السوق إلى المنزل 47. وقَع محمد من المقعد إلى الأرض

4.2.9 Verbs of swimming (class 09)

Class Description	These verbs refer to events in which the subject is surrounded by water. The subject can be an animate or inanimate object.
Levin's class	Verbs of motion
Vendler's class	Activity verbs
Transitive or intransitive	Intransitive
Class members	1. *sabaḥ* سبح 'to swim, bathe' 2. *ṭafā* طفا 'to float, buoy' 3. *ᶜām* عام 'to float, buoy; to swim' 4. *ġāṣ* غاص 'to dive into, plunge into, submerge in, sink into' 5. *ġaraq* غرِق 'to sink; to founder; to drown' 6. *ġaṭas* غطَس 'to dive, dip, plunge, sink, submerge'.
The syntactic	Verb + Subject (+Time Adverb)

frame of intransitives	
The nature of the subject	The subject is an animate or inanimate entity that can float, swim or dive.
The nature of the Time Adverb	Optionally, the time adverb indicates a certain period of time.
	1. سبَح محمد دقيقتين 2. طفَا محمد دقيقتين 3. عام محمد دقيقتين 4. غاص محمد دقيقتين 5. غرِق محمد دقيقتين 6. غطَس محمد دقيقتين

4.2.10 Verbs of location/place (class 10)

Class Description	These verbs denote that the locative subject is characterized by inherent qualities that express distance, direction or topographic nature
Levin's class	Verbs of entity-specific modes of being Measure verbs
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *baᶜud* بعُد 'to be or become far, faraway, far-off, distant, remote' 2. *janub* جنُب 'to be or become in the east' 3. *raḥub* رحُب 'to be or become wide, spacious, roomy' 4. *saḥuq* سحُق 'to be or become remote, distant, far, faraway' 5. *samā* سما 'to be or become high, lofty, elevated, exalted, sublime' 6. *sahul* سهُل 'to be or become smooth, even, level, flat' 7. *šaruq* شرُق 'to be or become in the east' 8. *šamal* شمل 'to be or become in the north' 9. *šahuq* شهق 'to be or become high' 10. *ḍāq* ضاق 'to be or become narrow, tight, close' 11. *ᶜalā* علا 'to be or become high, lofty, elevated, exalted, sub-lime' 12. *ᶜamuq* عمُق 'be or become deep(er) or (more) profound' 13. *ġarub* غرُب 'to be or become in the west' 14. *qarub* قرُب 'to be near or close (to), come near or close (to)' 15. *qaṣiy* قصي 'to be or become remote, distant, far, faraway, far-off' 16. *qaᶜur* قعر 'to be concave; to be deep, increase, enlarge, augment' 17. *māl* مال 'to be or become inclined, sloping, slanting, oblique' 18. *waᶜur* وعُر 'to be rugged, rough, uneven, bumpy' 19. *wasiᶜ* وسِع 'to be or become wide, roomy, spacious, vast, extensive'.
The syntactic frame of intransitives	Verb + Subject
The nature of the subject	The subject refers to a place.

Examples	1. بعُد المكانُ 2. جنُب المكانُ 3. رحُب المكانُ 4. سحُق المكانُ 5. سما المكانُ 6. سهُل المكانُ 7. شرُق المكانُ 8. شمُل المكان 9. شهق المكان 10. ضاق المكانُ	11. علا المكانُ 12. عمُق المكانُ 13. غرُب المكانُ 14. قرُب المكانُ 15. قصِي المكانُ 16. قعُر المكانُ 17. مال المكانُ 18. وعُر المكانُ 19. وسُع المكانُ

4.2.11 Verbs of violence and abuse (class 11)

Class Description	These verbs denote physical harming that is done by a (usually) animate subject. The object is usually an animate being.
Levin's class	Hurt verbs Verbs of killing
Vendler's class	Accomplishment verbs
Transitive or intransitive	Transitive
Class members	1. *baṭaḥ* بطح 'to prostrate; to throw down, fell; to stretch (out), outstretch; to flatten, level (off)' 2. *baṭaš* بطش 'to assault, attack with violence; to knock (out), strike sharply; to destroy, ruin, devastate, ravage, crush, stamp out' 3. *jalad* جلَد 'to whip, lash, flog, flagellate, slash, thrash, lace, scourge' 4. *jaraḥ* جرح 'to wound, injure, hurt' 5. *ḥaraq* حرق 'to burn, incinerate, destroy by fire, consume with fire' 6. *xazaq* خزق 'to pierce, transfix, stab' 7. *xaṭaf* خطَف 'to kidnap, abduct' 8. *xanaq* خنق 'to strangle, strangulate, throttle, choke to death' 9. *dahas* دهَس 'to run over' 10. *rajam* رجم 'to stone, pelt with stones, throw stones at' 11. *rašaq* رشق 'to pelt with, strike with; to throw at, hurl at, fling at' 12. *rafas* رفس 'to kick' 13. *rakal* ركل 'to kick' 14. *ramaḥ* رمح 'to spear, lance' 15. *saḥal* سحل 'to drag along, trail along on the ground' 16. *salab* سلب 'to steal, rip off, rob, abstract, fleece, plunder, loot' 17. *samm* سمّ 'to poison; to envenom, venom' 18. *šanaq* شنق 'to hang, halter, gibbet, execute by hanging' 19. *ṣadam* صدم 'to collide (with), clash (with), run (into), bump (against), bang (against), knock (against), hit (against)' 20. *ṣara*^{c} صرع 'to throw down, fell, knock down, strike down, bring to the ground; to knock out (in boxing)' 21. *ṣa*^{c}*aq* صعق 'to strike, hit, shock' 22. *ṣafa*^{c} صفَع 'to slap, cuff, buffet' 23. *ḍarab* ضرب 'to beat, strike, hit; to knock, punch; to slap, flap' 24. *ṭaraḥ* طرح 'to throw, cast, fling, toss, hurl, pitch' 25. *ṭa*^{c}*an* طعن 'to stab, thrust, pierce, lunge, transfix, jab'

	26. *ᶜaḍḍ* عضَّ ‘to bite’ 27. *qatal* قتَل ‘to kill, slay, murder, assassinate’ 28. *qaḏaf* (ب) قذف ‘to throw, cast, fling, hurl, toss, pitch; to pelt (with)’ 29. *qaraṣ* قرَص ‘to bite, sting’ 30. *qaṣaf* قصف ‘to shell, bombard, bomb, batter, cannonade, cannon, attack with bombs or artillery fire, fire guns at, open artillery fire at’ 31. *qaṭaᶜ* قطع ‘to commit or engage in highway robbery’ 32. *qamaᶜ* قمع ‘to curb, check, restrain, bridle, repress, suppress, subdue; to crush, quell, quash’ 33. *qahar* قهر ‘to subdue, subjugate, conquer, vanquish’ 34. *kasar* كسر ‘to break, fracture, shatter, smash, crash, crush’ 35. *ladaġ* لدغ ‘to sting, bite’ 36. *lasaᶜ* لسع ‘to sting, bite; to hurt (with words), offend’ 37. *laṭam* لطم ‘to slap, cuff, buffect; to strike, hit’ 38. *lakaz* لكز ‘to punch, box, strike with the fist’ 39. *lakazm* لكم ‘to punch, box, strike with the fist’ 40. *naxaz* نخز ‘to prick, sting; to pierce’ 41. *nahaš* نهش ‘to bite, snap (at)’ 42. *waxaz* وخز ‘to prick, sting, twinge; to jab, pierce’.	
The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject is usually an animate entity that commits a violent act. It may be an inanimate entity that can cause violence.	
The nature of the object	The object is usually an animate entity affected by violence or abuse.	
Examples	1. بطَح محمد الخصمَ 2. بطَش محمد الخصمَ 3. جلَد محمد الخصمَ 4. جرَح محمد الخصمَ 5. حرَق محمد الخصمَ 6. خزَق محمد الخصمَ 7. خطَف محمد الخصمَ 8. خنَق محمد الخصمَ 9. دهِس محمد الخصمَ 10. رجَم محمد الخصمَ 11. رشَق محمد الخصمَ 12. رفَس محمد الخصمَ 13. ركَل محمد الخصمَ 14. رمَح محمد الخصمَ 15. سحَل محمد الخصمَ 16. سلَب محمد الخصمَ 17. سمَّ محمد الخصمَ 18. شنَق محمد الخصمَ 19. صدَمت السيارةُ الرجلَ 20. صرَع محمد الخصمَ 21. صعَق محمد الخصمَ	22. صفَع محمد الخصمَ 23. ضرَب محمد الخصمَ 24. طرَح محمد الخصمَ 25. طعَن محمد الخصمَ 26. عضّ محمد الخصمَ 27. قتَل محمد الخصمَ 28. قذَف محمد الخصمَ 29. قرَص محمد الخصمَ 30. قصَف محمد الخصمَ 31. قطَع محمد الخصمَ 32. قمَع محمد الخصمَ 33. قهَر محمد الخصمَ 34. كسَر محمد الخصمَ 35. لدَغ الثعبان الرجل 36. لسَع النحل الرجلَ 37. لطَم محمد الخصمَ 38. لكَز محمد الخصمَ 39. لكَم محمد الخصمَ 40. نخَز محمد الخصمَ 41. نهَش محمد الخصمَ 42. وخَز محمد الخصمَ

4.2.12 Verbs of mental process (class 12)

Class Description	These verbs refer to processes in the mind such as perception, introspection, memory, creativity, imagination, conception, belief, reasoning, volition, calculation and emotion. The subject is a human being.
Levin's class	Verbs of perception
Vendler's class	State verbs
Transitive or intransitive	Transitive
Class members	1. *baḥaṯ* بحث 'to study, explore, inquire into, examine, investigate, inspect, check out, deal with, treat, research, do research' 2. *ḥazar* حزر 'to guess, conjecture, surmise, estimate, assess, appraise' 3. *ḥasab* حسَب 'to calculate, compute, count, number, enumerate; to consider, deem, regard as, look at as, judge, think' 4. *ḥasib* حسِب 'to think, suppose, assume, take it, consider, deem, regard as, take for, take as, hold' 5. *ḥafiẓ* حفِظ 'to memorise, learn by heart, commit to memory' 6. *ḥall* حلّ 'to solve (a problem), resolve, settle, work (out), unravel' 7. *xāl* خال 'to think, believe, suppose, assume, imagine, fancy, take as, take it, consider, deem, regard as' 8. *xabur* خبر 'to know, realise' 9. *darā* درى 'to know (of), have knowledge (of); to be or become cognizant of, aware of, familiar with' 10. *dall* (على) دلَّ 'to prove, establish, verify, substantiate, demonstrate, show, evidence; to attest to, testify, be evidence of, be proof of' 11. *ḏahab* (في) ذهب 'to be of the opinion (that), hold the view (that), think (that), believe (that)' 12. *sabar* سبَر 'understand or study thoroughly' 13. *ẓann* (بـ) ظنّ 'to think, assume, guess, take for, take as, consider, deem, regard as, hold; to suspect; to accuse (of), charge (with), indict (for)' 14. *ᶜaraf* عرف 'to know; to be or become cognizant of, familiar with; to familiarize oneself with, acquaint oneself with; to learn, come to know, find out (about); to recognize, perceive' 15. *ᶜalim* (بـ) علِم 'to know (of), have knowledge (of); to be or become aware of, cognizant of, familiar with, informed of or about' 16. *faraḍ* فرَضَ 'to suppose, assume, presume, hypothesize' 17. *faṭan* فطن 'to realize, discern, notice, see, understand, grasp; to be or become aware of; to learn (about), come to know (about), find out (about)' 18. *fahim* فهِم 'to understand, grasp, comprehend, apprehend, realize, conceive, perceive; to know (of); to learn (about), hear (of)' 19. *nabih* (لـ) نبه 'to notice, perceive, see, observe, take notice of, pay attention to, heed, mind' 20. *waᶜā* وعى 'to realise, understand, recognize' 21. *wahim* وهم 'to imagine, fancy, conceive, think, suppose, assume; to take for, take as; to suspect; to misconceive, misunderstand, misconstrue, misinterpret' 22. *yaqin* (من) يقن 'to ascertain, find out or learn with certainty about, know

	for certain; to be or become certain of, sure of, convinced of, confident of'.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject + Prepositional phrase + Complement	
The nature of the subject	The subject is a human being who has mental capabilities such as thinking and considering.	
The nature of the object	The object may be an issue, question, matter, problem or case.	
The nature of the prepositional phrase	The prepositional phrase is headed by the preposition *fī* في, and followed by a noun that refers to an issue, question, matter, problem or case.	
Examples	Transitives	1. بحَث محمد المسألة 2. حزَر محمد المسألة 3. حسَب محمد المسألة 4. حسِب محمد المسألة 5. حفَظ محمد المسألة 6. حلَّ محمد المسألة 7. خبر محمد المسألة 8. درَى محمد المسألة 9. دلّ محمد المسألة 10. سبَرمحمد المسألة 11. عرَف محمد المسألة 12. علِم محمد المسألة 13. فهِم محمد المسألة 14. وعى محمد المسألة
	Intransitives	15. خال محمد في المسألة 16. ذهَب محمد في المسألة 17. ظنّ محمد في المسألة 18. فرَض محمد في المسألة 19. فطِن محمد في المسألة 20. نبِه محمد في المسألة 21. وهِم محمد في المسألة 22. يقِن محمد في المسألة

4.2.13 Verbs of financial transaction (class 13)

Class Description	These verbs refer to financial transactions that take place between people or institutions in the stock exchange, trade, selling and buying. The subject can be the human agent of the transaction.
Levin's class	Cost verbs / Price verbs / Bill verbs
Vendler's class	Activity verbs
Transitive or intransitive	Transitive Intransitive

Class members	1. *bār* (العَمَلُ) بارَ ‘to be futile, unsuccessful, unprofitable, unfruitful, unavailing, useless; to fail’ 2. *bāᶜ* باعَ ‘to sell; to retail; to wholesale’ 3. *baxas* بخَس ‘to decrease, diminish, reduce; to depreciate, lessen the value of, disparage, belittle; to undervalue, underestimate, underrate’ 4. *baṣam* بصَم ‘to (im)print, impress, stamp; to make or leave a fingerprint (imprint, impression) on’ 5. *balaġ* (المِقْدارُ أو المَجْمُوعُ) بَلَغَ ‘to amount to, come to, make, reach, add up to, sum to, total, number’ 6. *jarad* (البَضَائِعَ أو المَوْجُوداتِ) جَرَدَ ‘to take stock, inventory, make an inventory (of)’ 7. *janā* جنى ‘to earn, get, gain, win, profit, reap, harvest; to attain, achieve, accomplish; to incur, bring upon oneself, draw on oneself’ 8. *ḥasab* (ل) حَسَبَ ‘to credit with’ 9. *ḥasab* (على) حَسَبَ ‘to debit with, charge to someone’s account’ 10. *ḥafiẓ* (في) حفظَ ‘to file’ 11. *xasir* خسِر ‘to lose, forfeit; to suffer or incur a loss’ 12. *xaṣam* خصم ‘to discount (a bill, note, etc.), deduct, rebate, take off, subtract’ 13. *xafaḍ* خفض ‘to reduce, lower, lessen, decrease, diminish, cut, cut back, cut down, scale down, minimise, abate, pull down, mark down; to slash’ 14. *dān* دان ‘to borrow, contract (raise, take up) a loan’ 15. *dafaᶜ* دفع ‘to pay, settle, discharge, clear, liquidate, pay up; to disburse, spend, expend, lay out, outlay, pay out’ 16. *rāj* (البِضَاعَة ـت) راجَ ‘to sell well, find a (good) market, be in (great) demand, sell like hot cakes, be sold rapidly and in large quantities’ 17. *rabiḥ* ربح ‘to gain, profit, win’ 18. *raxuṣ* رخُص ‘to cheapen, be or become cheap or inexpensive’ 19. *rašā* رشا ‘to bribe, buy off, corrupt’ 20. *raṣad* (مالاً) رصد ‘to appropriate, earmark, set apart, set aside, designate, dedicate, destine, allocate, allot, assign’ 21. *rafaᶜ* رفع ‘to raise, increase, step up, boost, hike, up, scale up, jack up, skyrocket; to heighten, intensify, enhance’ 22. *rahan* رهَن ‘to mortgage, pawn, pledge, hypothecate, give in pledge, deposit as security’ 23. *zād* زاد ‘to increase, augment, step up, scale up, boost, hike up, jack up, up, skyrocket; to intensify, enhance, build up, add to, enlarge, magnify’ 24. *sām* سامَ ‘to offer for sale’ 25. *saḥab* سحب ‘to withdraw, draw back, draw off, take back, recall, call back, revoke, repeal, cancel; to pull out; to take out’ 26. *šarā* شرى ‘to buy, purchase’ 27. *ṣaraf* (مالاً) صرف ‘to spend, expend, outlay, lay out, pay out, disburse’ 28. *ṭaraḥ* طرح ‘to subtract, deduct, discount’ 29. *ᶜalā* علا ‘to rise (high), tower up, go up, ascend, lift; to be or become high, lofty, elevated, exalted, sublime; to be or become loud’ 30. *ġašš* غشّ ‘to cheat swindle’ 31. *ġalā* غلا ‘to be or become expensive, high-priced’ 32. *qabaḍ* قبض ‘to receive, get, cash (money)’ 33. *qasad* قصَد ‘to economise, tighten one’s belt; to be economical, thrifty, frugal, provident; to husband, manage economically; to save’

	34. *qaraḍ* قرَض ‘to lend, loan, advance (money to)’ 35. *kasab* كسب ‘to gain, win, profit, earn, get, obtain, acquire, attain, reap, harvest’ 36. *kasad* (ت البضاعة) كسد ‘to be unsalable, be unmarketable, be a dead stock, find no market, remain unsold’.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	The subject may be a human being involved in financial transactions. The subject may also be a bank, company, foundation, or a form of commercial transaction.	
The nature of the object	The object is goods, prices, or commercial transactions.	
Examples	Transitive	1. بارت التجارة 2. راجت البضاعة 3. ربحت التجارة 4. رخُصت البضاعة 5. كسَدت البضاعة
	Intransitive	6. باع محمد البضاعة 7. بخَس محمد البضاعة 8. بصَم محمد وثيقة البيع 9. بلَغ سعر السهم مئة دينار 10. جرَد محمد البضاعة 11. جنَى محمد الأرباح 12. حسَب محمد الأرباح 13. حسَب محمد الأرباح 14. حفِظ محمد البضاعة 15. خسَر محمد الأرباح 16. خصَم محمد الأرباح 17. خفَض محمد الأرباح 18. دان محمد البضاعة 19. دفَع محمد ثمن البضاعة 20. رشَا محمد المستهلك 21. رصَد محمد الأرباح 22. رفَع محمد الأسعار 23. رهَن محمد البضاعة 24. زاد محمد الأسعار 25. سام محمد البضاعة 26. سحَب محمد الأسهم 27. شرَى محمد البضاعة 28. صرَف محمد الأرباح 29. طرَح محمد الأسهم 30. علا سعر السهم 31. غشَّ محمد البضاعة 32. غلا سعر البضاعة 33. قبَض محمد ثمن البضاعة

		34. قصُد سعر البضاعة 35. قرَض محمد المستهلك 36. كسَب محمد التجارة

4.2.14 Verbs of agriculture (class 14)

Class Description	These verbs describe activities undertaken by a human subject or changes that occur in plants and on the land.
Levin's class	Grow verbs
Vendler's class	Activity verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾabar* أبر 'to pollinate' 2. *bār* (ت الأرض)بارَ 'to lie fallow, remain uncultivated or unsown' 3. *baḏr* بذر 'to sow, seed, disseminate, spread, strew' 4. *bazr* بزر 'to sow, seed' 5. *baᶜar* بعَر 'to fertilize, manure, drop dung' 6. *baqal* بقَل 'to grow; to sprout, germinate' 7. *balaġ* (الثمر) بلَغَ 'to ripen, mature, be or become ripe or mature' 8. *ṯamar* ثمر 'to bear fruit, fructify, fruit; to yield, produce, pay (off), return, bring forth, bring in; to succeed, work (out), turn out well' 9. *jadab* جدب 'to be or become barren, sterile, infertile; to be or become arid, dry' 10. *janā* جنى 'to pick, gather, reap, harvest, pluck out, pull off' 11. *ḥaraṯ* حرث 'to plow; to till, cultivate' 12. *ḥaṣad* (الزرع) حصد 'to harvest, reap, gather, crop; to mow, cut down' 13. *ḥafar* حفر 'to disinter, disentomb, exhume, unearth, excavate, dig up' 14. *dabal* دبل 'to fertilize, manure, dung' 15. *daras* (الحِنطة) درس 'to thresh, thrash (grain)' 16. *ḏabal* ذبل 'to wither, wilt, wizen, shrivel, fade, dry up, flag' 17. *ḏarā* ذرى 'to winnow, fan (grain)' 18. *ḏawā* ذوى 'to wither, wilt, wizen, shrivel, fade, dry up, flag, decay' 19. *raḏḏ* ردّ 'to spray, sprinkle, shower, splash, spatter (water)' 20. *rašš* رشّ 'sprinkle, to spray, sparge, shower; to (be)spatter, splash, splatter, spout, squirt; to water' 21. *rawiy* روى 'to be irrigated, watered, supplied with water' 22. *zaraᶜ* زرع 'to sow; to plant, raise, grow, crop; to cultivate' 23. *saqā* سقى 'to irrigate, water, supply with water; to give (someone) to drink, quench someone's thirst, sate' 24. *šatal* شتل 'to plant; to transplant' 25. *ᶜašub* عشُب 'to be or become grassy, grass-covered' 26. *ġaras* غرس 'to plant' 27. *qaḥaṭ* قحط 'to be withheld (rain)' 28. *qaḥal* قحل 'to dry up; to be or become dry, arid, barren' 29. *qaṣṣs* قصّ 'to trim, clip, pare, cut back, lop' 30. *qaṣaᶜ* قصع 'to grind, crush, bruise' 31. *qaṭaf* قطف 'to pick, gather, reap, harvest, pluck out, pull off' 32. *qalam* قلم 'to clip, trim, cut, cut back, pare, prune, lop'

	33. *laqaḥ* لقح ‘to pollinate; to fertilize, impregnate, fecundate’ 34. *maḥal* محل ‘to be or become barren, sterile’ 35. *nabat* نبت ‘to grow; to sprout, germinate; to rise, spring’ 36. *naṯar* نثر ‘to scatter, disperse, disseminate, strew, bestrew, sprinkle’ 37. *namā* نما ‘to grow; to develop; to increase, augment, multiply, build up; to thrive, prosper, flourish’ 38. *yabis* يبس ‘be or become dry; to desiccate, exsiccate; to dry up, wither, shrivel; to stiffen, harden, solidify’.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	In terms of transitive verbs, the subject is a human being involved in agricultural activity, while the subject of intransitive verbs is a kind of plant or agricultural land.	
The nature of the object	The object in the case of transitive verbs is a kind of plant or agricultural land.	
Examples	Transitive	1. أبر محمد النخل 2. بذّر محمد الأرض 3. بزَر محمد الأرض 4. بعَر محمد الأرض 5. جنَى محمد الثمار 6. حرَث محمد الأرض 7. حصَد محمد الثمار 8. حفَر محمد الأرض 9. دبَل محمد الأرض 10. درَس محمد المحصول 11. ذرَى محمد المحصول 12. ردّ محمد الأرض 13. رشّ محمد الثمار 14. روَى محمد الأشجار 15. زرَع محمد الأشجار 16. سقَى محمد الأشجار 17. شتّل محمد الأشجار 18. غرَس محمد الأشجار 19. قصّ محمد الأشجار 20. قصَع محمد الأشجار 21. قطَف محمد الثمار 22. قلَم محمد الأشجار 23. نثَر محمد البذار
	Intransitive	24. بارت الأرض 25. بقَل الشجر 26. بلُغ الشجر 27. ثمَر الشجر 28. جدَبت الأرض 29. ذبُلت الثمار 30. ذوَت الثمار 31. عشُبت الأرض

		32. قحِطت الأرض 33. قحَلت الأرض 34. لقِحت الأشجار 35. محَلت الأرض 36. نبَتت الثمار 37. نمَت الثمار 38. يبِس الثمار

4.2.15 Verbs of desire and request (class 15)

Class Description	These verbs express that the subject has a desire or request to obtain material or virtual things. The subject is usually a human being.
Levin's class	Verbs of desire
Vendler's class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾamal* أمل 'to hope; to hope for; to look forward to, expect, anticipate' 2. *tāq* تاق 'to long for, yearn for, hanker after, pine for, hunger for, thirst for, die to; to crave, desire, desiderate; to miss; to aspire to' 3. *jaši ᶜ* جشع 'to be or become greedy, covetous, avid, avaricious, grasping' 4. *ḥariṣ* حرص 'to be greedy, covetous, avid, avaricious' 5. *ḥann* حنّ 'to long for, yearn for, hanker after, pine for, hunger for, thirst for, crave, desire, miss' 6. *daᶜā* دعا 'to call upon, appeal to, invite, request' 7. *rād* راد 'to look for, search for, seek' 8. *rām* رام 'to desire, wish, want, crave after; to aspire to, seek, aim at; to have in mind' 9. *rajā* رجا 'to hope; to hope for; to look forward to, expect; to wish (for something); to wish someone something; to ask (for), request' 10. *raġib* (في) رغب 'to desire, wish, want, crave after; to aspire to, seek' 11. *ramā* (إلى) رمى 'to drive at, aim at, intend to, purpose to; to be aimed at, be intended to' 12. *saʾal* سأل 'to ask for, request; to call upon, appeal to, entreat, beseech, implore; to demand' 13. *šaḥaḏ* شحذ 'to beg, ask for alms' 14. *ṭalab* طلب 'to ask for, request, seek, try to get or obtain; to order, demand, require, call for; to want, wish (for), desire' 15. *ṭamaḥ* (إلى) طمح 'to aspire to or after, seek (to), aim to; to long for, yearn' 16. *ṭamu ᶜ* طمع 'to be or become greedy, covetous, avid, avaricious, grasping' 17. *ṭamaᶜ* (في،بـ) طمع 'to to covet, desire, wish for, crave after; to aspire to, seek' 18. *ᶜāz* عاز 'to need, require, want; to be in need of, in want of, lacking, wanting' 19. *qaṣad* قصد 'to intend, purpose, design, mean, have in mind, drive at, aim at'

	20. *našad* نشد 'to seek, look for, search for' 21. *hadaf* (إلى) هدف 'to aim at, drive at, purpose to, design to'.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject + Prepositional phrase	
The nature of the subject	The subject is a human being who has a desire or request to obtain.	
The nature of the object	The object is something that refers to desire and request.	
The nature of the prepositional phrase	The prepositional phrase starts with the preposition *fī* في 'in', *ʾilā* إلى 'to', and *ʿalā* على 'on' followed by a noun that refers to a desire or request.	
Examples	Intransitives	1. أمَل محمد في النجاح 2. جشِع محمد في تجارته 3. رغِب محمد في النجاح 4. طمَح محمد في النجاح 5. طمَع محمد في جمع المال 6. طمَع محمد في تجارته
		7. تاق محمد إلى النجاح 8. حنَّ محمد إلى الوطن 9. دعا محمد إلى المحبة 10. رمى محمد إلى النجاح 11. هدَف محمد إلى النجاح
		12. حرِص محمد على النجاح
	Transitives	13. راد محمد النجاح 14. رام محمد النجاح 15. رجا محمد النجاح 16. سأَل محمد النجاح 17. شحَذ محمد المال 18. طلَب محمد المال 19. عاز محمد المال 20. قصَد محمد النجاح 21. نشَد محمد النجاح

4.2.16 Verbs of intention (class 16)

Class Description	These verbs denote the intention or aim of the subject. The subject should be a human being.
Levin's class	Verbs of future having
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *ḏahab* (إلى) ذهب 'to head for'

	2. *ramā* (إلى) رمى 'to drive at, aim at, intend to, purpose to; to be aimed at, be intended to' 3. *saᶜā* (إلى، ل، وراء) سعى 'to seek (to), attempt (to), endeavor (to), try hard (to), make every effort (to), strive (to); to pursue, strive for, seek after' 4. *ṭamaḥ* طمح 'to aspire to or after, seek (to), aim to; to long for, yearn for' 5. *ᶜamad* عمد 'to intend, purpose, design, mean, do on purpose, do intentionally' 6. *ᶜanā* عنى 'to mean, intend, purpose, have in mind' 7. *qaṣad* قصد 'to intend, purpose, design, mean, have in mind, drive at, aim at' 8. *nawā* نوى 'to intend, purpose, plan, design, mean, have in mind; to resolve, determine, make up one's mind' 9. *hadaf* هدف 'to aim at, drive at, purpose to, design to'.
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)
The nature of the subject	The subject is a human being who intends to do something.
The nature of the prepositional phrase	The prepositional phrase is headed by the preposition *ʾilā* إلى 'to', *fī* في 'in', or *bi* بـ 'to' followed by a noun that refers to the object of desire or request.
Examples	1. ذهَب محمد إلى قول الصدق 2. رمى محمد إلى النجاح 3. طمَح محمد في النجاح 4. سعَى محمد إلى النجاح 5. عمِد محمد إلى الصدق 6. عنَى محمد بالصدق 7. قصَد محمد إلى النجاح 8. نوَى محمد على الصدق 9. هدَف محمد إلى النجاح

4.2.17 Verbs of combining and constructing (class 17)

Class Description	These verbs denote works of combining, mixing, attaching and building that may occur on animate and inanimate objects. The subject is an animate being.
Levin's class	Verbs of combining and attaching / Build verbs
Vendler's class	Achievement verbs
Transitive or intransitive	Transitive
Class members	1. *banā* بنى 'to build, construct, erect, set up, put up, raise, rear; to build up, develop, create, establish, make, form' 2. *jabā* جبى 'to collect, levy, raise' 3. *jabal* جبل 'to blunge; to knead'

	4. *jama ᶜ* جمع ‘to gather, collect; to pick (up); to combine, group; to join, unite, connect, pair; to assemble, put together, fit together, joint’ 5. *ḥabak* حبك ‘to weave; to knit; to crochet’ 6. *ḥazam* حزم ‘to pack, package, parcel, tie up, wrap (up), bundle, bale, stow’ 7. *ḥašā* حشا ‘to stuff, fill, fill up, fill in; to pad; to wad; to cram, ram, pack, charge; to insert, foist into; to interpolate’ 8. *ḥašad* حشد ‘to gather, collect, assemble, congregate, crowd, rally, round up; to accumulate, amass, pile up, heap up, stack’ 9. *ḥašar* حشر ‘to gather, assemble, crowd, congregate, overcrowd’ 10. *xāṭ* خاط ‘to sew, stitch; to tailor’ 11. *xafaq* خفق ‘to beat, whip, whisk’ 12. *xalaṭ* خلط ‘to mix, mingle, blend, commingle, admix, combine’ 13. *damaj* دمج ‘to merge, amalgamate, unite, join, fuse, incorporate, integrate, affiliate, combine, blend’ 14. *rabaṭ* ربط ‘to bind, tie (up), fasten, make fast, attach, moor; to connect, link, join, unite, attach, couple; to tie (in); to ligate; to correlate’ 15. *rataq* رتق ‘to mend, patch, sew up, darn, fin-draw’ 16. *radam* ردم ‘to fill up (with earth)’ 17. *razam* رزم ‘to pack, package, parcel, wrap up, bundle, bale’ 18. *raqaᶜ* رقع ‘to patch (a garment)’ 19. *sadd* سدّ ‘to plug up, stop up; to stopper; to seal, shut (off); to block (up, off), bar, obstruct, occlude, obturate, barricade, choke (up)’ 20. *saraj* سرج ‘to braid, plait’ 21. *saqaf* سقف ‘to roof, ceil’ 22. *šadd* شدّ ‘to tighten, tauten, strain, draw tight, stretch tight, pull taut’ 23. *ṣarr* صرّ ‘to bundle, bale, wrap (up), pack, package, parcel; to bind, tie (up)’ 24. *ḍaġaṭ* ضغط ‘to press, compress, squeeze’ 25. *ḍamm* ضمّ ‘to join, unite, bring together, conjoin, connect, bind; to combine, amalgamate; to group; to couple, pair; to gather, collect’ 26. *ṭamar* طمر ‘to bury, inter; to embed; to fill up (with earth)’ 27. *ᶜaqad* عقد ‘to knot, tie, knit; to fasten, lock; to join’ 28. *ġazal* غزل ‘to spin’ 29. *ġamar* غمر ‘to flood, overflow, inundate; to engulf, gulf, overwhelm; to cover, overspread, spread over, suffuse, fill, fill up, pervade’ 30. *laᵓam* لأمَ ‘to dress, bandage, bind up’ 31. *laḥam* لحم ‘to weld, solder; to fuse; to mend’ 32. *laṣiq* لصق ‘to stick (to), adhere (to), cling (to); to agglutinate, conglutinate’ 33. *laff* لفّ ‘to connect, join, attach’ 34. *lamm* لمّ ‘to collect, gather’ 35. *mazaj* مزج ‘to mix, mingle, blend, admix, commix, commingle, combine’ 36. *nasaj* نسج ‘to weave; to knit’ 37. *waṣal* (الشَّيْءَ بِالشَّيْءِ) وَصَلَ ‘to connect, link, join, unite, joint, attach, couple, pair’.
The syntactic frame of transitives	Verb + Subject + Object

The nature of the subject	The subject is a human being who can do work of combining and constructing.	
The nature of the object	The object can be people (construction) materials, tools, or clothes.	
Examples	1. بنَى محمد الجدار 2. جبَى محمد الإيرادات 3. جبَل محمد المواد 4. جمَع محمد المواد 5. حبَك محمد الثوب 6. حزَم محمد الحطب 7. حشا محمد العشب 8. حشَد محمد الطلاب 9. حشَر محمد الأغنام 10. خاط محمد الثوب 11. خفَق محمد المواد 12. خلَط محمد المواد 13. دمَج محمد المواد 14. ربَط محمد الحبال 15. رتَق محمد الثوب 16. ردَم محمد الحفرة 17. رزَم محمد الحطب 18. رقَع محمد الثوب 19. سدّ محمد الحفرة	20. سرَج محمد الثوب 21. سقَف محمد البيت 22. شدّ محمد الحبال 23. صرّ محمد الجعبة 24. ضغَط محمد المواد 25. ضمّ محمد الحبال 26. طمَر محمد الحفرة 27. عقَد محمد الحبال 28. غزَل محمد الثوب 29. غمَر محمد الحفرة 30. لأَم محمد الحفرة 31. لحَم محمد الشق 32. لصِق محمد المواد 33. لفّ محمد الحبال 34. لمّ محمد المواد 35. مزَج محمد المواد 36. نسَج محمد الثوب 37. وصَل محمد الحبال

4.2.18 Verbs of sending and carrying (class 18)

Class Description	These verbs describe actions that involve carrying animate and inanimate objects.
Levin's class	Verbs of sending and carrying
Vendler's class	Achievement verbs
Transitive or intransitive	Transitive
Class members	1. *ba^{c}a̲ṯ* بعث 'to send, send out, dispatch, forward, expedite' 2. *jarr* جرَّ 'to draw, pull, drag, tug, haul, tow; to trail along (on the ground), drag along' 3. *jaraf* جرف 'to sweep (away); to drift; to wash away, wash out; to carry off, tear away; to erode; to shovel (away), spade; to plow; to remove' 4. *ḥamal* حمل 'to carry; to load up, lift; to convey, transport, deliver; to transmit (to), communicate (to), take (to); to carry with oneself, to carry away, take away' 5. *dafa^{c}* دفع 'to propel, move, impel, drive forward, shove, thrust, push ahead, push along, push forward, rush' 6. *rafa^{c}* رفع 'to raise, lift (up), uplift, hoist (up), elevate, boost, upraise, upheave, jack up, hike, up' 7. *zaff* (العروس) زفّ 'to carry home the bride in procession; to give away (in a marriage ceremony)' 8. *sāq* ساق 'to carry (along), transport, transfer, transmit, deliver; to convey, communicate, impart, bring, transmit; to send, dispatch'

	9. *saḥab* سحب ‘to pull, draw (off), draft, drag, haul, tug, tow; to trail along (on the ground), drag along’ 10. *sakab* سكب ‘to pour (out), shed, spill, empty’ 11. *šāl* شال ‘to raise, lift (up), pick up; to carry, convey, transport’ 12. *šaḥan* شحن ‘to ship, freight, consign, transport, forward’ 13. *ᶜabar* (بـ) عبر ‘to carry (take, transport) across or through or over’ 14. *ᶜatal* عتل ‘to carry’ 15. *naqal* نقل ‘to transport, carry, haul; to take; to move; to transfer, shift; to transmit, deliver; to convey, communicate, impart, bring’ 16. *wazar* وزر ‘to carry, bear (a burden)’.	
The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject can be an animate being, vehicle, or natural factor that can move things from one place to another.	
The nature of the object	The object is an entity that can be moved from one place to another.	
Examples	1. بعَث محمد الأشياء 2. جرَّ محمد الأشياء 3. جرف محمد الأشياء 4. حمل محمد الأشياء 5. دفع محمد الأشياء 6. رفع محمد الأشياء 7. زفّ محمد الأشياء 8. ساق محمد الأشياء	9. سحب محمد الأشياء 10. سكب محمد الأشياء 11. شال محمد الأشياء 12. شحَن محمد الأشياء 13. عبَر محمد الأشياء 14. عتَل محمد الأشياء 15. نقل محمد الأشياء 16. وزَر محمد الأشياء

4.2.19 Verbs of separating and disassembling (class 19)

Class Description	These verbs denote an action in which a usually animate subject separates or breaks up animate and inanimate objects.
Levin’s class	Verbs of separating and disassembling
Vendler’s class	Accomplishment verbs
Transitive or intransitive	Transitive
Class members	1. *batar* بتر ‘to cut off, sever, lop off’ 2. *jaḏam* جذم ‘to cut off, chop off, lop off; to amputate, remove; to mutilate, maim’ 3. *ḥazz* حزّ ‘to cut, cut off’ 4. *ḥall* حلّ ‘to untie, unfasten, unbind, undo, unravel, loosen, unloose, unfix, unwind, unscrew, untangle, disentangle, disengage, free’ 5. *daqq* دقّ ‘to pound, grind, crush, bruise, bray, powder, beat, stamp, pulverize, comminute, pestle, triturate’ 6. *dakk* دكّ ‘to tear down, pull down, raze, wreck, demolish, destroy, ruin, crush, smash, devastate; to undermine’ 7. *saḥaq* سحق ‘to crush, pound, grind, beat, bruise, stamp, bray, powder, pulverize, comminute, pestle, triturate’ 8. *šaṭar* شطر ‘to halve, bisect, divide into two (usually equal) parts; to split, intersect, cut across; to sunder, sever, cut off’

	9. *šaqq* شقّ ‘to split, cleave, fissure, crack, rift, break; to tear, rend, rip (apart), rive; to cut open, slash open, slit open, cut, incise, make incisions into; to carve up, dissect’ 10. *ṣada*ᶜ صدع ‘to split, cleave, crack, break, rift’ 11. ᶜ*azal* عزل ‘to separate, isolate, seclude, segregate, set aside or apart, remove’ 12. *fataḥa* فتح ‘to open, unlock, unclose, unfasten, unfold, unwrap’ 13. *faraz* فرز ‘to separate, set apart or aside, isolate’ 14. *faram* فرم ‘to mince, chop (up), hash’ 15. *fasax* فسخ ‘to detach, disjoin, disconnect, separate’ 16. *faṣal* فصل ‘to separate, part, divide, disunite, dissociate, disconnect, disjoin, disengage, disentangle, detach, break up, resolve’ 17. *fakk* فكّ ‘to unscrew’ 18. *falaq* فلق ‘to split, cleave, fissure, rift, rend, rip; to burst, break open, break apart’ 19. *qasam* قسم ‘to divide, part, split, separate, break up, partition, section, subdivide’ 20. *qaṣṣ* قصّ ‘to cut, cut off, clip, snip; to scissor; to shear, shear off, fleece (wool); to mow, cut down (grass, etc.)’ 21. *qaṭa*ᶜ قطع ‘to cut, cut off, sever; to chop off; to cut down (a tree); to amputate; to break; to divide, section; to segment; to separate, disconnect, tear (apart)’ 22. *kasar* كسر ‘to break, fracture, shatter, smash, crash, crush’ 23. *maza*ᶜ مزع ‘to split, break open, break apart’ 24. *naṯar* نثر ‘to scatter, disperse, disseminate, strew, bestrew, sprinkle’ 25. *našar* نشر ‘to saw’ *26.* *najar* نجَر ‘to hew (out), carve, plane; to whittle, pare’ 27. *naqar* نقر ‘to dig; to excavate, hollow out; to bore, drill, pierce, hole, pit’ 28. *hadam* هدم ‘to tear down, pull down, raze, wreck, demolish, destroy, devastate; to subvert’.	
The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject can be an animate being, vehicle, or natural factor that can separate or break up animate and inanimate objects.	
The nature of the object	The object is an animate or inanimate entity that is able to be separated or disassembled.	
Examples	1. بتَر محمد يده 2. جذَم محمد الحبل 3. حزّ محمد الحبل 4. حلّ محمد الحبل 5. دقّ محمد المسمار 6. دكَّ محمد الجدار 7. سحَق محمد الحجارة 8. شطَر محمد لحجارة 9. شقّ محمد الثوب 10. صدَع محمد الجدار 11. عزَل محمد الطعام 12. فتَح محمد الصندوق	15. فسَخ محمد القماش 16. فصَل محمد المواد 17. فكّ محمد الباب 18. فلَق محمد الحجارة 19. قسَم محمد الطعام 20. قصّ محمد القماش 21. قطَع محمد الماء 22. كسَر محمد الزجاج 23. مزع محمد القماش 24. نثَر محمد الحبوب 25. نشَر محمد الخشب 26. نقَر محمد الجدار

27. نشَر محمد الخشب 28. هدَم محمد الجدار	13. فرَز محمد المواد 14. فرَم محمد اللحم	

4.2.20 Verbs of removing (class 20)

Class Description	These verbs refer to a physical action by which a usually animate subject removes a usually inanimate object from its location.
Levin's class	Verbs of removing
Vendler's class	Accomplishment verbs
Transitive or intransitive	Transitive
Class members	1. *jaḥaf* جحف 'to scrape off, scratch off, shave off; to peel off; to sweep away, carry away' 2. *jaraf* جرف 'to sweep (away); to drift, carry away; to wash out; to carry off, tear away; to erode; to shovel (away), spade; to plow; to remove' 3. *jazz* جزّ 'to cut, cut off, clip; to shear, shear off, fleece (wool); to mow, cut down (grass, etc.)' 4. *ḥaḏaf* حذف 'to delete, cancel, strike off, expunge, cross off; to eliminate, cut out, take out; leave out, drop, skip; to take away, clip off' 5. *ḥalaq* حلق 'to shave, shave off; to have one's hair cut, have a haircut' 6. *xala ᶜ* خلع 'to extract, pull out, pluck out, tear out, uproot, root up, root out, deracinate' 7. *šaṭab* شطب 'to strike off, strike out, cross out, scratch out, cancel, delete; to remove, take off, take out; to erase, efface, expunge' 8. *qaḥaf* قحف 'to sweep away, carry away; to scoop; to scrape (off), graze' 9. *qašaṭ* قشط 'to take off, strip off, remove' 10. *qala ᶜ* قلع 'to pluck out, tear out, extract, pull out, pull up by the roots, uproot, deracinate, root up, root out, eradicate, extirpate, exterminate' 11. *kašaṭ* كشط 'to scrape off, scratch off, rub off, shave off, abrade, graze, excoriate, gall; to remove' 12. *maḥā* محا 'to erase, wipe off, rub out, sponge out; to efface, obliterate, blot out, expunge; to wipe out, eradicate, exterminate, extinguish; to eliminate, abolish, put an end to' 13. *maraṭ* مرط 'to pluck out, pull out, tear out' 14. *masaḥ* مسح 'to wipe off, rub out, erase; to blot out, efface, obliterate; to wipe out, eradicate, exterminate, extinguish, sweep away' 15. *nataf* نتف 'to pluck out, pull out, tear out (hair, feathers, etc.); to deplume (feathers); to depilate, (hair)' 16. *naza ᶜ* نزع 'to pull out, extract, pluck out, tear out; to remove, take away, take off' 17. *nafaḍ* نفض 'to shake (off), dust off'.
The syntactic frame of transitives	Verb + Subject + Object
The nature of the subject	The subject can be an animate entity, vehicle, or natural factor.

The nature of the object	The object is an inanimate entity that can be removed or snatched from their places.	
Examples	1. جحَف محمد التراب 2. جرَف محمد التراب 3. جزّ محمد العشب 4. حذَف محمد الملفات 5. حلَق محمد شعره 6. خلَع محمد الثياب 7. شطَب محمد الملفات 8. قحَف محمد التراب 9. قشَط محمد الماء	10. قلَع محمد الشجرة 11. كشَط محمد التراب 12. محَا محمد الرسم 13. مرَط محمد الحبل 14. مسَح محمد الماء 15. نتَف محمد الشعر 16. نزَع محمد الشعر 17. نفَض محمد التراب

4.2.21 Verbs of bending (class 21)

Class Description	These verbs denote an action by which the subject bends a usually inanimate object.
Levin's class	Bend verbs
Vendler's class	Accomplishment verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *baram* برم 'to twist, twine, entwine, curl, kink' 2. *ṯanā* ثنى 'to fold, double; to tuck, roll up; to bend, flex, turn, twist, curve, inflect' 3. *ḥaraf* حرف 'to slant, cant, incline, tip, tilt, swerve, deviate, deflect' 4. *ṭawā* طوى 'to fold, double; to roll up, tuck, pleat; to bend, flex, turn' 5. *fatal* فتل 'to twist, twine, entwine, curl, kind' 6. *qalab* قلب 'to turn; to turn over, overturn, tip over, capsize; to turn up(ward), upturn; to turn upside down; to turn inside out or outside in' 7. *laff* لف 'to wrap up, roll up, fold up, furl; to wind, coil, spool, reel, convolute, curl; to twist, twine' 8. *lawā* لوى 'to twist, curl, kink, contort, wrench, wring, writhe, wry; to bend, incline, turn, curve, flex, inflect'.
The syntactic frame of transitives	Verb + Subject + Object
The nature of the subject	The subject is a human being who has the ability to bend things such as clothes and bonds.
The nature of the object	The object is an inanimate entity that is able to be bent.
Examples	1. برَم محمد الحبل 2. ثنَى محمد الحبل 3. حرَف محمد القناة 4. طوَى محمد الثياب 5. فتَل محمد الخيط 6. قلَب محمد الثياب 7. لفّ محمد المقود 8. لوَى محمد القضيب

4.2.22 Verbs of decorating and transcribing (class 22)

Class Description	These verbs denote an action which involves painting, decorating, and transcribing works. The subject who does the work should be a human being.	
Levin's class	Image creation verbs Scribble verbs	
Vendler's class	Achievement verbs	
Transitive or intransitive	Transitive	
Class members	1. *jaṣṣ* جص 'plaster, plaster of paris; gypsum; parget, stucco' 2. *xatam* ختم 'to seal, signet, stamp, impress, imprint, rubber-stamp; to postmark' 3. *xaṭṭ* خطّ 'to write, pen, inscribe; to draw, trace, line, sketch, design; to inscribe, carve, engrave' 4. *damaġ* دمغ 'to stamp, imprint, impress, print' 5. *dahan* دهن 'to paint, daub; to varnish' 6. *rasam* رسم 'to draw, trace, sketch, delineate, design; to describe (a circle, etc.); to paint' 7. *ṣabaġ* صبغ 'to dye, tint, tinge, colour, paint, tincture, imbue; to pigment' 8. *ṣaqal* صقل 'to polish, burnish, scour, smooth, sleek, slick, brush up, glaze, gloss, shine, (re)furbish, luster, buff, lap, finish; to calender; to refine, cultivate' 9. *ṭaba'* طبع 'to print; to type, typewrite; to stamp, impress, imprint' 10. *ṭalā* طلى 'to paint, daub' 11. *katab* كتب 'to write, inscribe, write down, set down in writing, reduce to writing, record, register; to compose, compile, draw up, draft, indite' 12. *kašaṭ* كشط 'to scrape off, scratch off, rub off, shave off, abrade, graze, excoriate, gall; to remove' 13. *naḥat* نحت 'to hew (out), cut (out), carve, sculpture, chisel, grave' 14. *naqaš* نقش 'to engrave, incise, inscribe, chase; to carve (out), sculpture, chisel' 15. *wasam* وسم 'to mark, label; to stamp, brand, impress, (im)print' 16. *wašam* وشم 'to tattoo'.	
The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject is a human being who has the ability to paint, decorate or transcribe.	
The nature of the object	The object is an inanimate entity that can be decorated or inscribed.	
Examples	1. جصّ محمد الجدار 2. ختَم محمد الورقة 3. خطّ محمد الرسالة 4. دمَغ محمد الثوب	9. طبَع محمد الورقة 10. طلَى محمد الجدار 11. كتَب محمد الرسالة 12. كشَط محمد الجدار

	5. دهَن محمد الجدار 6. رسَم محمد اللوحة 7. صبَغ محمد الثوب 8. صقَل محمد الزجاج	13. نحَت محمد التمثال 14. نقَش محمد التمثال 15. وسَم محمد اللوحة 16. وشَم محمد يده

4.2.23 Verbs of measurement (class 23)

Class Description	These verbs denote an action by which the subject measures the weight or size of an object.
Levin's class	Measure verbs
Vendler's class	Achievement verbs
Transitive or intransitive	Transitive
Class members	1. *rajaḥ* رجح 'to weigh something in the hand' 2. *razan* رزن 'to weigh in the hands' 3. *ṣāᶜ* صاع 'to measure; to weight' 4. *qās* قاس 'to measure, gauge, quantify' 5. *kāl* كال 'to measure; to gauge; to weigh' 6. *wazan* وزن 'to weigh, determine the weight of'.
The syntactic frame of transitives	Verb + Subject + Object
The nature of the subject	The subject is a human being who has the ability to weigh or measure things.
The nature of the object	The object is an animate or inanimate entity that can be weighed or measured.
Examples	رجَح محمد الوزن رزَن محمد الوزن صاع محمد الكمية قاس محمد المسافة كال محمد الكمية وزَن محمد الكمية

4.2.24 Verbs of quantity and size (class 24)

Class Description	These verbs refer to the quantity or size of an animate or inanimate subject.
Levin's class	Measure verbs
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *daqq* دقّ 'to be or become small, little, tiny, minute' 2. *zād* زاد 'to increase, grow, augment, multiply, swell, build up, intensify, heighten; to be or become more, great(er), large(r)' 3. *šaḥḥ* شحّ 'to run short, fall short, run out, fail, be scarce or insufficient, decrease, diminish, decline, dwindle'

	4. *ṣaġur* صغر 'to be or become small, little, tiny, minute; to decrease, diminish, lessen, shrink, wane, dwindle' 5. *ġazur* غزُر 'to abound, superabound; to be or become abundant, copious, plentiful, ample' 6. *fāḍ* فاض 'to abound, superabound; to be or become (super) abundant, plentiful, copious' 7. *qall* قل 'to be or become little, small, few; to lessen, decrease, diminish, drop (off), grow less; to be or become less (than), smaller (than), fewer (than)' 8. *qaluṣ* قلص 'to shrink, dwindle, recede, diminish, decrease, decline' 9. *kabur* كبر 'to be(come) or grow great(er), big(ger), large(r); to grow, increase, enlarge, augment, swell' 10. *kaṯur* كثر 'to increase, grow, multiply, augment; to abound, exist in large numbers or amounts; to be or become much, many, numerous, abundant, plentiful' 11. *nadur* ندُر 'to be rare, infrequent, uncommon, scarce' 12. *nagus* نقص 'to decrease, diminish, lessen, become less, grow less, drop (off), decline, fall, abate; to be reduced, decreased, diminished'.
The syntactic frame of intransitives	Verb + Subject
The nature of the subject	The subject can be an animate or inanimate entity that is characterized by possible increase or decrease in its quantity or size.
Examples	1. دقّ الطريق 2. زاد الماء 3. شحّ الماء 4. صغُر الطريق 5. غزُر الماء 6. فاض الماء 7. قلّ الماء 8. قلَص الماء 9. كبُر الطريق 10. كثُر الماء 11. ندُر الماء 12. نقُص الماء

4.2.25 Verbs of stability (class 25)

Class Description	These verbs denote that the subject is stable and unchangeable in a certain place.
Levin's class	Lodge verbs
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *ʾawā* (إلى) أوى 'to lodge at, take up lodgings at, put up at, stay at, take up quarters at; to take refuge in, seek or take shelter in, harbor in' 2. *bāt* باتَ 'to spend or pass the night; to stay overnight' 3. *baqay* بقي 'to remain, stay; to be left over, be left behind; to last, continue, persist, subsist, go on; to keep on (doing), keep doing, persist in, persevere in, stick to' 4. *ṯabat* ثبت 'to be or become firm, fixed, stable, steady, solid, strong, enduring, durable, lasting, permanent, unshakable, unchangeable, established; to stand firm; to set, become fast or hard; to be or become

<table>
<tr><td></td><td>constant, invariable, unchangeable, steady’
5. ṯawā ثوى ‘to stay at, remain at, dwell in, reside in, live in; to settle (down) at’
6. jaṯam جثم ‘to crouch, cower; to lie face down, fall prone, lie prone, prostrate oneself’
7. ḥaṭṭ حط ‘to halt, stop, make a stop, dismount, alight; to encamp; to camp’
8. xalad (إلى، بـ) خلد ‘to abide in, remain at, stay at’
9. dām دام ‘to last, continue, go on, persist, subsist, endure, remain’
10. rasā رسا ‘to be or become firm, fixed, stable, steady’
11. rasax رسخ ‘to take root, strike root; to be or become deep-rooted, deep-seated, firmly established; to be or become firm, fixed, settled, stable, steady, solid, strong; to set, become fast’
12. rakad ركد ‘to stagnate; to be or become stagnant, dull, slack’
13. rakan ركن ‘to be or become firm, steady, solid’
14. sakan سكن ‘to live in, dwell in, reside in, lodge in, house in, domicile in; to inhabit, populate; to settle (down) in, stay in, remain in’
15. ṣamad صمد ‘to withstand, resist, oppose; to hold (out), hold one’s own, endure, stand, last, remain firm, be steadfast’
16. ẓall ظلّ ‘to remain, stay’
17. qarr قرّ ‘to be or become well-established, firmly established, fixed, steady, stable, solid, enduring, durable, lasting, unshakable; to be or become stationary, immobile’
18. qaṭan (في، بـ) قطن ‘to live in, dwell in, reside in, lodge in; to inhabit, populate’
19. lajaʾ لجأ ‘to resort to, turn to(for security or help), take or seek refuge or shelter in or with, seek protection in or with; to refer to’
20. labiṯ (بـ) لبث ‘to stay in, remain in, abide in, keep to’
21. makaṯ (بـ) مكث ‘to stay in, remain in, reside in, dwell in live in’
22. nazal (بِـ، في، عِنْدَ، على) نَزَلَ ‘to stop at, make a stop at, halt at; to stay at, lodge at, put up at, stop over at, take lodgings at; to settle down in, reside in, live in, inhabit’
23. waṭad وطد ‘to establish, settle, stabilize, make firm, make stable; to strengthen, consolidate, brace, cement, firm up, reinforce’
24. waṭan (بـ) وطن ‘to settle down in, reside in, dwell in, live in, inhabit’.</td></tr>
<tr><td>The syntactic frame of intransitives</td><td>Verb + Subject (+ Prepositional phrase)</td></tr>
<tr><td>The nature of the subject</td><td>The subject is an animate entity who chooses to stay in a certain place.</td></tr>
<tr><td>The nature of the prepositional phrase</td><td>The prepositional phrase is headed by the preposition fī في 'in' followed by a noun that refers to a place.</td></tr>
<tr><td>Examples</td><td>1. أوَى محمد في المنزل
2. باتَ محمد في المنزل
3. بقِي محمد في المنزل
4. ثبَت محمد في المنزل
5. ثوَى محمد في المنزل
6. جثَم محمد في المنزل</td><td>14. سكَن محمد في المنزل
15. صمَد محمد في المنزل
16. ظلّ محمد في المنزل
17. قرّ محمد في المنزل
18. قطَن محمد في المنزل
19. لجَأ محمد في المنزل</td></tr>
</table>

	7. حطّ محمد في المنزل 8. خلّد محمد في المنزل 9. دام محمد في المنزل 10. رسَا محمد في المنزل 11. رسَخ محمد في المنزل 12. ركّد محمد في المنزل 13. ركَن محمد في المنزل	20. لبِث محمد في المنزل 21. مكَث محمد في المنزل 22. نزَل محمد في المنزل 23. وطَد محمد في المنزل 24. وطَن محمد في المنزل

4.2.26 Verbs of creation (class 26)

Class Description	These verbs denote an action by which the subject creates or makes animate or inanimate objects.	
Levin's class	Create verbs	
Vendler's class	Achievement verbs	
Transitive or intransitive	Transitive	
Class members	1. *bara*ʾ برأ 'to create (said of God)' 2. *banā* بنى 'to build, construct, erect, set up, put up, raise, rear; to build up, develop, create, establish, make, form' 3. *jabal* جبل 'to mold, fashion, form, shape, frame, work, create, make' 4. *jaʿal* جعل 'to create, make, form, fashion' 5. *xalaq* خلق 'to create, make, originate; to mold, fashion, shape, form, work; to produce, bring into being, engender, generate, bring about' 6. *ḏara*ʾ ذرأ 'to create' 7. *ṣāġ* صاغ 'to form, shape, fashion, mold, frame, forge, work; to create, originate, make' 8. *ṣanaʿ* صنع 'to make, do, perform; to manufacture, fabricate, produce; to fashion, form, create; to work out, bring about' 9. *ʿamil* عمِل 'to do, make; to act; to perform, carry out, execute, fulfill, accomplish; to produce, manufacture, fabricate' 10. *faṭar* فطر 'to create, make, originate, bring into being' 11. *waḍaʿ* وضع 'to make, produce; to create, form; to work out, draw up, draft; to establish, found, set up, institute'.	
The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject is a creator or a maker who has the ability to create or make animate or inanimate objects.	
The nature of the object	The object can be an animate or inanimate entity that is made or created by the subject.	
Examples	1. برَأ الله المخلوقات 2. بنى محمد المنزل 3. جبَل الله الكون 4. جعَل الله الإنسان 5. خلَق الله الكون 6. ذرَأ الله الخَلق	7. صاغ محمد الذهب 8. صنَع محمد اللعبة 9. عمِل محمد الأدوات 10. فطَر الله الخَلق 11. وضَع محمد الأشياء

4.2.27 Verbs of preparing (class 27)

Class Description	These verbs denote daily work that takes place in houses or restaurants, such as cooking, washing, cleaning and tidying.
Levin's class	Verbs of preparing Cooking verbs
Vendler's class	Activity verbs
Transitive or intransitive	Transitive
Class members	1. *ḥakk* حكّ 'to rub, scrub; to scratch, scrape; to scrape off, rub off, scratch off, abrade, chafe, fret' 2. *xabaz* خبز 'to bake; to make bread' 3. *xadam* خدم 'to serve; to attend, wait on; to work (for); to render a service to, do someone a favour' 4. *xazan* خزن 'to store, stock, warehouse, reposit; to store up, lay up, lay by; to hoard, amass, accumulate, stockpile' 5. *xalaṭ* خلط 'to mix, mingle, blend, commingle, admix, combine' 6. *daᶜak* دعك 'to rub; to massage; to scrub, scour' 7. *saḥaq* سحق 'to crush, pound, grind, beat, bruise, stamp, bray, powder, pulverize, comminute, pestle, triturate' 8. *salaq* سلق 'to boil, cook in boiling water' 9. *šaṭaf* شطف 'to rinse, wash' 10. *šawā* شوى 'to grill, broil, roast, barbecue' 11. *ṣalā* صَلَى 'to roast, broil, grill' 12. *ḍaġaṭ* ضغط 'to press, compress, squeeze; to press, compress, push, force (together), serry, pack (tight), jam (together); to squeeze' 13. *ṭabax* طبخ 'to cook' 14. *ṭaḥan* طحن 'to grind, mill, pulverise, crush' 15. *ṭahā* طها 'to cook' 16. *ṭawā* طوى 'to fold, double; to roll up, tuck, pleat; to bend, flex, turn' 17. *ᶜajan* عجن 'to knead' 18. *ᶜaṣar* عصر 'to press (out), squeeze (out), express, compress wring' 19. *ġaraf* غرف 'to ladle, scoop (up), dip out' 20. *ġasal* غسل 'to wash, rinse, lave, flush, clean(se)' 21. *ġalā* غلى 'to boil, bubble (up); to simmer' 22. *farak* فرك 'to rub, scrub; to chafe' 23. *faram* فرم 'to mince, chop (up), hash' 24. *qaraᶜ* قرع 'to knock, rap, bang, beat (on or at a door); to ring, sound, toll (a bell)' 25. *qaššš* قشّ 'to sweep, broom, brush away' 26. *qalā* قلى 'to fry' 27. *kabas* (على) كبس 'to press, compress, squeeze' 28. *kanas* كنس 'to sweep, broom, scavenge; to vacuum, vacuum-clean' 29. *kawā* كوى 'to iron, press; to launder' 30. *masaḥ* مسح 'to wipe; to mop (up); to rub; to clean, polish; to sweep; to wash' 31. *malaᵓ* ملأ 'to fill, fill up; to fill in' 32. *nafaḍ* نفض 'to shake (off), dust off' 33. *naqaᶜ* نقع 'to soak; to steep, infuse; to saturate, drench; to macerate' 34. *haras* هرس 'to mash, squash, crush, bruise, pound, pestle'.

The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject is a human being who works in the house, particularly in the kitchen.	
The nature of the object	The object is an inanimate entity such as clothes, food or kitchenware.	
Examples	1. حكّ محمد الوعاء 2. خبَز محمد الخبز 3. خدَم محمد الضيوف 4. خزَن محمد القمح 5. خلَط محمد الطعام 6. دعَك محمد الثياب 7. سحَق محمد القمح 8. سلَق محمد الطعام 9. شطَف محمد المنزل 10. شوَى محمد اللحم 11. صلَى محمد اللحم 12. ضغَط محمد اللحم 13. طبَخ محمد اللحم 14. طحَن محمد القمح 15. طهَا محمد اللحم 16. طوَى محمد الثياب 17. عجَن محمد القمح	18. عصَر محمد الليمون 19. غرَف محمد الطعام 20. غسَل محمد الثياب 21. غلَى محمد الماء 22. فرَك محمد الوعاء 23. فرَم محمد اللحم 24. قرَع محمد جرس الطعام 25. قشَّ محمد المنزل 26. قلَى محمد اللحم 27. كبَس محمد الزيتون 28. كنَس محمد المنزل 29. كوَى محمد الثياب 30. مسَح محمد المنزل 31. ملأ محمد الوعاء 32. نفَض محمد الثياب 33. نقَع محمد اللحم 34. هرَس محمد القمح

4.2.28 Verbs of ingesting (class 28)

Class Description	These verbs refer to vital events of drinking and eating performed by animate beings.
Levin's class	Verbs of ingesting
Vendler's class	Achievement verbs
Transitive or intransitive	Transitive
Class members	1. *ʾakal* أكل 'to eat; to take, take in, have (a meal, etc.)' 2. *balaʿ* بلع 'to swallow, gulp (down), gobble, ingurgitate; to swallow up, engulf, gulf, absorb, take in, devour' 3. *jaraʿ* جرع 'to swallow, gulp (down), drink, pour down, quaff' 4. *ḥasā* حسا 'to drink, sip' 5. *ḏāq* ذاق 'to taste, sample' 6. *rašaf* رشف 'to sip, sup, suck; to drink (up)' 7. *raḍaʿ* رضع 'to suck (at the breast), suckle' 8. *šarib* شرب 'to drink' 9. *ʿalak* علك 'to chew, masticate' 10. *qaraḍ* قرض 'to gnaw, nibble at, champ, bite, eat into, eat away, corrode' 11. *qaram* قرم 'to nibble at, gnaw'

	12. *qaḍam* قضم ‘to gnaw, nibble at, bite, champ’ 13. *qaṭam* قطم ‘to cut off, sever; to lop off, chop off’ 14. *lāka* لاك ‘to chew, masticate’ 15. *laḥas* لحس ‘to lick; to lick up, lap (up)’ 16. *laᶜiq* لعِق ‘to lick; to lick up, lap (up)’ 17. *lagim* لقم ‘to devour, gobble, swallow up’ 18. *lahim* لهِم ‘to devour, gobble, swallow up, gorge, ingurgitate, gormandize’ 19. *maṣṣ* مصّ ‘to suck, suck up, soak up, absorb; to sip’ 20. *maḍaġ* مضغ ‘to chew, masticate’ 21. *nahal* نهل ‘to drink’ 22. *haḍam* هضم ‘to digest (food)’.	
The syntactic frame of transitives	Verb + Subject + (Object)	
The nature of the subject	The subject is an animate being who has the ability to eat and drink.	
The nature of the object	The object is food or drink.	
Examples	1. أكَل محمد الطعام 2. بلَع محمد الطعام 3. جرَع محمد الشراب 4. حسَا محمد الطعام 5. ذاق محمد الطعام 6. رشَف محمد الشراب 7. رضَع محمد الشراب 8. شرِب محمد الشراب 9. علَك محمد الطعام 10. قرَض محمد الطعام 11. قرَم محمد الطعام	12. قضَم محمد الطعام 13. قطَم محمد الطعام 14. لاك محمد الطعام 15. لحَس محمد الطعام 16. لعِق محمد الطعام 17. لقَم محمد الطعام 18. لهِم محمد الطعام 19. مصّ محمد الشراب 20. مضَغ محمد الطعام 21. نهِل محمد الطعام 22. هضَم محمد الطعام

4.2.29 Verbs of the five senses (class 29)

Class Description	These verbs denote that the subject is characterized by attributes that belong to the five senses, including sight, hearing, touch, smell, and taste.
Levin’s class	Verbs of perception
Vendler’s class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *baṣar* (بـ) بصر ‘to see; to look at, set eyes on, lay eyes on, catch sight of, descry’ 2. *jass* جسّ ‘to touch, feel, handle’ 3. *ḥass* حسّ ‘to touch’ 4. *ḏāq* ذاق ‘to taste, sample’ 5. *raʾā* رأى ‘to see; to behold, view, descry, catch sight of, perceive, discern’ 6. *samaᶜ* سمع ‘to hear’

	7. *šamm* شم ‘to smell, sniff, scent, nose, snuff’ 8. *lamas* لمس ‘to touch, feel, handle, finger’ 9. *mass* مسّ ‘to touch, feel, handle, finger’.
The syntactic frame of transitives	Verb + Subject + Object
The nature of the subject	The subject is an animate being who has the ability to see, hear, feel, taste, and smell.
The nature of the object	The object can be an animate being or an inanimate object that can be recognized.
Examples	1. بصَر محمد الأشياء 2. جسّ محمد الأشياء 3. حسّ محمد الأشياء 4. ذاق محمد الطعام 5. رأى محمد الأشياء 6. سمِع محمد الأصوات 7. شمّ محمد الطعام 8. لمَس محمد الأشياء 9. مسّ محمد الأشياء

4.2.30 Verbs of ruling and government (Class 30)

Class Description	These verbs denote that the subject is characterized by attributes of a ruler who has the authority to make decisions.
Levin’s class	Judgement verbs
Vendler’s class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾamar* أمر ‘to order, enjoin, direct, instruct, give orders or directions or instructions (to); to charge (with), require; to dictate; to prescribe’ 2. *ḥakam* حكم ‘to rule, reign, dominate, have power over; to govern, manage, control, regulate; to order, direct, dictate; to enjoin, decree’ 3. *ḥall* حلّ ‘to dissolve, disband, break up (a parliament, an organization, a company, etc.)’ 4. *xalaᶜ* خلع ‘to depose, oust, remove (from an office), dismiss, discharge, displace; to dethrone’ 5. *xalaf* خلف ‘to succeed, be the successor of; to follow, come after; to replace, take the place of, substitute for, displace, supplant, supersede’ 6. *raʾas* رأس ‘to head, lead, be in charge of; to preside over; to chair, be the chairman of; to be or become the president (head, chief) of’ 7. *raᶜā* رعى ‘to govern, rule, regulate, control, apply to, be applicable to’ 8. *sās* ساس ‘to govern, rule; to administer, manage, direct, run, lead, handle, conduct’ 9. *sann* سن (قانوناً) ‘to enact or pass (a law); to legislate, make laws; to establish, introduce, prescribe’ 10. *ḍabaṭ* ضبط ‘to control, check, curb, contain, restrain, subdue, hold (back), keep under control, keep down, keep back’ 11. *ṭarad* طرد ‘to expel, deport, banish, exile’

	12. *ẓalam* ظلم ‘to wrong, oppress, tyrannize, aggrieve, maltreat, treat unjustly (inequitably, tyrannically, badly)’ 13. *ᶜadal* عدل ‘to act justly, establish justice, be just, be fair, be equitable, give a just judgment’ 14. *faraḍ* فرض (على) ‘to impose (upon), enjoin (on), make something someone’s duty; to ordain, decree, prescribe; to dictate; to order’ 15. *qād* قاد ‘to lead; to guide, conduct, direct; to drive, steer, pilot’ 16. *qaḍā* قضى ‘to impose, enjoin, make incumbent (upon); to ordain, decree, prescribe; to order, require; to necessitate, make necessary or requisite’ 17. *nafā* نفى ‘to banish, exile, expatriate, expel, relegate, deport’.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject + Prepositional phrase	
The nature of the subject	The subject is a human being who has authority of some kind.	
The nature of the object	The object refers to followers, decisions, or citizens.	
	1. أمَر الملكُ الوزيرَ 2. حكَم الملكُ الرعيةَ 3. حلّ الملكُ مجلسَ النواب 4. خلَع الملكُ الوزيرَ 5. خلَف الأميرُ الملكَ 6. رأس الوزير الاجتماع 7. رعَى الملك الحفل 8. ساس الملك الدولة 9. سنّ الملك التشريعات	10. ضبَط الملك التشريعات 11. طرَد الملكُ الوزير 12. ظلَم الملك الرعية 13. عدَل الملك حُكمه 14. فرَض الملك القانون 15. قاد الملك الدولةَ 16. قضَى الملك الحُكم 17. نفَى الملكُ الوزيرَ

4.2.30 Verbs of the development of life (class 31)

Class Description	These verbs describe the developments that occur in the life stages of animate beings.
Levin’s class	Verbs of existence
Vendler’s class	Accomplishment verbs
Transitive or intransitive	Intransitive
Class members	1. *balaġ* بلغ ‘to attain puberty, reach sexual maturity, be or become sexually mature (marriageable, pubescent); to attain manhood, become an adult’ 2. *ḥayiy* حيي ‘to live, be alive, exist, subsist; to lead a life’ 3. *rabā* ربا ‘to grow up’ 4. *rašad* رشد ‘to be in legal age, adulthood’ 5. *šabb* شبّ ‘to grow up, become a youth, become a young man’ 6. *ᶜāš* عاش ‘to live, be alive, exist, subsist; to lead a life’ 7. *fatiy* فتي ‘to be youthful, young, adolescent’ 8. *faṭis* فطس ‘to die’

	9. *fanā* فنى ‘to perish, pass away, cease to exist, become extinct; to evanesce, vanish; to be consumed, exhausted, worn-out’ 10. *kabir* كبر ‘to grow old, get old(er), be advanced in years; to grow up’ 11. *māt* مات ‘to die down, subside, abate, let up’ 12. *naša*ᵓ نشأ ‘to grow up; to grow, develop, evolve; to thrive, flourish’ 13. *harim* هرم ‘to age, grow old; to become decrepit’ 14. *walad* (وَلَدَ(ـتِ الحامِلُ ‘to give birth (to), bear’.	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	The subject is an animate entity who passes through stages of life.	
Examples	1. بلَغ محمد 2. حيِي محمد 3. ربَا محمد 4. رشَد محمد 5. شبّ محمد 6. عاش محمد 7. فتِي محمد	8. فطَس محمد 9. فنِي محمد 10. كبِر محمد 11. مات محمد 12. نشَأ محمد 13. هرِم محمد 14. ولَد محمد

4.2.32 Verbs of uttering (class 32)

Class Description	These verbs describe the style of saying that is said by the subject, who should be a human being.
Levin’s class	Say verbs
Vendler’s class	Activity verbs
Transitive or intransitive	Transitive
Class members	1. *bāḥ* (السّرّ) باح ‘to be or become known, revealed, disclosed, divulged, uncovered; to reveal, disclose, divulge, uncover, unearth, make known’ 2. *baṯṯ* بثّ ‘to broadcast, to radio-broadcast, transmit, air; to telecast, televise’ 3. *basaṭ* بسط ‘to set forth, present, lay open; to explain, expound, elucidate’ 4. *talā* تلا ‘to read, recite’ 5. *ḥakā* حكى ‘to tell, relate, narrate, recount, recite, report, give an account of’ 6. *xaṭab* خطب ‘to make or deliver an address or speech; to speak; to address; to preach, deliver a sermon’ 7. *ḏakar* ذكر ‘to mention, make mention of, refer to, make reference to, name, specify, state, indicate, point out to, cite, report’ 8. *rawā* روى ‘to narrate, relate, tell, recite, recount, report, give an account of; to transmit, pass on; to quote (from), cite (from)’ 9. *saja*ᶜ سجع ‘to rhyme’ 10. *sarad* سرد ‘to relate, narrate, recite, recount, report, give an account of, tell’ 11. *šaraḥ* شرح ‘to explain, elucidate, explicate, expound, illustrate, make

	clear, describe, depict, discuss' 12. *šaᶜar* شعر 'to poetize, versify, compose poetry' 13. *ᶜaraḍ* عرض 'to offer, suggest, propose' 14. *qāl* قال 'to say, tell; to speak; to utter; to state, express in words' 15. *qaraẓ* قرظ 'to praise, commend, laud, extol, eulogise' 16. *qaṣṣ* قصّ 'to narrate, relate, recount, tell, recite, report, give an account of' 17. *lafaẓa* (كَلِمَةً) لَفَظَ 'to pronounce, utter, enunciate, say; to phonate, vocalize; to speak, talk' 18. *madaḥ* مدح 'to praise, commend, laud, extol, eulogize' 19. *nabas* نبس 'to utter, say, speak' 20. *našar* نشر 'to spread, propagate, disseminate; to circulate; to promulgate, publicize, circularize, publish, make public; to popularize' 21. *naṭaq* نطق 'to pronounce, utter, enunciate, say; to articulate; to phonate, vocalize; to speak, talk' 22. *haraf* هرف 'to shower with extravagant praise, laud excessively, extol highly; to rave, talk at random' 23. *hamas* همس 'to whisper; to mumble, murmur, mutter'.
The syntactic frame of transitives	Verb + Subject (+ Object)
The nature of the subject	The subject is a human being who has the ability to express himself.
The nature of the object	The object refers to what is said by the subject.
Examples	1. باح محمد السرّ 2. بثّ محمد الخبر 3. بسَط محمد الخبر 4. تلا محمد الخبر 5. حكَى محمد الخبر 6. خطَب محمد الخبر 7. ذكَر محمد الخبر 8. شعِر محمد قصيدةً 9. روَى محمد الخبر 10. سجَع محمد الخبر 11. سرَد محمد الخبر 12. شرَح محمد الخبر 13. عرَض محمد الخبر 14. قال محمد الخبر 15. قرَظ محمد الشعر 16. قصّ محمد الخبر 17. لفَظ محمد الكلمة 18. مدَح محمد أخاه 19. نبَس محمد الكلمة 20. نشَر محمد الخبر 21. نطَق محمد الكلمة 22. هرَف محمد الخبر 23. همَس محمد الكلمة

4.2.33: Verbs of accepting (class 33)

Class Description	These verbs denote that the subject accepts or allows another person to do something, or accepts an order, decision or request.
Levin's class	
Vendler's class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾaxaḏ* (بـ) أخذ 'to accept' 2. *ʾaḏin* أذن 'to allow, permit, give permission to; to license, authorize'

	3. *tabiᶜ* تبِع ‘to obey, follow, pursue, adopt’ 4. *tarak* (ـه) ترك ‘to allow, let, permit’ 5. *raḍiy* (بِـ، عن، على) رضي ‘to be or become satisfied (with); to be or become pleased (with); to accept (to), agree (to), consent (to), assent (to), accede (to), approve (of), subscribe (to), sanction, OK’ 6. *samaḥ* (لِـ أو بِـ) سمح ‘to allow, permit, let, give permission (to); to admit; to authorize, sanction, warrant, legitimate, legitimize, legalize; to license’ 7. *qabil* (بـ) قبل ‘to accept (to), agree (to), consent (to), assent (to), approve (of), subscribe (to), OK, sanction; to take; to settle for, content oneself with; to admit’ 8. *qaniᶜ* (بـ) قنع ‘to be or become content with, satisfied with; to content oneself with, settle for’.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)	
The nature of the subject	The subject is a human being who has the ability to accept or allow for another person to do something.	
The nature of the object	The object can be a human being or an order, decision or request.	
The nature of the Prepositional phrase	The prepositional phrase is headed by the preposition *bi* بِـ ‘with’ followed by a noun that refers to an order or a matter.	
Examples	Transitives	1. تبع محمد الأمر 2. ترَك محمد الأمر
	Intransitives	3. أخَذ محمد بالأمر 4. أذِن محمد بالأمر 5. قنِع محمد بالأمر 6. رضِي محمد بالأمر 7. سمَح محمد بالأمر 8. قبِل محمد بالأمر

4.2.34 Verbs of refusing and disobedience (class 34)

Class Description	These verbs denote that the subject refuses to do something (does not accept a thing, person, or matter). The subject should be an animate being.
Levin’s class	
Vendler’s class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾabā* أبى ‘to refuse, decline, reject, turn down’ 2. *jaḥad* جحد ‘to deny, disown, disavow, disclaim; to repudiate, refuse, reject’ 3. *ḥaniṯ* حنث ‘to break (or violate) one’s oath; to perjure’

	4. *radd* ردّ 'to turn down, reject, refuse, decline' 5. *raḏal* رذَل 'to reject, discard, cast off or away' 6. *rafaḍ* رفض 'to refuse, reject, turn down, decline, repudiate, disapprove; to deny; to veto' 7. *ṣadd* صدّ 'to repel, reject, refuse, deny' 8. *ᶜaṣā* عصى 'to breach; break; commit a breach of' 9. *nabaḏ* نبَذ 'to discard, reject' 10. *nafar* (عن) نفر 'to avoid, shun, eschew, turn away from, keep away from' 11. *nakaṯ* نكث 'to break, violate, infringe; to renege, break (go back on, fail to keep) one's promise or word or commitment; to break faith' 12. *nakil* (عن، من) نكل 'to abstain from, refrain from, forbear, desist from, stop; to refuse'.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)	
The nature of the subject	The subject is a human being who has the ability to refuse to do something.	
The nature of the object	The object can be work, issue, opinion, promise, or matter.	
The nature of the Prepositional phrase	The prepositional phrase is headed by the preposition *ᶜan* عن 'about' followed by a noun that refers to a work, issue, opinion, promise, or matter.	
	Transitives	1. جحَد محمدٌ الحقَّ 2. حنِث محمد وعده 3. ردّ محمد الشكوى 4. رذل محمد الأمر 5. رفَض محمد الحق 6. عصى محمد صديقه 7. نبذ محمد صديقه 8. نكَث محمد وعده
	Intransitives	9. أبَى محمد عن قول الحق 10. صدّ محمد عن الحق 11. نفَر محمد عن الحق 12. نكِل محمد عن الحق

4.2.35 Verbs of preventing and prohibition (class 35)

Class Description	These verbs denote that the subject prevents an animate object from doing something.
Levin's class	Keep verbs
Vendler's class	Achievement verbs
Transitive or intransitive	Transitive

Class members	1. *ʾasar* أسر ‘to capture, take prisoner, arrest, apprehend, jail; to intern; to bind, fetter, shackle, chain’ 2. *ḥabas* حبس ‘to withhold, hold (back), restrain, detain; to retain; to confine, constrain; to obstruct, block, bar; to debar; to prevent, hinder’ 3. *ḥajab* حجب ‘to veil, cover, curtain; to hide, obscure, blind, wrap, (en)shroud; to cloak, mantle; to make invisible; to obstruct’ 4. *ḥajar* حجر ‘to limit someone’s legal competence; to place under guardianship; to interdict, prohibit (from); to prevent (from)’ 5. *ḥaram* حرم ‘to deprive of, dispossess of, strip of, take away from; to disentitle; to deny, refuse (to grant), withhold from; to debar, exclude’ 6. *ḥaḍar* حضر ‘to ban, prohibit, forbid, interdict, proscribe, enjoin, bar, outlaw; to taboo; to embargo’ 7. *daraʾ* درأ ‘to ward off, parry, fend off, stave off, keep off, avert, turn away, repel, repulse, drive back’ 8. *rabaṭ* ربط ‘to bind, tie (up), fasten, make fast, attach, moor; to connect, link, join, unite, attach, couple; to tie (in); to ligate; to correlate’ 9. *radaᶜ* (عن) ردع ‘to deter (from), discourage (from), prevent (from), keep (from), restrain (from), hold back (from), inhibit (from)’ 10. *zajar* زجر ‘to restrain, check, hold back, prevent, deter’ 11. *sajan* سجن ‘to jail, imprison, lock up, incarcerate, intern, confine, detain, keep or hold in custody’ 12. *ṣadd* صدّ ‘to repel, repulse, keep off or back, hold off, avert, turn away; to check, rebuff, stop; to force out, shut out,foreclose; to hinder’ 13. *ṭarad* طرد ‘to drive away or out, expel, throw out, force out, kick out, put out, oust, evict, eject, dismiss; to drive back, repel, repulse’ 14. *ᶜāq* عاق ‘to hinder, obstruct, block, stand in the way of, make difficult; to delay, slow; to prevent, hold (back), countercheck; to frustrate’ 15. *qaṭᶜ* قطع ‘to stop, suspend, discontinue, cease, halt, interrupt, break, cut, end, put an end to, terminate’ 16. *qamaᶜ* قمع ‘to curb, restrain, repress, suppress, subdue; to crush, quash, quench, squelch, put down, stifle, squash, stifle, extinguish’ 17. *kabat* كبت ‘to suppress, repress, subdue, stifle, restrain, inhibit, keep (back), hold (back), withhold, check, curb, bridle, contain’ 18. *kabaḥ* كبح ‘to rein in, bridle; to check, curb, keep under control, keep down, restrain, suppress, repress, subdue, prevent; to brake’ 19. *kaff* كفّ ‘to prevent from, keep from, restrain from, hold back from, inhibit from, dissuade from’ 20. *lajam* لجم ‘to bridle, rein in, restrain, curb, check, control, hold (back), keep down, keep back’ 21. *manaᶜ* منع ‘to prevent, hinder, stop; to deter (from); to bar, block; to forbid; to deny, withhold from; to deprive of; to debar, exclude’ 22. *nabaḏ* نبذ ‘to discard, cast away, throw away, fling away, reject, remove, eliminate, dismiss, abandon, renounce, forsake, give up, drop’ 23. *naqaḍ* نقض ‘to revoke, repeal, rescind, countermand, annul, nullify, abrogate, invalidate, cancel,; to reverse, overrule; to quash, vacate’ 24. *nahā* نهى ‘to forbid, prohibit, interdict, ban, proscribe; to restrain, prevent’.
The syntactic frame of transitives	Verb + Subject + Object

The nature of the subject	The subject can be an animate or an inanimate entity that can prevent something from doing something.	
The nature of the object	The object is an animate or inanimate entity.	
Examples	1. أسَر محمدٌ الخصمَ 2. حبَس محمدٌ الخصمَ 3. حجَب محمدٌ الخصمَ 4. حجَر محمدٌ الخصمَ 5. حرَم محمدٌ الخصمَ 6. حضَر محمدٌ الخصمَ 7. درَأ محمدٌ الخصمَ 8. ردَع محمدٌ الخصمَ 9. زجَر محمدٌ الخصمَ 10. سجَن محمدٌ الخصمَ 11. صدّ محمدٌ الخصمَ 12. طرَد محمدٌ الخصمَ	13. عاق محمدٌ الخصمَ 14. قطَع محمدٌ الخصمَ 15. قمَع محمدٌ الخصمَ 16. كبَت محمدٌ الخصمَ 17. كبَح محمدٌ الخصمَ 18. كفّ محمدٌ الخصمَ 19. لجَم محمدٌ الخصمَ 20. منَع محمدٌ الخصمَ 21. نبَذ محمدٌ الخصمَ 22. نقَض محمدٌ الخصمَ 23. نهَى محمدٌ الخصمَ

4.2.36 Verbs of occurrence and progressing (class 36)

Class Description	These verbs denote that the subject is characterized by attributes that refer to starting, progressing, or delaying an event.
Levin's class	Verbs of occurrence
Vendler's class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾaṯal* أثل 'to be deep-rooted, firmly established' 2. *ʾajil* أجل 'to tarry, linger; to be late' 3. *bāt* بات 'to become, come to be, grow (into), turn (into); to be; to reach a stage where, get to a point where' 4. *badaʾ* بدأ 'to begin, start, set in, commence, originate, get under way, come into being, come into existence, arise, rise, spring up, crop up' 5. *tamm* تمّ 'to be complete, full, whole, entire, total; to be completed, concluded, finalized, terminated; to end' 6. *ḥadaṯ* حدث 'to happen, take place, occur, come to pass, transpire, go on, pass' 7. *sabaq* سبق 'to precede, antecede, forego, be (go, come) before or ahead of; to antedate, predate, be earlier than, happen before' 8. *salaf* سلف 'to pass, elapse, go by, be past, be over, be bygone; to precede, antecede' 9. *šaraʿ* شرع 'to begin, start, commence, set about, set to; to go into, enter upon' 10. *ġabar* غبر 'to pass, elapse, go by; to be past, elapsed, bygone' 11. *ġadum* قدم 'to precede' 12. *kamal* كمل 'to be or become complete, full, total, perfect, consummate; to be or become completed, finished, concluded, consummated' 13. *waqaʿ* وقع 'to happen, take place, occur, come to pass, transpire'.
The syntactic	Verb + Subject

frame of intransitives		
The nature of the subject	The subject refers to a matter or an event.	
Examples	1. أثّل الأمر 2. أجَل الأمر 3. بات الأمر 4. بدَأ الحدث 5. تمّ الحدث 6. حدَث الأمر 7. سبَق الحدث	8. سلَف االأمر 9. شرَع الحدث 10. غبَر الزمن 11. قدُم الأمر 12. كمَل الحدث 13. وقَع الحدث

4.2.37 Verbs of appearance (class 37)

Class Description	These verbs denote a description in which the subject appears.
Levin's class	Verbs of appearance
Vendler's class	Accomplishment verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *bān* بان 'to appear, come out, come to light, show, emerge, surfacereveal itself; to be or become visible, manifest, distinct, clear' 2. *baṯaq* بثق 'to spout, spurt, squirt, jet, shoot out, cause to flow or gush out; to extrude, force out, push out, expel, discharge, throw out' 3. *badā* بدا 'to appear, come out, come into view, emerge, manifest itself; to be or become visible, apparent, clear; to seem' 4. *baraz* برز 'to appear, come out, come into view, show, arise, spring up, manifest itself; to stand out; to come to the fore' 5. *bazaġ* بزغ 'to rise (sun, etc.); to dawn (day, era, etc.); to break (forth); to appear, emerge, come out' 6. *jalā* جلا 'to be or become clear, plain, distinct, manifest, patent, evident, obvious, explicit, unequivocal; to manifest itself, surface, come to light' 7. *jahar* جهر 'to appear, come out, show, reveal itself; to be or become known, revealed, disclosed; to be made public; to spread, circulate' 8. *ḥaḍar* حضر 'to attend, be present, be there; to report (for duty, to a certain place), present oneself; to come, appear; to reach, get to; to visit' 9. *saṭaᶜ* سطع 'to spread, diffuse, emanate; to rise' 10. *šahid* شهد 'to witness, see (personally or for oneself); to attend, be present at' 11. *ṭafā* طفا 'to emerge, surface, crop up, rise, spring up, appear' 12. *ṭall* طلّ 'to emerge, rise, show, appear, surface' 13. *ṭaliᶜ* طلع 'to rise; to appear, come out, come into view or sight, show, emerge, surface' 14. *ẓahar* ظهر 'to appear, come out, come to light, show, emerge, crop up, surface, rise, arise, develop, reveal itself; to be or become apparent' 15. *maṯal* مثل 'to appear, come into view, come out, present itself' 16. *nabaᶜ* نبع 'to well, well up, well out, gush out, gush forth, pour out, pour forth, stream, flow, flow out'

	17. *nabaġ* نبغ ‘to arise, emerge, appear, show’ 18. *nataj* نتج ‘to result from, ensue from, proceed from, follow from, arise from, derive from, originate from, issue from, grow out of, come out of’ 19. *waḍaḥ* وضح ‘to be or become clear, plain, distinct, manifest; to clarify, clear up; to appear, show; to follow clearly (from); to be clarified’	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	The subject can be an animate or inanimate entity that can appear clearly.	
Examples	1. بان القمر 2. بثَق الضوء 3. بدا القمر 4. برَز الضوء 5. بزَغ الفجر 6. جلا الضوء 7. جهَر الصوت 8. حضَر محمدٌ 9. سطَع الضوء 10. شهِد محمدٌ	11. طفا السمك 12. طَلَّ محمدٌ 13. طلَع الفجر 14. ظهَر محمدٌ 15. مثَل محمدٌ 16. نبَع الماء 17. نبَغ الماء 18. نتَج الثمر 19. وضِح الفجر

4.2.38 Verbs of disappearing and ending (class 38)

Class Description	These verbs denote a description in which the subject disappears or ends something or makes something disappear.
Levin’s class	Verbs of disappearance
Vendler’s class	Accomplishment verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *ʾafal* أفل ‘to set, go down, sink; to decline, fade, dim’ 2. *bād* باد ‘to perish, pass away, become extinct, cease to exist’ 3. *xabā* خبا ‘to go out, die, be extinguished; to abate, subside, cool off; to fade, tarnish, grow dull’ 4. *xaraj* خرج ‘to go out, come out, emerge, issue, egress; to walk out, drive out, ride out, move out, exit; to leave, depart, go away’ 5. *xasif* خسف ‘to sink down, fall down, collapse, cave in, fall in, give way; to subside’ 6. *xafiy* خفي ‘to disappear, vanish; to hide (oneself), conceal oneself; to be hidden, concealed, obscured; to be unknown; to remain (a) secret’ 7. *xamad* خمد ‘to go out, die, be extinguished; to abate, subside, let up, die down, die away, fade away, cool off, calm down’ 8. *zāl* زال ‘to disappear, vanish, clear (away), go (away); to abate; to cease to exist; to end, come to an end, terminate’ 9. *ġāb* غاب ‘to disappear, vanish; to hide (oneself), keep oneself out of sight; to be or become hidden, concealed, sheltered, mantled, covered’ 10. *ġār* غار ‘to sink, sink down, sink in, fall in, cave in, collapse, go down, subside, give way’

	11. *faraġ* فرغ ‘to be or become empty, void, vacant, unoccupied’ 12. *kaman* كمن ‘to hide; to be hidden, concealed, latent; to lie in, be in, exist in, be found in’ 13. *māt* مات ‘to die, expire, pass away’ 14. *naḍab* نضب ‘to run out; to be or become exhausted, depleted; to peter out; to dwindle, drain away, fade; to diminish, decrease, lessen’ 15. *nafid* نفد ‘to run out; to be or become exhausted, depleted, used up; to come to an end’ 16. *nafaq* نفق ‘to run out; to be exhausted, used up’.	
The syntactic frame of intransitives	Verb + Subject	
The nature of the subject	The subject can be any entity that can disappear.	
Examples	1. أفَل النجم 2. باد الغنم 3. خبا الماء 4. خرَج محمدٌ 5. حسِف الشيءُ 6. خفِي الماء 7. خمَدت النار 8. زال الماء	9. غاب محمد 10. غار الماء 11. فرِغ الماء 12. كمَن الماء 13. مات محمدٌ 14. نضَب الماء 15. نفِد الماء 16. نفَقت الماشية

4.2.39 Verbs of bodily movements (class 39)

Class Description	These verbs describe the bodily movements of an animate being.
Levin’s class	Curtsey verbs
Vendler’s class	Achievement verbs
Transitive or intransitive	Intransitive
The syntactic frame of intransitives	1. *barak* برك ‘to kneel down; to lie down, rest’ 2. *jaṯā* جثا ‘to kneel, rest or fall on the knees; to genuflect, bend the knee’ 3. *jalas* جلس ‘to sit down, sit, take a seat, seat oneself’ 4. *ḥanā* (رَأسَه أو ظَهْرُه) حَنَى ‘to bow, bend (the head or body), stoop; to hunch’ 5. *raqad* رقد ‘to lie down, repose, rest’ 6. *raqaṣ* رقص ‘to dance’ 7. *rakaᶜ* ركع ‘to kneel (down); to bow (down)’ 8. *sajad* سجد ‘to prostrate oneself (in worship), genuflect, kneel (with the forehead touching the ground), bow (down)’ 9. *ᶜaṯir* عثر ‘to tumble’ 10. *qaᶜad* قعد ‘to sit down, sit, take a seat, seat oneself’ 11. *māl* مال ‘to incline, slope, slant, skew, tilt, tip, cant; to be or become inclined, sloping, slanting, oblique’ 12. *nām* نام ‘to sleep’ 13. *nahad* نهد ‘to rise, get up’

	14. *nahaḍ* نهض ‘to rise, get up’ 15. *waqaf* وقف ‘to stand up, rise, get up, stand erect’ 16. *waṭiʾ* وطِئ ‘to tread on, step on, walk on, foot on; to set foot on; to trample down, trample underfoot’.	
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)	
The nature of the subject	The subject is an animate entity who can move its body parts.	
The nature of the Prepositional phrase	The prepositional phrase is headed by the preposition *ʿala* على ‘on’ followed by a noun that refers to a place.	
Examples	1. برَك الجَمَلُ على الأرض 2. جثَا الجَمَلُ على الأرض 3. جلَس محمدٌ على الأرض 4. حنَى محمدٌ على الأرض 5. رقَد محمدٌ على الأرض 6. رقَص محمدٌ على المسرح 7. ركَع محمدٌ على الأرض 8. سجَد محمدٌ على الأرض	9. عثر محمدٌعلى الأرض 10. قعَد محمدٌ على الأرض 11. مال محمدٌ على الأرض 12. نهَد محمدٌ على الأرض 13. نهَض محمدٌ على الأرض 14. وقَف محمدٌ الأرض 15. وطِئ محمدٌ على الأرض

4.2.40 Verbs of taking and giving (class 40)

Class Description	These verbs denote an action in which the subject takes, gives or brings something or someone.
Levin’s class	Bring and take verbs Give verbs
Vendler’s class	Accomplishment verbs
Transitive or intransitive	Transitive
Class members	1. *ʾaxaḏ* أخذ ‘to take; to pick up; to take in; to receive, obtain’ 2. *jāʾ* (بـ) جاء ‘to bring, bring forward, fetch, get, produce, advance, present, introduce’ 3. *jalab* جلب ‘to bring, fetch, get, bring forward, introduce’ 4. *ḥāz* حاز ‘to hold, possess, have, take or gain possession of, lay hands on, occupy, seize; to acquire, win, gain; to achieve, attain’ 5. *ḥadar* حدر ‘to bring down, lower, drop’ 6. *ḥaṣal* (على) حصل ‘to obtain, get, acquire, win, gain, earn, receive; to attain, achieve; to possess, own, have’ 7. *ḥaẓiy* (بـ) حظي ‘to acquire, get, obtain, win, gain; to attain, achieve’ 8. *dān* دان ‘to borrow, contract (raise, take up) a loan, make or incur debts’ 9. *raji ʿ* (بـ) رجع ‘to entail; to bring about; to bring in, return, yield, produce, pay’ 10. *radd* ردّ ‘to return, give back, restore, restitute; to send back; to bring back, take back, turn back; to put back, lay back, replace, place back’ 11. *saraq* سرق ‘to steal, pilfer, pinch, filch, purloin, abstract, thieve; to burglarize, housebreak; to rob, rip off; to hold up’

	12. *salab* سلب ‘to steal, rip off, rob, abstract, fleece, plunder, pillage, rifle, loot, spoil, ransack, maraud; to strip of, dispossess of’ 13. *ẓafar* ظفر ‘to win, gain, obtain, get, attain, achieve’ 14. *qaraḍ* قرَض ‘to lend, loan, advance (money to)’ 15. *kasab* كسب ‘to gain, win, profit, earn, get, obtain, acquire, attain, reap, harvest’ 16. *manaḥ* منح ‘to grant (to), give (to), donate (to), award (to), confer upon, bestow upon; to endow with, gift with; to contribute (to)’ 17. *nāl* نال ‘to obtain, get, acquire, win, gain, earn, receive; to attain, achieve, accomplish, realize’ 18. *naḥal* نحل ‘to present with, gift with, make or give a present (gift, donation) to, donate (to), grant (to), give (to), bestow upon’ 19. *nafaḥ* نفح ‘to give (to), grant (to), present (to or with), donate (to), accord (to), award (to), bestow upon, confer upon’ 20. *nahab* نهب ‘to plunder, loot, pillage, rifle, spoil, despoil, spoliate, maraud, rob’ 21. *wahab* وهب ‘to donate (to), grant (to), give (to), accord (to), award (to), bestow upon, confer upon; to present (to or with)’.	
The syntactic frame of transitives	Verb + Subject + Object	
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)	
The nature of the subject	The subject is a human being that can take and hold something.	
The nature of the object	The object can be an animate being or an inanimate object that can be taken by the subject.	
The nature of the prepositional phrase	The prepositional phrase is headed by the prepositions *bi* بـ ‘with’ or *ᶜalā* على ‘on’ followed by a noun that refers to something that can be taken.	
Examples	Transitives	1. أخَذ محمدٌ الشيءَ 2. جلَب محمدٌ الشيءَ 3. حاز محمدٌ الشيءَ 4. حذّر محمدٌ الشيءَ 5. دان محمدٌ الشيءَ 6. ردّ محمدٌ الشيءَ 7. سرَق محمدٌ الشيءَ 8. سلَب محمدٌ الشيءَ 9. قرَض محمدٌ الشيءَ 10. كسَب محمدٌ الشيءَ 11. منَح محمدٌ الشيءَ 12. نال محمدٌ الشيءَ 13. نحَل محمدٌ الشيءَ 14. نفَح محمدٌ الشيءَ 15. نهَب محمدٌ الشيءَ 16. وهَب محمدٌ الشيءَ

	Intransitives	17. جاء محمدٌ بالشيءِ 18. حصَل محمدٌ على الشيء 19. حظِي محمدٌ بالشيءَ 20. رجَع محمدٌ بالشيءَ 21. ظفَر محمدٌ بالشيءَ

4.2.41 Verbs of human sounds (class 41)

Class Description	These verbs describe the sounds that are produced by a human being.	
Levin's class	Verbs of manner of speaking	
Vendler's class	State verbs	
Transitive or intransitive	Intransitive	
Class members	1. *ʾann* أنَّ 'to moan, groan, whimper, whine, wail' 2. *bakā* بكى 'to cry, weep, shed tears, break or burst into tears' 3. *xann* خنّ 'to twang, snuffle, nasalize, speak through the nose, speak in a nasal tone or manner, speak nasally' 4. *zaᶜiq* زعق 'to cry, yell, shout, scream, shriek, screech, squall' 5. *šaxar* شخر 'to snort' 6. *šadā* شدا 'to sing, chant, warble' 7. *ṣāt* صات 'to sound, ring, toll, knell, make a sound or noise; to phonate, produce speech sounds; to vocalize; to shout, cry, yell' 8. *ṣāḥ* صاح 'to cry, yell, shout, scream, screech, shriek, squall, whoop' 9. *ṣadaḥ* صدح 'to sing, chant, warble' 10. *ṣarax* صرخ 'to cry, yell, shout, scream, shriek, screech, squall' 11. *ṣafar* صفر 'to whistle; to hiss, sibilate; to toot' 12. *ḍaḥik* ضحك 'to laugh' 13. *ṭann* طنّ 'to buzz, hum, drone; to whizz; to ring' 14. *nāḥ* ناح 'to wail, lament, cry, weep' 15. *nadab* ندب 'to mourn (for), lament, bewail, wail over, weep (for or over), moan' 16. *nafax* نفخ 'to blow, puff' 17. *hataf* هتف 'to shout, cry, yell; to exclaim, cry out' 18. *hadar* هدر 'to roar; to snarl, growl'.	
The syntactic frame of intransitives	Verb + Subject (+ prepositional phrase)	
The nature of the subject	The subject is a human being who can produce sounds.	
The nature of the prepositional phrase	Optionally, the prepositional phrase is headed by the preposition *bi* بـ 'with' followed by a noun that refers to sound.	
Examples	1. أنَّ محمدٌ (بصوتٍ مرتفع) 2. بكى محمدٌ (بصوتٍ مرتفع) 3. خنّ محمدٌ (بصوتٍ مرتفع)	10. صرَخ محمدٌ (بصوتٍ مرتفع) 11. صفَر محمدٌ (بصوتٍ مرتفع) 12. ضحِك محمدٌ (بصوتٍ مرتفع)

	4. زعِق محمدٌ (بصوتٍ مرتفع) 5. شخَر محمدٌ (بصوتٍ مرتفع) 6. شدَا محمدٌ (بصوتٍ مرتفع) 7. صات محمدٌ (بصوتٍ مرتفع) 8. صاح محمدٌ (بصوتٍ مرتفع) 9. صدَح محمدٌ (بصوتٍ مرتفع)	13. طنّ محمدٌ (بصوتٍ مرتفع) 14. ناح محمدٌ (بصوتٍ مرتفع) 15. ندُب محمدٌ (بصوتٍ مرتفع) 16. نفَخ محمدٌ (بصوتٍ مرتفع) 17. هتَف محمدٌ (بصوتٍ مرتفع) 18. هدَر محمدٌ (بصوتٍ مرتفع)

4.2.42 Verbs of sounds made by animals (class 42)

Class Description	These verbs describe the sounds that are produced by a non-human animate being.
Levin's class	Verbs of sounds made by animals
Vendler's class	State verbs
Transitive or intransitive	Intransitive
Class members	1. *ṯaġā* (الخروف) ثغا 'to bleat' 2. *zaʾar* (الأسد) زأر 'to roar' 3. *sajaʿ* (الحمام) سجع 'to coo' 4. *ṣahal* (الخيل) صهل 'to neigh, whinny' 5. *ʿawā* (الكلب) عوى 'to howl, yelp, yowl' 6. *māʾ* (الهر) ماء 'to mew, meow, miaow' 7. *nabaḥ* (الكلب) نبح 'to bark (at), bay (at)' 8. *naʿab* (الغُرَابُ) نَعَبَ 'to caw, croak' *naʿab* (البُومُ) نَعَبَ 'to hoot, whoop' 9. *naʿaq* (الغراب) نعق 'to caw, croak' 10. *nahaq* (الحمار) نهق 'to bray, hee-haw' 11. *hadal* (الحمام) هدل 'to coo'.
The syntactic frame of intransitives	Verb + Subject (+ Prepositional phrase)
The nature of the subject	The subject is an animal that can produce sounds.
The nature of the preposition	Optionally, the prepositional phrase is headed by the preposition *bi* بـ 'with' followed by a noun that refers to sound.
Examples	1. ثغَا الخروف (بصوتٍ مرتفع) 2. زأَر الأسد (بصوتٍ مرتفع) 3. سجَع الحمام (بصوتٍ مرتفع) 4. صهَل الخيل (بصوتٍ مرتفع) 5. عوَى الكلب (بصوتٍ مرتفع) 6. ماء الهر (بصوتٍ مرتفع) 7. نبَح الكلب (بصوتٍ مرتفع) 8. نعَب الغراب (بصوتٍ مرتفع) 9. نعَق الغراب (بصوتٍ مرتفع) 10. نهَق الحمار (بصوتٍ مرتفع) 11. هدل الحمام (بصوتٍ مرتفع)

4.2.43 Verbs of bodily care (class 43)

Class Description	These verbs describe the appearance, grooming and dressing of a human subject.	
Levin's class	Verbs of grooming bodily care Verbs of dressing	
Vendler's class	Achievement verbs	
Transitive or intransitive	Transitive	
Class members	1. *ḥalaq* حلق 'to shave, shave off; to have one's hair cut, have a haircut' 2. *xala^{c}* خلع 'to take off, doff, put off, slip off; to undress, take off one's clothes, disrobe, strip; to striptease' 3. *ṣabaġ* (الشعر) صبغ 'to dye, tint, tinge, colour, paint, tincture, imbue; to pigment' 4. *qala^{c}* قلع 'to take off one's clothes, undress, strip' 5. *kaḥal* كحل 'to darken the (edges of the) eyelids with kohl; to paint or smear with kohl to feast one's eyes on' 6. *kasā* كسا 'to clothe, dress, garb, attire, robe; to drape, face; to cover; to overlay, coat, plate' 7. *labis* لبس 'to wear, put on, be clothed in, be clad in; to dress, put on one's clothes, get dressed, clothe oneself' 8. *mašaṭ* مشط 'to comb (the hair), do or do up (the hair), dress or style (the hair), coif or coiffure (the hair)' 9. *naza^{c}* نزع 'take off, to pull out, extract, pluck out, tear out; to remove, take away' 10. *nataf* نتف 'to pluck out, pull out, tear out (hair, feathers, etc.); to deplume (feathers); to depilate, (hair)' 11. *naḍ* (الثوب عنه) نضا 'to take off one's clothes, undress'.	
The syntactic frame of transitives	Verb + Subject + Object	
The nature of the subject	The subject is a human being who is interested in appearance and dressing.	
The nature of the object	The object can be a body part or clothes.	
Examples	1. حلَق محمدٌ شعره 2. خلَع محمدٌ ثوبه 3. صبَغ محمدٌ شعره 4. قلَع محمدٌ ثوبه 5. كحَل محمدٌ عينه 6. كسَا محمدٌ جسده	7. لبَس محمدٌ ثوبه 8. مشَط محمدٌ شعره 9. نزع محمد شعر وجهه 10. نتَف محمدٌ شعره 11. نضَا محمدٌ ثوبه

4.2.44 Verbs of winning (class 44)

Class Description	These verbs describe events, occasions, or activities in which the subject wins or gains by success in competition.
Levin's class	
Vendler's class	State verbs
Transitive or intransitive	Transitive Intransitive
Class members	1. *bazz* بزّ 'to surpass, excel, overtop, defeat, overcome' 2. *baluġ* بلغ 'to culminate' 3. *janā* جنى 'to earn, gain, win, profit' 4. *ḥāz* حاز 'to hold, possess, own, win, gain, earn' 5. *ḥaṣal* حصل 'to obtain, get, acquire, win, gain, earn' 6. *rabaḥ* ربح 'to win, gain, earn' 7. *rajaḥ* رجح 'to outweigh, outbalance, overbalance, overweigh, exceed in influence or power to incline' 8. *saḥaq* سحق 'overwhelm, smash' 9. *ẓafar* ظفر 'to win, gain' 10. *ġalab* غلب 'to defeat, overcome, prevail' 11. *ġanam* غنم 'to gain, earn' 12. *fāz* فاز 'to win, gain, achieve' 13. *fāq* فاق 'to excel, overtop' 14. *faḍal* فضل 'to excel, surpass, outshine' 15. *qahar* قهر 'to overcome, defeat' 16. *nāf* ناف 'to outmatch' 17. *nāl* نال 'to win, gain, earn, acquire' 18. *najaḥ* نجح 'to succeed, pass, achieve' 19. *najaz* نجز 'to achieve' 20. *hazam* هزم 'to defeat, overcome'.
The syntactic frame of transitives	Verb + Subject + Object
The syntactic frame of intransitives	Verb + Subject + Prepositional phrase
The nature of the subject	The subject is an animate entity, usually human, that has the ability to win, gain, earn, or overcome in competition.
The nature of the object	The object is an animate entity that has the ability to lose.
The nature of the Prepositional phrase	The prepositional phrase is headed by the preposition *ᶜalā* على 'on' followed by a noun that refers to a losing opponent.

Examples	Transitives	1. بزّ محمد الخصم 2. سحق محمد الخصم 3. غلب محمد الخصم 4. قهر محمد الخصم 5. هزم محمد الخصم
	Intransitives	6. فاق محمد على الخصم 7. فضل محمد على الخصم 8. فاز محمد على الخصم 9. حصل محمد على الجائزة 10. ظفر محمد على المنافسة 11. ناف محمد على الخصم

Chapter Five

Morphological, Prosodic, and Semantic Analysis of the Nominal Derivatives

5.1 Introduction

This chapter analyzes the morphological and prosodic structure of the nominal derivatives. The word formation of each type of the nominal derivatives is defined, described, and analyzed by the stem-based approach and prosodic analysis. Within the stem-based approach, a nominal derivative is the output stem that is derived from the input stem, a Form I verb (see section 2.6.2). The prosodic analysis describes the word formation processes and prosodic structures of the nominal derivatives. The chapter then moves on to describe the nominal derivatives semantically. The semantic features of each type of the nominal derivative in terms of its object and situation entities are discussed in order to determine the semantic restrictions of deriving valid nominal derivatives from a given class of verbs. Finally, the chapter discusses the semantic features, in terms of its object and situation entities, of the verb classes, accompanied by the compatibility of deriving the six types of nominal derivatives.

5.2 Morphological and prosodic analysis of the nominal derivatives

The following six sub-sections will respectively provide morphological and prosodic analysis of the active participle, the passive participle, the form of exaggeration, the instrumental noun, the qualificative adjective, and finally the locative noun. In each section, the templatic patterns of the nominal derivatives undergo stem-based (see section 2.6.2) and prosodic (see section 2.5) analysis, exemplified by diagrams (prosodic trees) showing the stages of derivation of the nominal derivatives from their Form I verbs.

5.2.1 Morphological and prosodic analysis of the active participle

The active participle is a noun derived from a verb, denoting the doer of an activity, a process, or a state, so it involves transitory, temporary, or incidental actions or states (status). It conveys the basic meaning of the verb from which it is derived as well as describing the entity that is involved in an action, process, or state. The active participle is considered as “a deverbal adjective that may function as a noun” (Ryding 2005: 689). It

can be derived from a triliteral verb (Form I) and other verb forms, both transitive and intransitive. The current study is dedicated to examining nominal derivatives from Form I (triliteral) verbs. The active participle of Form I verbs has one morphological pattern $C_1āC_2iC_3$ (*CVVCVC*). Table 11 shows examples of Form I verbs and their active participles.

Table 11: Form I verbs and their participles

Verb	Active Participle
qaraʾ قرأ 'to read'	*qāriʾ* قارئ 'reader'
katab كتب 'to write'	*kātib* كاتب 'writer'
ḥaras حرس 'guard'	*ḥāris* حارس 'guard'
zār زار 'to visit'	*zāʾir* زائر 'visitor'
baḥaṯ بحث 'to research'	*bāḥiṯ* باحث 'researcher'

"[T]he active participle can function syntactically as a noun, verb or attributive adjective" (Holes 2004: 149). As a noun, the English equivalent of an active participle usually ends in *-er* or *-or*, as in: *qāʾid* قائد 'leader' and *mumtaḥin* ممتحن 'moderator'. As a verb, it corresponds in English to the present participle that ends in *-ing*. The active participle often functions as an adjective, as in *al-jaww bārid* الجو بارد 'the weather is cold'. Some templatic patterns of the active participle involve modifications when a verb is geminate, hollow[8], or defective (Ryding 2005). Table 12 shows the different verb types with their active participles:

Table 12: The different verb types with their active participles

Verb type	Verb	Active Participle
Strong verb صحيح *ṣaḥīḥ*	*qatal* قتل 'to kill'	*qātil* قاتل 'killer'
Geminate verb مضعّف *muḍaᶜᶜaf*	*ḥabb* حبّ 'to love'	*ḥābb* حابٌّ 'lover'
Hamzated verb مهموز *mahmūz*	*qaraʾ* قرأ 'to read'	*qāriʾ* قارئ 'reader'

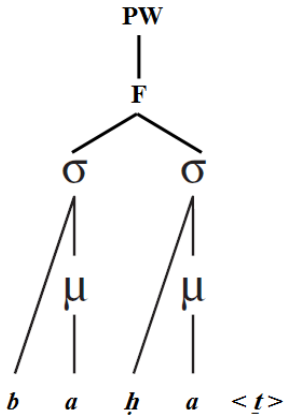
8. This verb has the semi-consonats *wāw* و or *yāʾ* ي as its medial radical. According to Ryding (2005: 461), "These two semi-consonants undergo various mutations, turning into ʾalif, a short vowel, or a long vowel depending on the word structure and derivation".

Assimilated verb مثال *miṯāl*	*waᶜad* وعد 'to promise'	*wāᶜid* واعد 'promiser'
Hollow verb أجوف *ʾajwaf*	*bāᶜ* باع 'to sell'	*bāʾiᶜ* بائع 'seller'
Defective verb ناقص *nāqiṣ*	*nasā* نسى 'to forget'	*nāsin* ناسٍ 'forgetter'

Within the stem-based approach (see section 2.6.2), the stem of the Form I verb is the input deriving the active participle. A Form I verb is a fully vocalized stem that refers to the active perfective verb stem (the third person masculine singular past tense). The templatic pattern of Form I verbs is $C_1VC_2VC_3$, while the active participle (the output of the derivation) has the templatic pattern $C_1āC_2iC_3$ (*CVVCVC*). For example, *lāᶜib* لاعب 'player' can be analyzed as derived from the verb stem *laᶜib* لعب 'to play'. The Form I verb exhibits a moraic trochee foot.

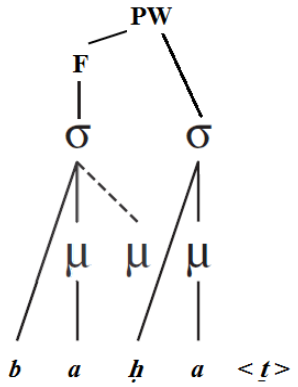
The following diagrams show the prosodic representation (see section 2.5) of the formation of the active participle *baḥaṯ* باحث 'researcher' that is derived from the Form I verb *baḥaṯ* بحث 'to research'. The prosodic representation of the verb stem *baḥaṯ* بحث which is the input of the derivation is presented in (1a). From this the active participle *bāḥiṯ* باحث 'researcher' is derived through three stages. First, reduplication of the initial mora, as shown in (1b). Second, association of the vowel /a/ with the reduplicated mora, resulting in a long vowel, as shown in (1c). Finally, melodic overwriting takes place where /a/ is overwritten by /i/, as shown in (1c).

(1) (a)

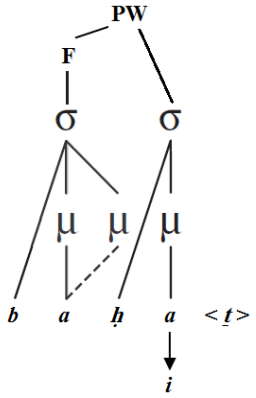


- Prosodic representation of Form I verb *baḥaṯ* بحث 'to research'

(b)



(c)



There is only one templatic pattern CVVCVC for the active participle of Form I verbs. Prosodically, this templatic pattern can be analyzed within these levels: At the syllabic level of analysis, it comprises two heavy syllables *CVV* and *CVC*. At the moraic level, the initial syllable is bimoraic and the final one is monomoraic; for instance, *xāsir* خاسر 'loser', comprises one bimoraic syllable and one monomoraic syllable *CV<C>*. The final consonant in the prosodic template of the active participle is extrametrical. At the foot level, this word has only one moraic trochaic foot followed by an unparsed syllable (see section 2.5).

5.2.2 Morphological and prosodic analysis of the passive participle

The passive participle is derived from a verb to denote the entity that represents the entity affected by the action of the verb. The passive participle can be formed from any transitive verb, and from an intransitive verb that takes a complementary prepositional phrase (or adverbial phrase), such as *mamrūr bih* ممرور به 'it m. is passed by' and *maḏhūb ʾilayhā* هذه المدرسة مذهوبٌ إليها 'it f. is gone towards'. The passive participle of Form I verbs has the

single morphological pattern *maC₁C₂ūC₃* مفعول (*maCVVC*). Table 13 shows passive participles derived from Form I verbs:

Table 13: Passive participles derived from Form I verbs

Form I Verb	Passive Participle
ʾakal أكل 'to eat'	*maʾkūl* مأكول 'eaten'
fataḥ فتح 'to open'	*maftūḥ* مفتوح 'opened'
saraq سرق 'to steal'	*masrūq* مسروق 'stolen'
kasar كسر 'to break'	*maksūr* مكسور 'broken'
kašaf كشف 'to reveal'	*makšūf* مكشوف 'revealed'

Some templatic patterns of the passive participle involve modifications when a verb type is hollow or defective (Ryding 2005). Table 14 shows passive participles derived from different verb types:

Table 14: Passive participles derived from different verb types

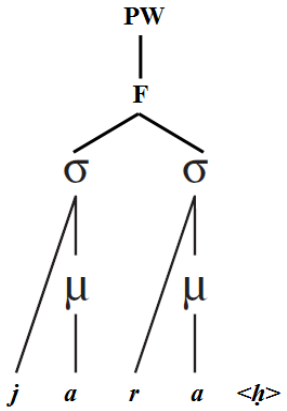
Verb type	Verb	Passive Participle
Strong verb صحيح *ṣaḥīḥ*	*karih* كره 'to hate'	*makrūh* مكروه 'hateful'
Geminate verb مضعّف *muḍaᶜᶜaf*	*ḥabb* حبّ 'to love'	*maḥbūb* محبوب 'lovable'
Hamzated verb مهموز *mahmūz*	*qaraʾ* قرأ 'to read'	*maqrūʾ* مقروء 'read'
Assimilated verb مثال *miṯāl*	*wahab* وهب 'to endue'	*mawhūb* موهوب 'endowed'
Hollow verb أجوف *ʾajwaf*	*bāᶜ* باع 'to sell'	*mabıᶜ* مبيع 'sold'
Defective verb ناقص *nāqiṣ*	*nasā* نسى 'to forget'	*mansiy* منسي 'forgotten'

Under a stem-based analysis (see section 2.6.2), the stem of the passive participle, with the templatic pattern *maC₁C₂ūC₃*, is derived from the stem of the Form I verb *C₁VC₂VC₃* (third person masculine singular past tense). For example, the passive participle *majrūḥ* مجروح 'injured' is derived from the verb *jaraḥ* جرح 'to injure'.

The prosodic representation of (the input of the derivation) the verb *jaraḥ* جرح is shown in (2a). A series of templatic changes takes place, including *mμ*-prefixation, disassociation within the left-most mora, and melodic overwriting. As shown in (2b), *mμ*- is prefixed to the prosodic template, the consonant /j/ is associated with the left-most mora, the vowel /a/

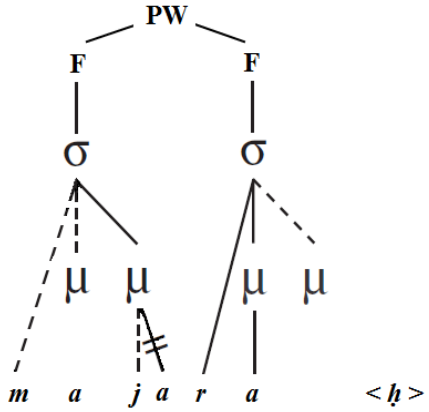
is disassociated from the left-most mora, and the final-mora is reduplicated. Finally in (2c), mora association and melodic overwriting of /a/ by /u/ take place to form the passive participle (see section 2.5).

(2) (a)



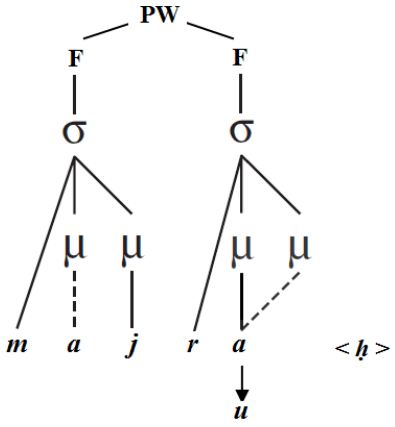
- The prosodic representation of Form I verb *jaraḥ* جرح 'to injure'

(b)



- Association of the consonant /j/ with the left-most mora; disassociation [9] of the vowel /a/ from the left-most mora; *mμ*-prefixation; final-mora reduplication

(c)



- Association of the left-most vowel /a/ with the prefixed mora; association of the right-most vowel /a/ with the reduplicated mora; melodic overwriting of /a/ by /u/

9. From now on I assume, where the derived template takes the form *CV-C₁C₂V(V)C₃(-VC)*, association of the left-most stem consonant with the left-most mora and disassociation of the initial stem vowel from the left-most mora.

The passive participle of Form I verbs, such as *maṭlūb* مطلوب 'required', has only the template $maC_1C_2\bar{u}C_3$ (*CVCCVVC*). Prosodically, this templatic pattern can be analyzed within these levels: At the syllabic level of analysis, this template is bisyllabic, containing the heavy syllable *CVC* and the superheavy syllable *CVVC*. At the moraic level, both syllables are bimoraic. The final consonant in the syllable *CVV<C>* is considered extrasyllabic (see section 2.5). At the foot level, there are two feet where both syllables are bimoraic.

5.2.3 Morphological and prosodic analysis of the form of exaggeration

The form of exaggeration is related to the active participle and used to indicate an exaggeration and abundance in the meaning of an event, action or state. The form of the active participle involves potentially both scarcity and abundance in its meaning. If there is a need to indicate abundance in terms of quality and quantity, the form of exaggeration can be better used. The form of exaggeration has three standard templatic patterns: $C_1aC_2C_2\bar{a}C_3$ فعّال (*CVCCVVC*), $C_1aC_2\bar{u}C_3$ فعول (*CVCVVC*), and $miC_1C_2\bar{a}C_3$ مفعال (*CVCCVVC*). The three patterns can be theoretically applied to any triliteral verb. Table 15 exemplifies patterns of the form of exaggeration:

Table 15: Patterns of the form of exaggeration

Pattern	Verb	Form of exaggeration
$C_1aC_2C_2\bar{a}C_3$	*saraq* سرق 'to steal'	*sarrāq* سرّاق 'robber, burglar'
$C_1aC_2\bar{u}C_3$	*ʾakal* أكل 'to eat'	*ʾakūl* أكُول 'gluttonous'
$miC_1C_2\bar{a}C_3$	*qadim* قدِم 'to come'	*miqdām* مِقْدام 'audacious'

$C_1aC_2C_2\bar{a}C_3$ is the most common pattern and can be applied to any transitive and intransitive triliteral verb, while $C_1aC_2\bar{u}C_3$ and $miC_1C_2\bar{a}C_3$ are derived from transitive verbs only (Ḥasan 1969: 3/260). The verb type affects the formation of the form of exaggeration. If the verb type is hollow or defective, templatic patterns of the form of exaggeration involve some modifications. Table 16 shows the different verb types with their forms of exaggeration:

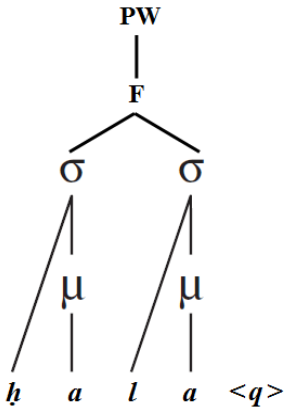
Table 16: The different verb types with their forms of exaggeration

Verb type	Verb	Form of exaggeration

Strong root صحيح *ṣaḥīḥ*	*kaḏab* كذب ‘to lie’	*kaḏḏāb* كذّاب ‘mendacious’
Geminate root مضعّف *muḍa^{cc}af*	*wadd* ودّ ‘to like’	*wadūd* ودود ‘affable’
Hamzated root مهموز *mahmūz*	*ra^{ʾ}af* رأف ‘to mercy’	*ra^{ʾ}ūf* رؤوف ‘gracious’
Assimilated root مثال *miṯāl*	*wahab* وهب ‘to endue’	*wahhāb* وهّاب ‘donatory’
Hollow root أجوف *^{ʾ}ajwaf*	*nām* نام ‘to sleep’	*nawwām* نوّام ‘sleeper; slugabed’
Defective root ناقص *nāqiṣ*	*da^{c}ā* دعى ‘to call’	*da^{c} ^{c}ā^{ʾ}* دعّاء ‘propagandist’

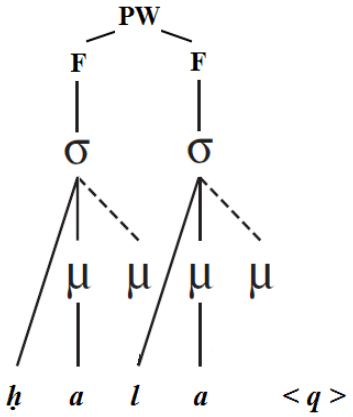
According to the stem-based approach (see section 2.6.2), the Form I verb stem $C_1VC_2VC_3$ is the input for the form of exaggeration that has three templatic patterns $C_1aC_2C_2āC_3$, $C_1aC_2ūC_3$ and $miC_1C_2āC_3$. The stem of the form of exaggeration with the pattern $C_1aC_2C_2āC_3$, such as *ḥallāq* حلاّق ‘barber’, is derived from the Form I verb stem *ḥalaq* حلق ‘to shave’. In (3a), the prosodic representation of (the input of the derivation process) the verb *ḥalaq* حلق ‘to shave’ is presented. The output stem is formed by initial-mora reduplication and final-mora reduplication as shown in (3b). Finally, in (3c) the vowels are associated with the reduplicated moras (see section 2.5).

(3) (a)



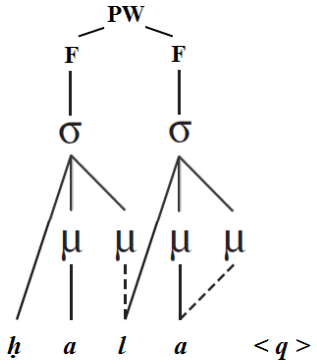
- The prosodic representation of Form I verb *ḥalaq* حلق ‘to shave’

(b)



- Initial-mora reduplication; final-mora reduplication

(c)

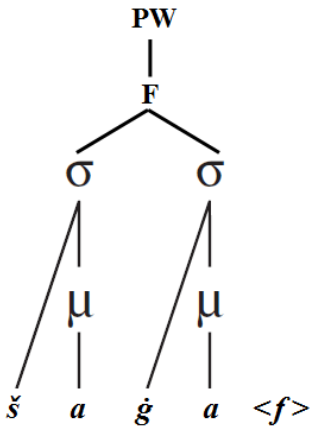


- Association of medial consonant with initial reduplicated mora; association of right-most vowel with final reduplicated mora

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level of analysis, the template $C_1aC_2C_2\bar{a}C_3$ is bisyllabic, with the heavy syllable *CVC* and the superheavy syllable *CVV<C>*; the final consonant is extrasyllabic. At the moraic level, both syllables in the template $C_1aC_2C_2\bar{a}C_3$ are bimoraic. At the foot level of analysis, this template has two feet (see section 2.5).

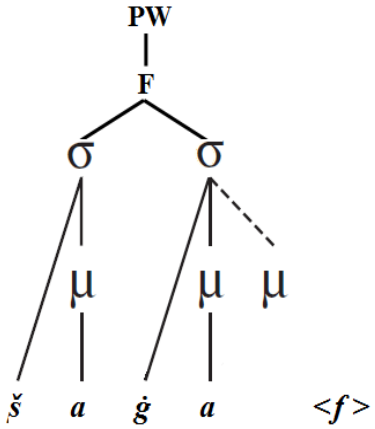
The form of exaggeration that has the template $C_1aC_2\bar{u}C_3$, such as *šaġūf* شغوف 'humane, sympathetic' is derived from the Form I verb *šaġaf* شغف 'to be very fond of, to adore'. In (4a), the prosodic representation of the verb *šaġaf* شغف is presented. Here, the form of exaggeration is formed by final-mora reduplication, as in (4b); and association of the right-most vowel /a/ with the reduplicated mora and the melodic overwriting of the vowel /a/ by /u/ are shown in (4c).

(4) (a)



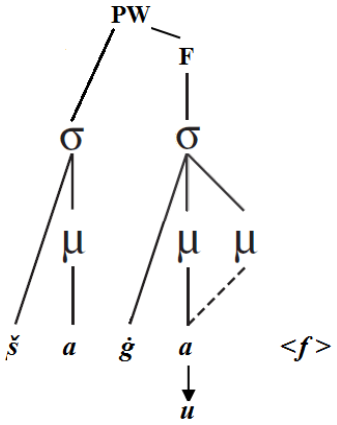
- Prosodic representation of Form I verb *šaġaf* شغف 'to be very fond of, to adore'

(b)



- Final-mora reduplication

(c)

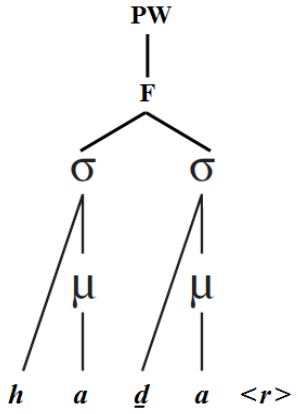


- Association of the right-most vowel /a/ with the reduplicated mora; melodic overwriting of the vowel /a/ by /u/

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level of analysis, the template $C_1aC_2\bar{u}C_3$ is bisyllabic, containing the light syllable *CV* and the superheavy syllable *CVVC*; the final consonant in this template is extrasyllabic. At the moraic level, the first syllable in the template $C_1aC_2\bar{u}C_3$ is monomoraic, while the other is bimoraic. At the foot level, there is one iambic foot.

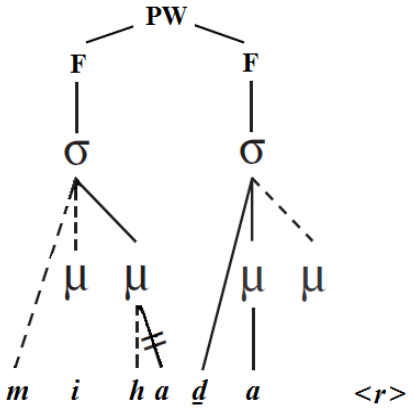
Finally is the form of exaggeration with the template $miC_1C_2\bar{a}C_3$, such as *mihḏār* مهذار 'babbler; loquacious' is derived from the form I verb *haḏar* هذر 'to babble'. The prosodic representation of the verb stem *haḏar* هذر is presented in (5a). The stem of the form of exaggeration ($miC_1C_2\bar{a}C_3$) is derived, as shown in (5b), by prefixing the syllable *mμ-* to the template, associating the consonant /h/ with the left-most mora, disassociating the vowel /a/ from the left-most mora, and reduplicating the final-mora. Finally, in (5c), association of the left-most vowel /i/ with the prefixed mora and the right-most vowel /a/ with the reduplicated mora take place (see section 2.5).

(5) (a)



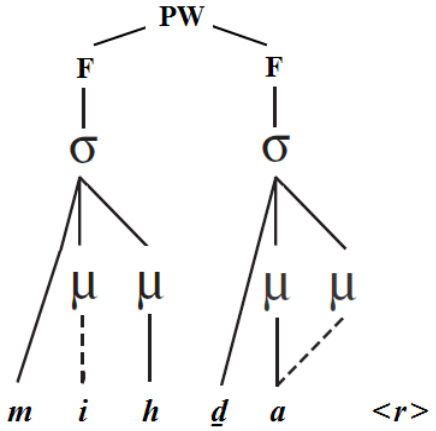
- The prosodic representation of Form I verb *haḏar* هذر 'to babble'.

(b)



- Association of the consonant /h/ with the left-most mora; disassociation of the vowel /a/ from the left-most mora; *mμ*-prefixation; final-mora reduplication

(c)



- Association of the vowel /i/ with the prefixed mora; association of the right-most vowel /a/ with the reduplicated mora

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level of analysis, the template *miC$_1$C$_2$āC$_3$* is also bisyllabic, containing the heavy syllable *miC* and the superheavy syllable *CVVC*. At the moraic level, the template *miC$_1$C$_2$āC$_3$* has two bimoraic syllables. The final consonant in the three templates in the syllable *CVV<C>* is considered extrasyllabic (see section 2.5). At the foot level, this template has two feet and exhibits iambic feet.

5.2.4 Morphological and prosodic analysis of the instrumental noun

The instrumental noun is a noun derived from Form I triliteral verbs. It denotes a tool, device, or machine by which the action of a verb is performed. For example, the instrumental noun *miftāḥ* مفتاح 'key' is a tool by which something is opened. Therefore, the verb from which the instrumental noun is derived should express a kind of making, forming, working, producing, functioning, handling, or crafting. The instrumental noun in Arabic has four canonical templatic patterns. Table 17 exemplifies Form I verbs and their instrumental noun patterns:

Table 17: Form I verbs and their instrumental noun patterns

Form I Verb	Pattern	Instrumental Noun
barad برد 'to file'	*miC₁C₂aC₃* مِفْعَل	*mibrad* مبرد 'rasp'
fataḥ فتح 'to open'	*miC₁C₂āC₃* مفعال	*miftāḥ* مفتاح 'key'
kanas كنس 'to sweep'	*miC₁C₂aC₃ah* مفعلة	*miknasah* مكنسة 'broom'
ġasal غسل 'to wash'	*C₁aC₂C₂āC₃ah* فعّالة	*ġassālah* غسالة 'washing machine'

The patterns *miC₁C₂aC₃* مِفْعَل (CVCCVC), *miC₁C₂āC₃* مفعال (CVCCVVC), and *miC₁C₂aC₃ah* مفعلة (CVCCVCVC) are the most frequent in Arabic of all eras, whereas the *C₁aC₂C₂āC₃ah* فعّالة (CVCCVVCVC) pattern emerged in the modern era.[10] In Arabic, it is acceptable grammatically to derive the instrumental noun from the four mentioned patterns; however, not all valid potential forms are in use. For example, the valid instrumental nouns of the verb *našar* نشر 'to saw wood' can be *minšar* مِنْشَر, *minšarah* مِنْشَرَة, *naššārah* نَشّارة, and *minšār* منشار 'saw'. The potential to derive new semantically and grammatically valid instrumental nouns has allowed the Arabic language to keep up with developments in human civilization through the coining of new terms; hence potential words can be established for future use in order to enhance the productivity of the language. Some templatic patterns of the instrumental noun involve modifications only when a verb type is hollow (Ryding 2005). Table 18 shows the different verb types provided with their instrumental nouns:

10. This pattern was approved by Academy of the Arabic Language in Cairo to be used for new words in Arabic.

Table 18: The different verb types with their instrumental nouns

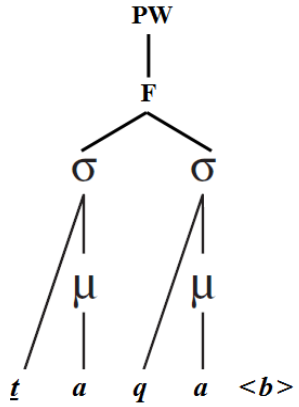
Verb type	**verb**	**Instrumental Noun**
Strong root صحيح *ṣaḥīḥ*	*kasar* كسر 'to break'	*kassārah* كسارة 'crusher'
Geminate root مضعّف *muḍa^{c} ^{c}af*	*jarr* جرّ 'to drag'	*mijrār* مجرار 'bulldozer; tractor'
Hamzated root مهموز *mahmūz*	*qara^{ɔ}* قرأ 'to read'	*maqrā^{ɔ}* مقراء 'reader'
Assimilated root مثال *miṯāl*	*wašam* وشم 'to tattoo'	*mawšim* موشم 'tattoo tool'
Hollow root أجوف *^{ɔ}ajwaf*	*bā^{c}* باع 'to sell'	*bayyā^{c}ah* بيّاعة 'selling machine'
Defective root ناقص *nāqiṣ*	*qalā* قلى 'to fry'	*miqlā* مقلى 'frying pan'

As a condition, the verb from which the instrumental noun is derived is generally a transitive verb. As the instrument is a tool by which the subject handles the object to convey the effect of the verb's action to the object. However, the verb may become intransitive when it denotes handling something practical, such as *miṣfāh* مصفاة 'filter' that is derived from the verb *ṣafā* صفى 'to filter'.

The instrumental noun within the stem-based analysis (see section 2.6.2) is an output derived from the input stem Form I verb $C_1VC_2VC_3$. The stem of the instrumental noun has specific templatic patterns: $maC_1C_2aC_3$ مِفْعَل (*CVCCVC*), $miC_1C_2āC_3$ مِفْعَال (*CVCCVVC*), مِفْعَلَة (*CVCCVCVC*), and $C_1aC_2C_2āC_3ah$ فعّالة (*CVCCVVCVC*).

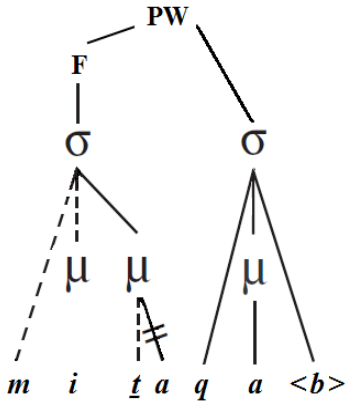
The templatic pattern $maC_1C_2aC_3$ مِفْعَل, such as *miṯqab* مثقب 'hole punch', is derived from the verb stem $C_1VC_2VC_3$ *ṯaqab* ثقب 'to make a hole'. The prosodic representation of the verb stem *ṯaqab* ثقب is presented in (6a). The stem *miṯqab* مثقب 'hole punch' is formed by prefixing *mμ-* to the template, associating the consonant /ṯ/ with the left-most mora, and disassociating the vowel /a/ from left-most mora, as shown in (6b); and association of the vowel /i/ with the prefixed mora, as shown in (6c).

(6) (a)



- Prosodic representation of Form I verb *ṯaqab* ثقب 'to bore'

(b)



- Association of the consonant /t̲/ with left-most mora; disassociation of the vowel /a/ from left-most mora; *mμ*-prefixation

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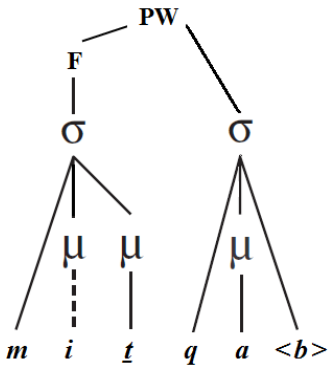
(c)



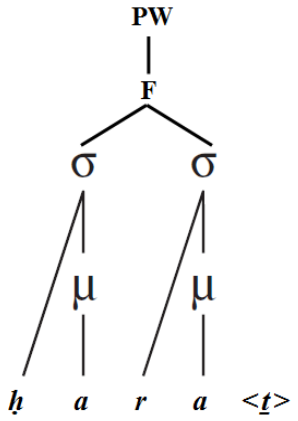
- Association of the vowel /i / with the prefixed mora

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level of analysis, the template *miC₁C₂aC₃* comprises two heavy syllables *CVC / CV<C>*. At the moraic level, the initial syllable is bimoraic while the final syllable is monomoraic. The final consonant in this template is extrametrical. At the foot level, there is one foot and one monomoraic syllable (see section 2.5).

The stem of the instrumental noun that has the prosodic template *miC₁C₂āC₃* مِفْعَال, such as *miḥrāṯ* مِحْرَاث 'plough', is derived from the verb stem *C₁VC₂VC₃ ḥaraṯa* حرث 'to plough'.

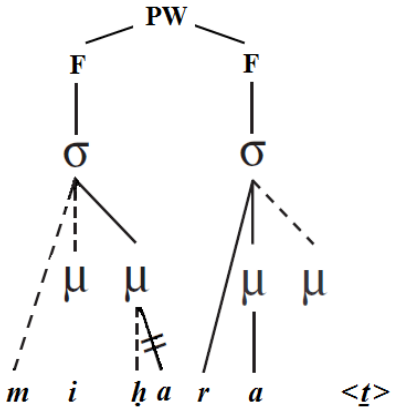
The prosodic representation of the verb stem *ḥaraṯ* حرث is presented in (7a). The stem *miḥrāṯ* مِحْرَاث 'plough' is formed by prefixing *mμ-* to the template, associating the consonant /ḥ/ with the left-most mora, disassociating the vowel /a/ from the left-most mora, and reduplicating the vowel /a/ within the final-mora, as shown in (7b). Finally, there is a process of associating the vowel /i/ with the prefixed mora and the vowel /a/ with the reduplicated mora, as in (7c).

(7) (a)



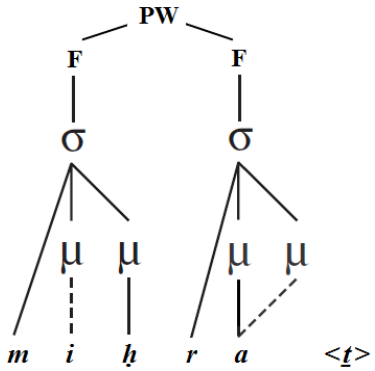
- The prosodic representation of Form I verb *ḥaraṯ* حرث 'to plough'

(b)



- Association of the consonant /ḥ/ with the left-most mora; disassociation of the vowel /a/ from the left-most mora; *mμ-* prefixation; final-mora reduplication

(c)

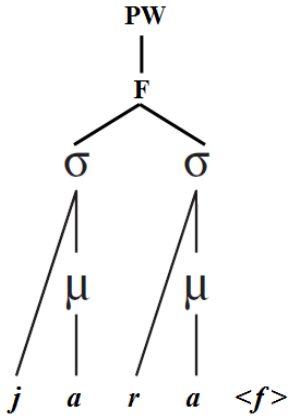


- Association of the vowel /i/ with the prefixed mora, and the vowel /a/ with the reduplicated mora

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level of analysis, this prosodic template is bisyllabic, with a heavy syllable *miC* and a superheavy syllable *CVVC*. At the moraic level, both syllables are bimoraic. The final consonant in the template is considered extrasyllabic. At the foot level, this template has two feet and exhibits iambic feet.

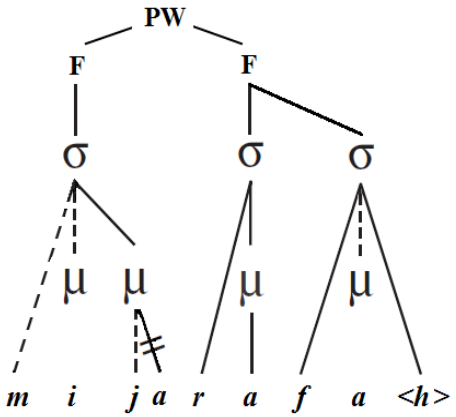
The stem of the instrumental noun that has the prosodic template *miC$_1$C$_2$aC$_3$ah* مِفْعَلَة , such as *mijrafah* مجرفة 'shovel' is derived from the verb stem *C$_1$aC$_2$aC$_3$ jaraf* جرف 'to sweep away'. The prosodic representation of the verb stem *jaraf* جرف is shown in (8a). The stem *mijrafah* مجرفة 'shovel' is formed by prefixing *mμ-* to the template, associating the consonant /j/ with the left-most mora; disassociating the vowel /a/ from the left-most mora; and *mμ*-prefixation and *μ*-suffixation of *-at* as shown in (8b). In (8c), prefixed and suffixed moras are associated.

(8) (a)



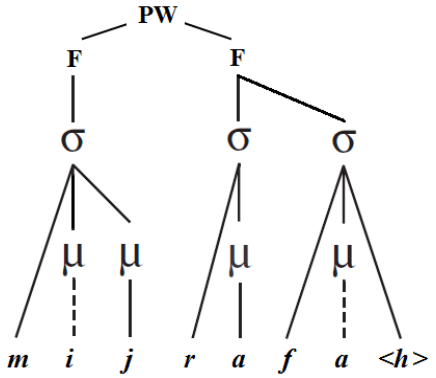
- The prosodic representation of Form I verb *jaraf* جرف 'to sweep away'.

(b)



- Association of the consonant /j/ with left-most mora; disassociation of the vowel /a/ from left-most mora; *mμ*-prefixation; *μ*-suffixation

(c)

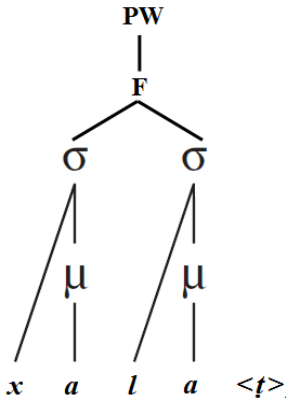


- Association of the vowel /i/ with prefixed mora; association of right-most vowel /a/ with suffixed mora

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level, the prosodic template *miC₁C₂aC₃ah* (*CVCCVCVC*) consists of three syllables, the heavy syllable *CVC*, light syllable *CV*, and finally heavy syllable *CV<C>*. At the moraic level of analysis, the initial syllable is bimoraic while the two other syllables are monomoraic. The final consonant in the template is extrametrical. At the foot level, this template has two feet and exhibits a trochaic foot.

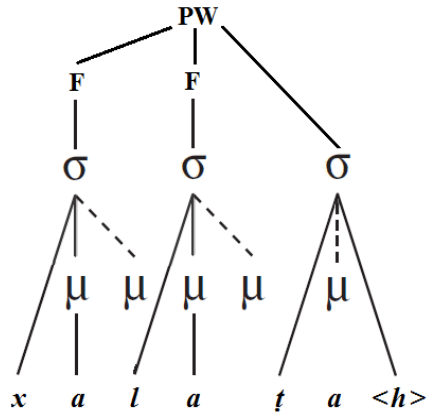
Finally, the instrumental noun has the templatic pattern *C₁aC₂C₂āC₃ah* فعّالة, such as *xallāṭah* خلّاطة 'mixer' derived from the verb stem *C₁VC₂VC₃ xalaṭ* خلط 'to mix'. This stem is formed by reduplicating the initial-mora, reduplicating the final-mora, and *μ*-suffixing -*ah* to the template, as shown in (9b). Finally (9c) shows associating the medial consonant /l/ with the left-most reduplicated mora, associating the right-most vowel /a/ with the right-most reduplicated mora, and associating-*ah* with the suffixed mora.

(9) (a)



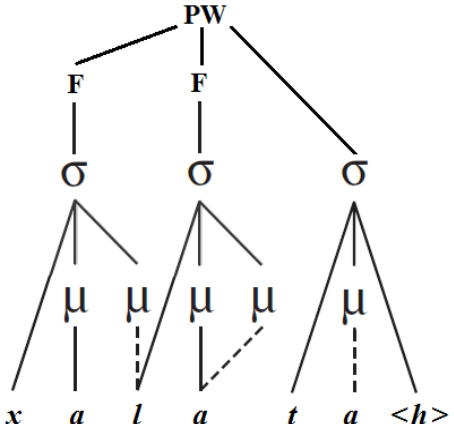
- The prosodic representation of Form I verb *xalaṭ* خلط 'to mix'

(b)



- Initial-mora reduplication; final-mora reduplication; *μ*-suffixation

(c)



- Association of medial consonant /l/ with left-most reduplicated mora; association of right-most vowel /a/ with right-most reduplicated mora; association of *-ah* with suffixed mora

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level of analysis, the template *$C_1aC_2C_2\bar{a}C_3ah$* comprises three heavy syllables *CVC / CVV / CVC*. At the moraic level, the first two syllables are bimoraic, while the final syllable is monomoraic. The final consonant in the syllable *CV<C>* is considered extrametrical. At the foot level of analysis, this template has two feet and one monomoraic syllable and exhibits iambic feet (see section 2.5).

5.2.5 Morphological and prosodic analysis of the qualificative adjective

The qualificative adjective is an adjective that functions as a noun. It can only be derived from an intransitive verb, otherwise it is not valid grammatically. Three aspects must exist in the qualificative adjective: a pointer to the description of a state or quality, such as colour; a pointer to an entity (person or thing) that is described or characterized by a state or quality, for example, *jamīl* جميل ‘beautiful’ which indicates an entity (person or thing) that is characterised by beauty; third, its description is inherent and permanent throughout all times (past, present, and future), such as *ʾabyaḍ* أبيض ‘white’ (Ḥasan 1969: 3/283).

There are similarities and differences between the active participle and the qualificative adjective. The similarity is found where both refer to an entity and an action, process, or state. The difference between them is that the active participle refers to an accidental non-permanent action, process or state, while the qualificative adjective refers to a stable permanent state or quality. For example, from the same verb *karum* كَرُمَ 'to be generous' we can derive the active participle *kārim* كارم and the qualificative adjective *karīm* كريم. The former refers to someone who is temporarily (occasionally) generous, whereas the latter refers to someone who is by nature generous in the past, present, and future.

The qualificative adjective has three main templatic patterns $C_1VC_2VC_3$ فعل (*CVCVC*), $^{ɔ}aC_1C_2VC_3$ أفعل (*CVCCVC*), and $C_1aC_2\bar{i}C_3$ فعيل (*CVCVVC*):

- *CVCVC* ($C_1aC_2iC_3$) governs the qualificative adjectives that are derived from Form I verbs with the templatic pattern *CVCVC* ($C_1aC_2iC_3$). Here, there is no templatic change as both of verb and its derived qualificative adjective have the same pattern; for example, the qualificative adjectives *fariḥ* فرح 'happy', *taʿib* تعِب 'tired', and *ḍajir* ضجِر 'bored' are respectively derived from the verbs *fariḥ* فرح 'to be happy' *taʿib* تعِب 'to be tired', and *ḍajir* ضجِر 'to be bored'.
- *ʾaCCVC* ($^{ɔ}aC_1C_2aC_3$) governs the qualificative adjectives that denote colours, flaws and bodily qualities, such as *ʾaḥmar* أحمر 'red', *ʾaʿwar* أعور 'one-eyed', and *ʾaḥwar* أحور 'one who has beautiful eyes', derived respectively from the verbs *ḥamir* حمِر 'to be red', *ʿawir* عوِر 'one-eyed', and *ḥawir* حوِر 'having beautiful eyes'.
- *CVCVVC* ($C_1aC_2\bar{i}C_3$) governs the qualificative adjectives that describe a permanent quality relatively, such as the qualificative adjective *ḥazīn* حزِين 'sad' that is derived from *ḥazin* حزِن 'to be sad'.

The formation of the qualificative adjective involves modifications when a verb is hollow. Table 19 shows the different verb types presented with their qualificative adjectives:

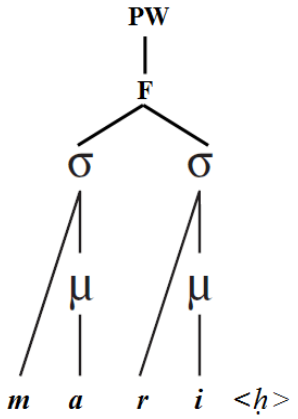
Table 19: The different verb types with their qualificative adjectives

Verb type	**Verb**	**Qualificative Adjective**
Strong verb صحيح *ṣaḥīḥ*	*saʿud* سعيد 'to be happy'	*saʿīd* سعيد 'happy'
Geminate verb مضعّف *muḍaʿʿaf*	*marr* مرَّ 'to be bitter'	*marīr* مرير 'bitter'

Hamzated verb مهموز *mahmūz*	*sāʾ* ساء ‘to offend’	*sayyiʾ* سيّء ‘bad’
Assimilated verb مثال *miṯāl*	*wahim* وهم ‘to be illusory’	*wahimun* وهِمٌ ‘deceived’
Hollow verb أجوف *ʾajwaf*	*sād* مات ‘to die’	*sayyid* ميّت ‘dead’
Defective verb ناقص *nāqiṣ*	*jarā* عمِيَ ‘to be blind’	*ʾaʿmā* أعمى ‘blind’

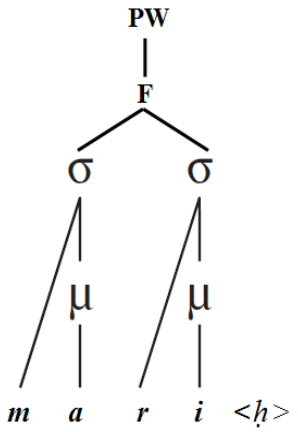
The stem of the qualificative adjective, within the stem-based approach (see section 2.6.2), is derived from the stem of Form I verbs. The stem of the qualificative adjective that has the templatic pattern $C_1VC_2VC_3$ does not involve any templatic change as both the verb and its qualificative adjective share the same templatic pattern, such as *CVCVC mariḥ* مرِح ‘cheerful’ derived from the verb stem *CVCVC mariḥ* مرِح ‘to be cheerful’, as shown in (10a, 10b, and 10c). Only the context determines whether it is a qualificative adjective or a Form I verb.

(10) (a)



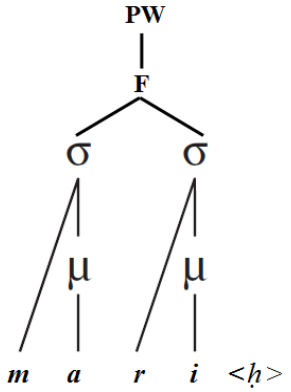
- The prosodic representation of Form I verb *mariḥ* مرِحٌ ‘to be cheerful’

(b)



- There is no templatic change

(c)

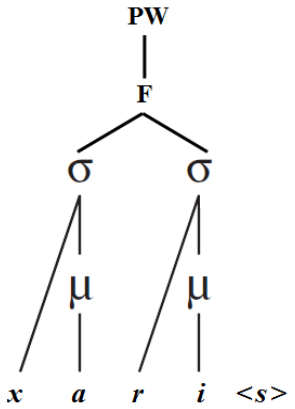


- There is no new association

Prosodically, the template $C_1VC_2VC_3$ can be analyzed within these levels: at the syllabic level of analysis, it comprises two light syllables *CV<C>*. The final consonant in the word is extrametrical. At the moraic level, both syllables *CV* are monomoraic. At the foot level of analysis, there is one moraic trochaic foot in this template.

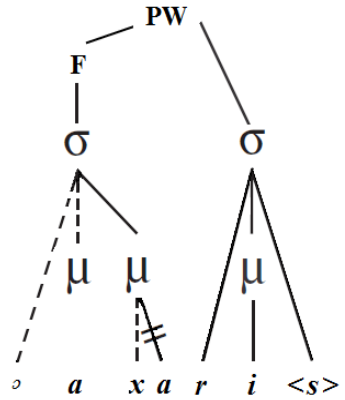
The stem of the qualificative adjective which has the templatic pattern *ʾaCCVC* is derived from the Form I verb $C_1VC_2VC_3$. For example, the qualificative adjective *ʾaxras* أخرس 'dumb' is derived from the verb *xaris* خرِس 'to be dumb'. The prosodic presentation of the verb *xaris* خرِس is presented in (11a). The stem *ʾaxras* أخرس is formed by prefixing *ʾμ-* to the template, associating the consonant /x/ with the left-most mora, and disassociating the vowel /a/ from the left-most mora, as shown in (11b). Finally in (11c), there is association of the vowel /a/ with the prefixed mora and melodic overwriting of the vowel /i/ by /a/.

(11) (a)



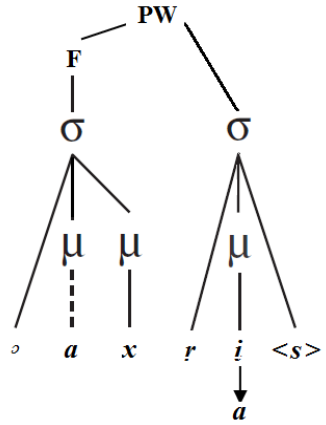
- Prosodic representation of Form I verb *xaris* خرِس 'to be dumb'

(b)



- Association of the consonant /x/ with the left-most mora; disassociation of the vowel /a/ from the left-most mora; *ʾμ*-prefixation

(c)

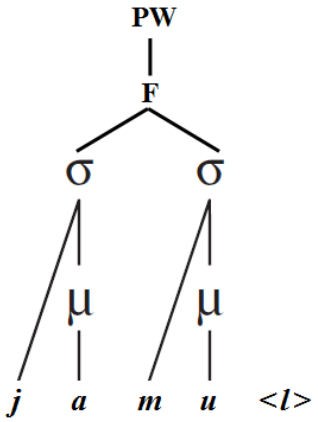


- Association of the left-most vowel /a/ with the prefixed mora; melodic overwriting of the vowel /i/ by /a/

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level, the template *ʾaC₁C₂VC₃* is bisyllabic, containing two heavy syllables *CVC*. At the moraic level, the first syllable is bimoraic, while the other is monomoraic. The final consonant in the syllable *CV<C>* is considered extrametrical. At the foot level of analysis, this template has one moraic trochaic foot and one monomoraic syllable (see section 2.5).

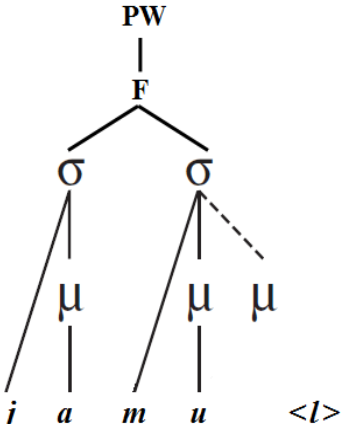
Finally, the qualificative adjective that has the templatic pattern *C₁aC₂ūC₃* (*CVCVVC*), such as *jamīl* جميل 'beautiful', is derived from the verb stem *jamul* جمُل 'to be beautiful'. The prosodic representation of the verb stem *jamul* جمُل is presented in (12a). The stem *jamīl* جميل is formed by reduplicating the final-mora, as shown in (12b). Finally in (12c), association of the right-most vowel with the reduplicated mora, and melodic overwriting of /u/ by /i/ take place.

(12) (a)



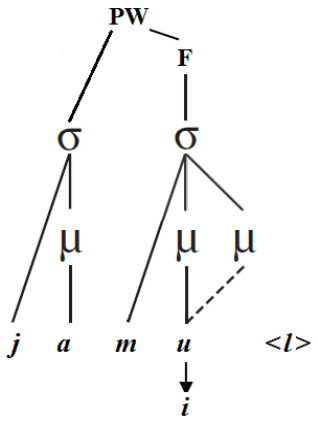
- Prosodic representation of Form I verb *jamul* جمُل 'to be beautiful'

(b)



- Final-mora reduplication

(c)



- Association of right-most vowel /u/ to reduplicated mora; melodic overwriting of the vowel /u/ by /i/

Prosodically, this templatic pattern can be analyzed within these levels: at the syllabic level, the template $C_1aC_2\bar{u}C_3$ (*CVCVVC*) is bisyllabic, containing the light syllable *CV* and the superheavy syllable *CVVC*. The final consonant in this template is extrasyllabic. At the moraic level of analysis, the first syllable in the template *CV/CVVC* is monomoraic, while the other is bimoraic. At the foot level, there is one iambic foot (see section 2.5).

5.2.6 Morphological and prosodic analysis of the locative noun

The locative noun is derived from a Form I verb, and refers to the location in which the action of the verb takes place. The locative noun combines the core meaning of the verb and the place in which the action of the verb occurs. The locative noun can be derived from both transitive and intransitive verbs, such as *laᶜib* لعب 'to play' and *jalas* جلس 'to sit', for example the locative nouns *malᶜab* ملعب 'playground, playland, stadium' and *majlis* مجلس 'council, seat' (Ḥasan 1969: 3/318).

The locative noun of Form I verbs $C_1VC_2VC_3$ has the single morphological pattern, $maC_1C_2aC_3$ (*CVCCVC*). Regularly, the vowel that follows the second consonant in the morphological pattern *maCCVC* is /a/ vowel. However, in two cases the morphological pattern of the locative noun is *maCCVC* ($maC_1C_2iC_3$ with /a/ vowel after the second consonant). In the first case, the Form I verb $C_1VC_2VC_3$ is an assimilated verb (starting with the consonant *w* و), such as *waḍaᶜ* وضع 'to put' for which the locative noun is *mawḍiᶜ* موضع 'place, spot, site'. Secondly, if the pattern of the Form I verb *CVCVC* is $C_1aC_2aC_3$ - $yaC_1C_2iC_3$, including the /i/ vowel after the second consonant in its imperfective form, such as *rajiᶜ* رجع - *yarjiᶜ* يرجع 'to get back', the locative noun is $maC_1C_2iC_3$, as in *majlis* مجلس 'council, seat' (Ḥasan 1969: 3/318). Table 20 presents examples of locative nouns and their input verbs:

Table 20: Examples of locative nouns and their input verbs

Verb	**Pattern**	**Locative Noun**
xaraj خرج 'to exit'	$maC_1C_2aC_3$	*maxraj* مخرج 'exit'
laᶜab لعب 'to play'	$maC_1C_2aC_3$	*malᶜab* ملعب 'playfield'
jalas جلس 'to sit'	$maC_1C_2iC_3$	*majlis* مجلس 'council, seat'

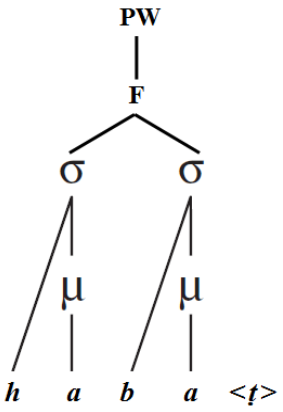
Unlike other types of nominal derivatives, the locative noun formation does not involve modifications when a verb is geminate, hollow, or defective. Table 21 shows the different verb types presented with their locative nouns:

Table 21: The different verb types with their locative nouns

Verb type	Verb	Locative Noun
Strong verb صحيح *ṣaḥīḥ*	*xaraj* خرج ‘to go out’	*maxraj* مخرج ‘exit’
Geminate verb مضعّف *muḍa^{cc}af*	*marr* مرَّ ‘to pass’	*mamarr* ممرَّ ‘path’
Hamzated verb مهموز *mahmūz*	*ʾasar* أسر ‘to capture’	*maʾsar* مأسر ‘prison’
Assimilated verb مثال *miṯāl*	*waqif* وقف ‘to stop’	*mawqif* موقف ‘stop’
Hollow verb أجوف *ʾajwaf*	*sār* سار ‘to sell’	*masār* مسار ‘track’
Defective verb ناقص *nāqiṣ*	*jarā* جرى ‘to flow’	*majrā* مجرى ‘stream’

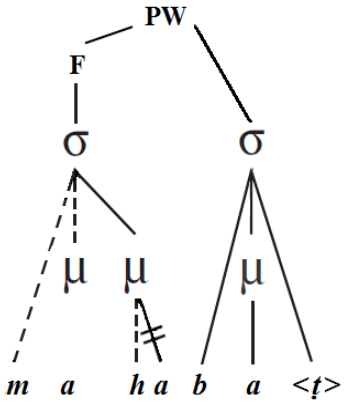
The stem of the locative noun has the single templatic pattern *maC$_1$C$_2$VC$_3$*, which can be analyzed with the stem-based approach (see section 2.6.2); for example, when derived from the stem of a Form I verb *CVCVC*, such as the locative noun *mahbaṭ* مهبط ‘airstrip’ derived from *habaṭ* هبط ‘to land’. The prosodic representation of the verb stem *habaṭ* هبط is presented in (13a). The stem *mahbaṭ* مهبط is formed by prefixing *mμ-* to the template, associating the consonant /h/ with the left-most mora, and disassociating the vowel /a/ from it, as shown in (13b). Finally in (13c), there is association of the left-most vowel /a/ to the prefixed mora, and melodic overwriting if the template is *maC$_1$C$_2$iC$_3$* (with /i/ vowel after the second consonant), with /a/ overwritten by /i/.

(10) (a)



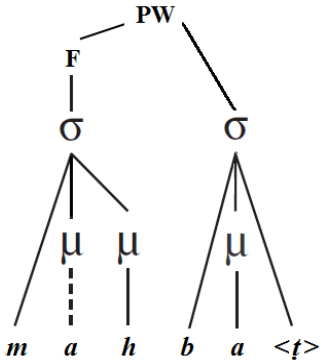
- The prosodic representation of Form I *habaṭ* هبط ‘to land’

(b)



- Association of the consonant /h/ with left-most mora; disassociation of the vowel /a/ from left-most mora; *mμ*-prefixation

(c)



- Association of the vowel /a/ with the prefixed mora; association of right-most vowel /a/ with right-most reduplicated mora and association of with the vowel /a/

At the syllabic level of analysis, this templatic pattern comprises two heavy syllables *maC* and *CVC*. At the moraic level, the initial syllable *CVC* is a bimoraic syllable, and the final syllable *CV<C>* is a monomoraic syllable. The final consonant in the syllable *CV<C>* is extrametrical. At the foot level, there is one foot and one unparsed monomoraic syllable (see section 2.5).

5.3 Semantic analysis of the nominal derivatives

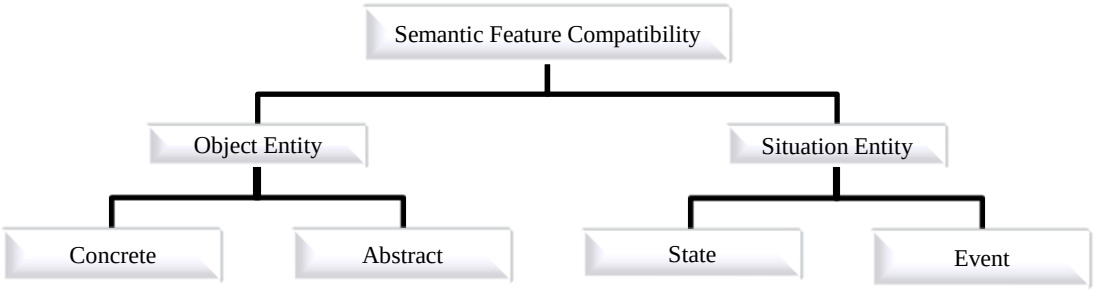
The semantic features of the nominal derivatives and the verb classes (see chapter 4) will be described here in order to determine the validity of deriving each type of nominal derivatives from each class of the 44 verb classes. Our model to determine the validity is based on identifying the compatibility between the nominal derivatives and the verb classes in terms of two types of entity (object entities and situation entities) inspired by Helbig (2006: 410) (see section 3.5). Our model describes and classifies both nominal derivatives and verb classes, in terms of the object entity,[11] wheather they refer to concrete or abstract entities, and in terms of the situation entity wheather they refer to state or event entities.

To determine the semantic restrictions to deriving valid nominal derivatives from a given class of verbs, compatibility between the following aspects is considered and determined:

- The semantic features (object entities and situation entities) of the nominal derivative.
- The semantic features (object entities and situation entities) of each verb class.

The following figure illustrates the semantic features that will be examined to measure the compatibility between the nominal derivative and the verb classes:

Figure 2: Semantic feature compatability between the nominal derivative and the verb classes



Our own criteria for determining the verb classes and nominal derivatives into concrete or abstract entities and into state or event entities, are detailed below:

11. The word ‘object’ here does not refer to the grammatical sense that denotes ‘noun governed by a transitive verb’.

- *Concrete* entity refers to an action, event or state which is accessible to one or more of the five senses, i.e. the entity can be seen, heard, touched, smelt, or tasted. It expresses tangible meanings that occupy physical space.
- *Abstract* entity refers to a concept, attribute, quality or state which is not accessible to any of the five senses. It expresses non-physical, unseen and intangible meanings.
- *State* entity refers to a state which is permanent or will last for a significant length of time.
- *Event* entity refers to a change from one state to another.

To derive a valid nominal derivative from a given verb, there must be compatibility between the semantic features of the nominal derivative and the semantic features of the verb. For example, a nominal derivative, such as an instrumental noun, has to have semantic features that involve the concrete and event entities; therefore, the verb from which we can derive the instrumental noun must also involve concrete (object) and event (situation) entities, such as the verb *xalaṭ* خلط 'to mix'[12] whose instrumental noun is *xallāṭah* خلاطة 'mixer'. On the contrary, a verb involving abstract and state entities, such as *ḥazin* حزن 'to be sad',[13] cannot produce an instrumental noun. From a verb that refers to abstract (object) and state (situation) entities, a qualificative adjective such as *ḥazīn* حزين 'sad, doleful' that is derived from the verb *ḥazin* حزن 'to be sad' (see section 3.5).

5.3.1 Semantic features of the active participle

In the literature of semantics, the active participle as an agent noun has been discussed according to its thematic roles. Fillmore (1971: 42) states that the agent is a thematic role along with instrument, experiencer, object, source, goal, location, time and path. In this sense, the agent is the initiator of an activity, a process, or a state. Luján (2010) argues that, "Agents are prototypically animates, especially humans, and are characterized by control and intentionality over the action that they perform. Some inanimate entities can also have control over the action, but obviously they cannot have any intentionality".

12. The verb *fataḥ* فتح 'to open' involves a concrete entity in terms of it requires a physical space (touchable), and involves an event entity in terms of it refers to an action and a change.
13. The verb *karih* كره 'to hate' involves an abstract entity in terms of it does not require a physical space, and involves a state entity in terms of it does not refer to an action and a change.

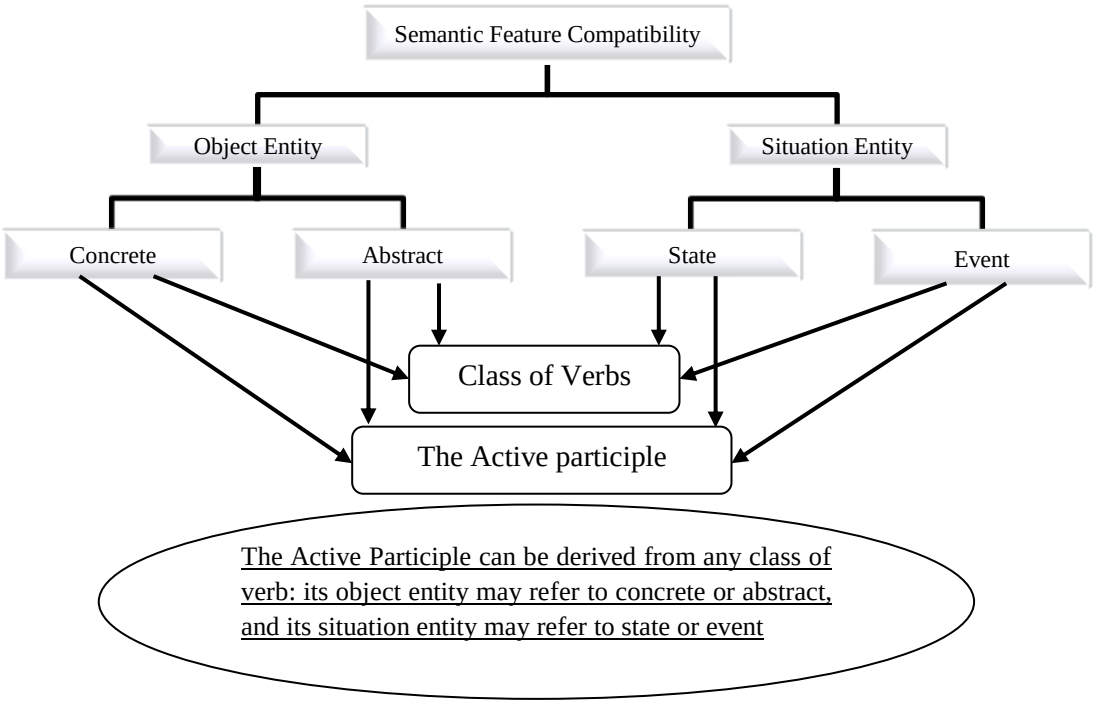
Table 22 shows the semantic features of the active participle, including its object and situation entities:

Table 22: Semantic features of active participle

Active Participle	
Object Entity	Situation Entity
The semantic features of the active participle refer to either concrete or abstract entities, where some active participles refer to a concrete entity, and other active participles refer to an abstract entity: - Concrete entities (animate or inanimate) express tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space. - Abstract entities express non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space.	The semantic features of the active participle refer to either event or state situation entities, where some active participles refer to an event entity, and other active participles refer to a state entity: - Event entity involves a change from one state to another. - State entity describes a state which is permanent or will last for a significant time.

Due to the fact that semantic features of the active participle refer to either concrete or abstract (object) entities, as well as either event or state (situation) entities, valid active participles can be derived from all of the 44 verb classes. In all cases, the semantic features of any class of verbs (object and situation entities) are compatible with the semantic features of the active participle (object and situation entities). The following figure shows the semantic feature compatibility (see section 3.5) of deriving the active participle:

Figure 3: The semantic feature compatability of deriving the active participle



In the Arabic linguistic literature, there is an argument that involves constraints on deriving an active participle, based on its semantics. Ḥasan (1969: 3/240) argues that a verb from which the active participle can be derived must indicate an impermanent event. He claims that we can only derive a qualificative adjective[14] from a verb that refers to a permanent state meaning, even if it has the same morphological pattern as the active participle. Thus, Hassan excludes these forms from being active participles, and claims they are qualificative adjectives. Several nominal derivatives of the pattern *CāCiC* that denote permanent state meanings are found and used in modern and classical Arabic, such as *kāriḥ* كاره 'hater' and *nājiḥ* ناجح 'successful'.

5.3.2 Semantic features of the passive participle

The semantics of the passive participle is, to some extent, relevant to a number of the semantic roles, including recipient, patient and experiencer. Finegan (2008: 204) define them as follows:

14. The qualificative adjective was discussed in section 5.2.5.

- Patient semantic role: “the entity that undergoes a certain change of state”.
- Recipient semantic role: “the entity that receives a physical object”.
- Experiencer semantic role: “the entity that receives a sensory input”.

Table 23 shows the semantic features of the passive participle, including its object and situation entities:

Table 23: The semantic features of the passive participle

Passive Participle	
Object Entity	Situation Entity
The semantic features of the passive participle refer to either concrete or abstract entities, where some passive participles refer to a concrete entity, and other passive participles refer to an abstract entity: - Concrete entities (animate or inanimate), express tangible meanings (of an action, event or state which is accessible to one or more of the five senses) that occupy physical space. - Abstract entities express non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space.	The semantic features of the passive participle refer to either event or state entities, where some passive participles refer to an event entity, and other passive participles refer to a state entity: - Event entity involves a change from one state to another. - State entity describes a state which is permanent or will last for a significant time.

Due to the fact that semantic features of the passive participle refer to either concrete or abstract (object) entities, as well as either event or state (situation) entities, valid passive participles can be derived from all of the 44 verb classes. In all cases, the semantic features of any class of verbs (object and situation entities) are compatible with the semantic features of the passive participle (object and situation entities). The following figure shows the semantic feature compatibility (see section 3.5) of deriving the passive participle:

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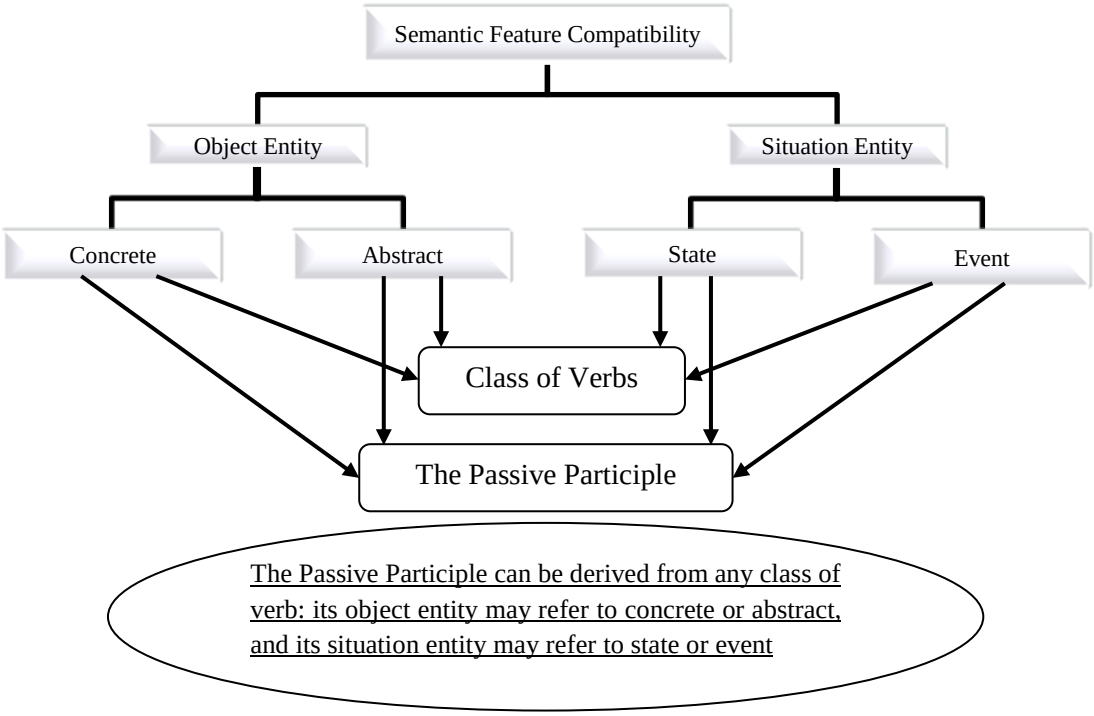
Figure 4: The semantic feature compatability of deriving the passive participle



5.3.3 Semantic features of the form of exaggeration

The form of exaggeration is semantically similar to the active participle. Both represent the entity that refers to the doer of an activity, process or state. However, the form of exaggeration specifically signifies intensivity in the meaning in terms of the quantity and frequency of an activity, process or state. As with the active participle, the semantics of the form of exaggeration are related to the agent thematic role (see section 5.4.2). In Arabic, the form of exaggeration is usually used to indicate professions, such as *ḥallāq* حلاق 'barber', *xabbāz* خبّاز 'baker', *ḥarrāṯ* حرّاث 'ploughman', *sawwāq* سواق 'driver', and *tayyār* طيّار 'pilot'.

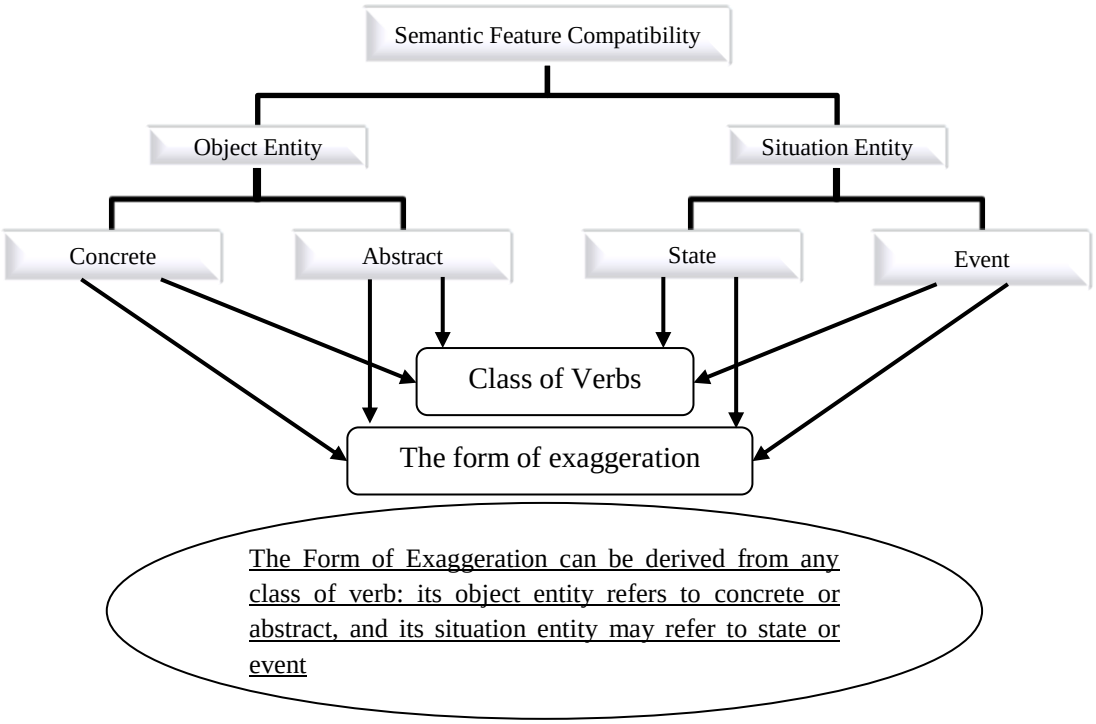
Table 24 shows the semantic features of the form of exaggeration, including its object and situation entities:

Table 24: The semantic features of the verb of exaggeration

Form of Exaggeration	
Object Entity	Situation Entity
The semantic features of the form of exaggeration refer to either concrete or abstract entities, where some forms of exaggeration refer to a concrete entity, and other forms of exaggeration refer to an abstract entity: - Concrete entities (animate or inanimate) express tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space. - Abstract entities express non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space.	The semantic features of the form of exaggeration refer to either event or state entities, where some forms of exaggeration refer to an event entity, and other forms of exaggeration refer to a state entity: - Event entity involves a change from one state to another. - State entity describes a state which is permanent or will last for a significant time.

Due to the fact that the semantic features of the form of exaggeration refer to either concrete or abstract (object) entities, as well as either event or state (situation) entities, valid forms of exaggeration can be derived from all of the 44 verb classes. In all cases, the semantic features of any class of verbs (object and situation entities) are compatible with the semantic features of the form of exaggeration (object and situation entities). The following figure shows the semantic feature compatibility (see section 3.5) of deriving the form of exaggeration:

Figure 5: The semantic feature compatability of deriving the form of exaggeration



5.3.4 Semantic features of the Instrumental Noun

Semantically, the notion of the instrument has been discussed under thematic roles. According to Fillmore (1971), the instrument is a thematic role. Fromkin, Rodman et al. (2011: 165) define the instrument thematic role as "the means used to accomplish the action". Another semantic description of the instrument is provided by Pawlak and Bielak (2011: 54), as "a physical object which is manipulated by the agent and serves as the 'intermediary' in the transmission of energy".

Table 25 shows the semantic features of the instrumental noun, including its object and situation entities:

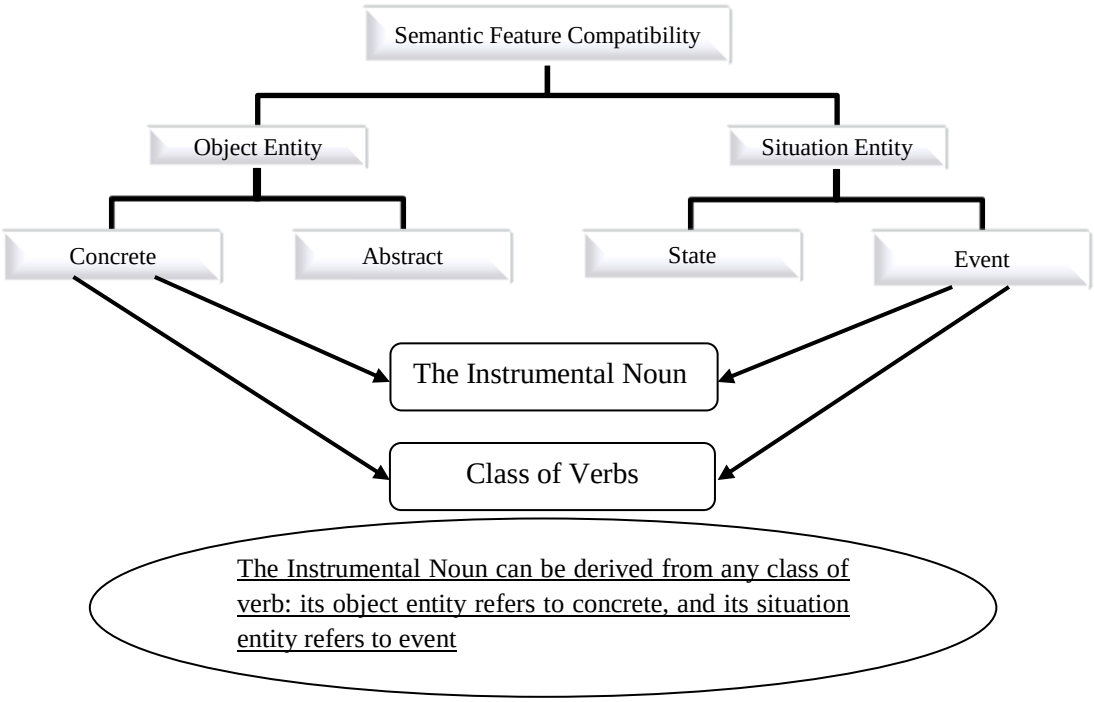
Table 25: The semantic features of the instrumental noun

Instrumental Noun	
Object Entity	Situation Entity
The instrumental noun refers to a concrete entity that occupies physical space. Furthermore, it must be an inanimate object	The instrumental noun can be described in terms of the situation entity as an event that induces change from one state to another. It

that does not have life, spirit or agency.	must particularly express a kind of making, forming, working, producing, functioning, handling or crafting something.

To derive valid instrumental nouns, the semantic features (object and situation entities) of the instrumental noun should be identical with those of the verb classes. Therefore, the object and situation entity of a verb class must be, respectively, concrete and event. Otherwise, a derived instrumental noun will be invalid semantically (see Figure 11). The following figure shows the semantic feature compatibility (see section 3.5) of deriving the instrumental noun:

Figure 6: The semantic feature compatability of the instrumental noun



5.3.5 Semantic features of the qualificative adjective

Similarly, the qualificative adjective functions semantically like the active participle, and can be described under the thematic role of the agent (see section 5.3.1) where the qualificative adjective refers to an entity that involves a state. For example, the qualificative adjective *kabīr* كبير 'big' refers to an entity (person or thing) and the state of being big. This state indicates stability and continuity in the meaning. Furthermore, the

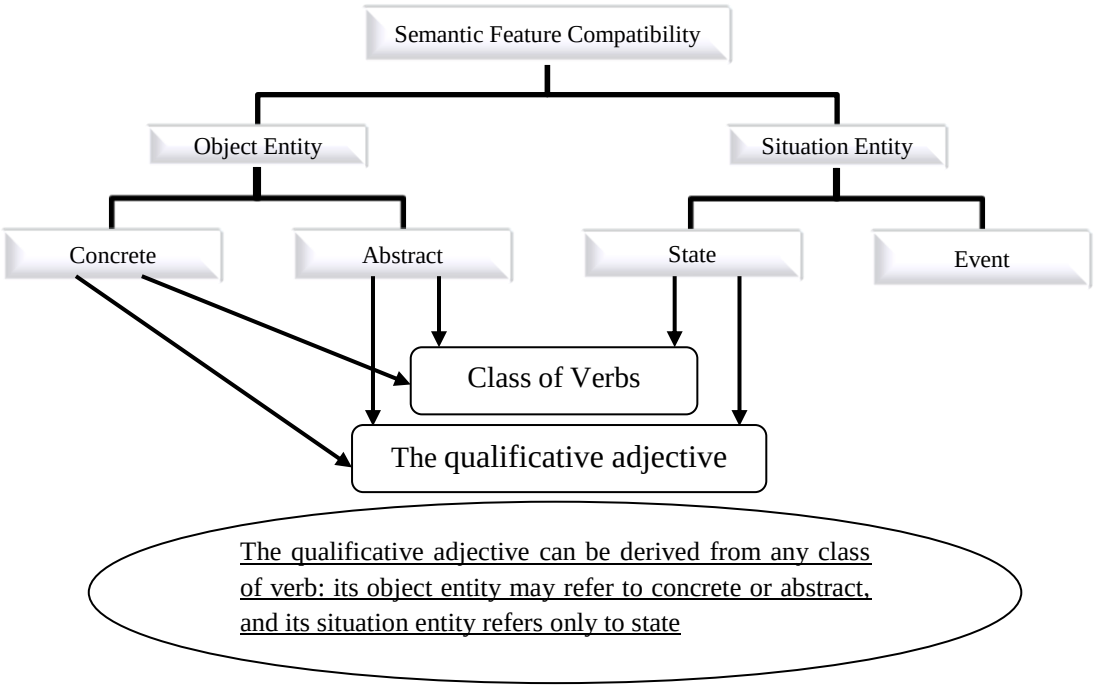
qualificative adjective is derived from intransitive verbs that are apparently related to state, not event, entities. The qualificative adjective is not required to indicate event. Table 26 shows the semantic features of the qualificative adjective, including its object and situation entities:

Table 26: The semantic features of the qualitative adjective

Qualificative Adjective	
Object Entity	Situation Entity
The qualificative adjective may refer either to a concrete entity or an abstract entity: - Concrete entities (animate or inanimate) express tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space. - Abstract entities express non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space.	The situation entity of the qualificative adjective refers only to the state entity that describes a state which is permanent or will last for a significant time.

Valid qualificative adjectives can be derived from a class of verbs whose semantic features (object and situation entities) are compatible with the semantic features of the qualificative adjective features (object and situation entities) (see Figure 11). The following figure shows the semantic feature compatibility (see section 3.5) of deriving the qualificative adjective:

Figure 7: The semantic feature compatability of the qualificative adjective



5.3.6 Semantic features of the locative noun

In the literature of semantics, the locative is considered a type of semantic role (Fillmore 1971: 41). It is the entity that denotes the physical place or location in which the action of the verb occurs. Therefore, it should be a tangible entity that can mainly be measured by the sense of touch. Three of the semantic roles presented by Fillmore (1971) can fall under the locative role:

- Goal that represents the location to which the action is targeted.

- Source that represents the location from which the action initiates.

- Path that represents the location through which the action moves.

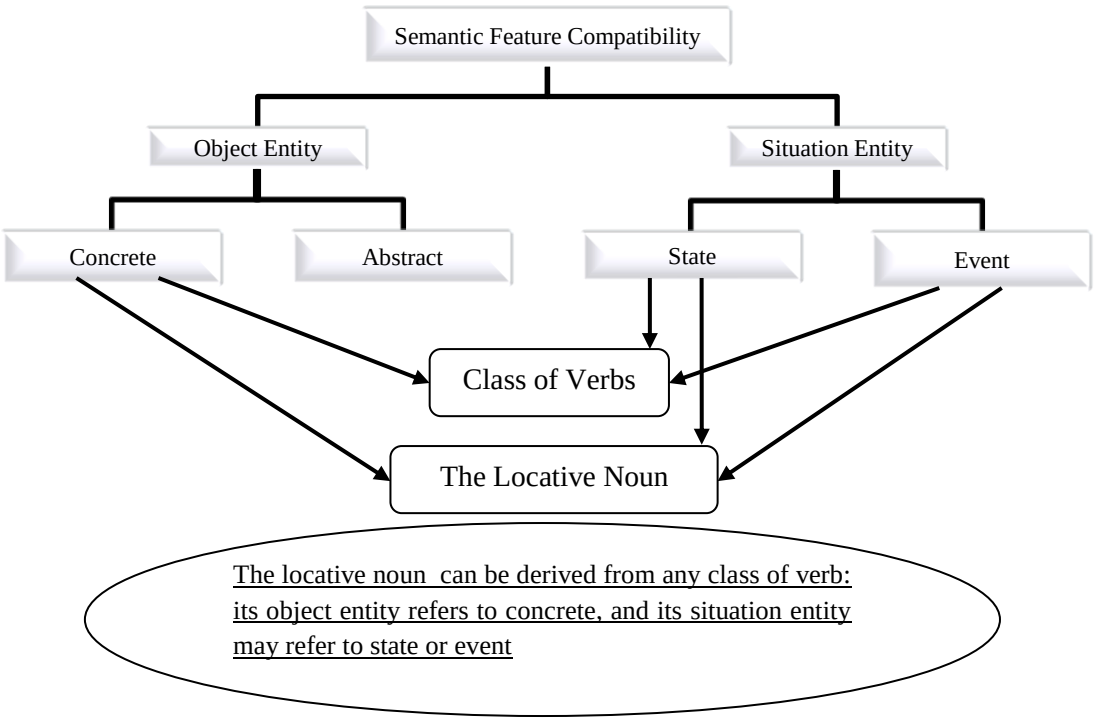
Table 27 shows the semantic features of the locative noun, including its object and situation entities:

Table 27: The semantic features of the locative noun

Locative Noun	
Object Entity	Situation Entity
The locative noun refers only to a concrete entity that occupies physical space (accessible to the sense of touch). Moreover, it is entirely an inanimate object that does not have life, spirit or agency.	The situation entity of the locative noun may refer either to an event entity or a state entity: - Event entity involves a change from one state to another. - State entity describes a state which is permanent or will last for a significant time.

To derive valid locatives nouns, the semantic features (object and situation entities) of the locative noun should be identical with those of the verb classes. Therefore, the object and situation entity of a verb class must be respectively concrete and state or event; otherwise, a derived locative noun will be invalid semantically (see Figure 11). The following figure shows the semantic feature compatibility (see section 3.5) of deriving the locative noun:

Figure 8: The semantic feature compatability of deriving the locative noun



5.4 Semantic features of the verb classes and their compatibility with the nominal derivatives

The following 44 tables provide the semantic features (object and situation entities) of our Arabic verb classes. In terms of the object entity, each of the 44 verb classes is labelled as an abstract or concrete entitity, while in terms of the situation entity they are labelled as state or event entities. The compatibility of each class of verbs with the six types of nominal derivatives is determined, with the validity or invalidity of deriving a nominal derivative clarified with the justification and examples (see section 3.5).

Class 01: ***Verbs of the state of the body***	
Object entity	Situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to feel pain', 'to be hungry' and 'to be thirsty'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of the state of the body* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of the state of the body*. For example, *jāʾiᶜ* جائع 'hungry', *nāᶜis* ناعس 'sleepy', *dāʾix* دائخ 'dozy'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of the state of the body* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of the state of the body*. For example, *maʾrūq* مأروق 'wakeful', *maskūr* مسكور 'drunken', *matᶜūb* متعوب 'fatigued'.	

Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of the state of the body* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of the state of the body*. For example, *miᶜṭāš* مِعْطاش 'very thirsty', *taᶜūb* تعوب ' so tired', *ʾallām* ألاّم 'feeling pain'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of the state of the body* and the semantic features of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involve concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of the state of the body*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of the state of the body* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of the state of the body*. For example, *ᶜariq* أرق 'insomniac', *xadir* خدِر 'anesthetized, doped', *ẓamiʾ* ظَمِئ 'thirsty'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of the state of the body* and the semantic features of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involve concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of the state of the body*.

Class 02: ***Verbs of body parts***	
The object entity	The situation entity
These verbs refer to concrete entities,	These verbs refer to state entities. They

expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space. They involve a physical action that can be seen, heard, or touched, such as ‘to blink, wink, bat’, ‘to cough’, and ‘to sneeze’.	describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of body parts* (that involve concrete and state entities) and those of *the active participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of body parts*. For example, *bākin* باكٍ ‘one who cries’, *sāʿil* ساعل‘one who coughs’, *ʿāṭis* عاطس ‘one who sneezes’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of body parts* (that involve concrete and state entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of body parts*. For example, *maxlūj* مخلوج ‘twitched’, *maḏrūf* مذروف‘shedded tears’, *malhūṯ* ملهوث ‘panted’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of body parts* (that involve concrete and state entities) and those of *the form of exaggeration* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of body parts*. For example, *bakkāʾ* بكّاء ‘often tearful’, *saʿāl* سعّال ‘coughing a lot’, *ʿaṭās* عطّاس ‘sneezing a lot’.	
Compatibility with the instrumental noun	
There is no compatibility between the semantic features of *Verbs of body parts* and the semantic features of *the instrumental noun*, where the features of the verbs involve concrete and state entities, and those of the instrumental noun involve concrete and event	

entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of body parts*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of body parts* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of body parts*. For example, *damīᶜ* دميع 'tearful', *bakiyy* بكِيّ 'weepy', and *saᶜil* سعل 'cougher'.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of body parts* (that involve concrete and state entities) and those of *the locative noun* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of body parts*. For example, *maḏraf* مذرف 'a place from which tears shed', *marᶜaf* مرعف 'a place from which a nosebleed bleeds', *mašhaq* مشهق 'a place through which the air is breathed in'.

Class 03: ***Verbs of diseases***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to be deaf or dumb'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of diseases* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of diseases*. For example, *bākim* باكم 'one who suffers from dumbness', *ᶜāqim* عاقم	

‘one who suffers from infertility’, *zākim* زاكم ‘one who suffers from cold’.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of diseases* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of diseases*. For example, *mašlūl* مشلول ‘sufferer from being paralyzed’, *mazkūm* مزكوم ‘sufferer from catching a cold’, *mabrūṣ* مبروص ‘sufferer from being a leper’.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of diseases* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of diseases*. For example, *marrāḍ* مرّاض ‘one who is very ill’, *jarrāb* جرّاب ‘one who has a lot of mange’, *mizkām* مزكام ‘one who suffers from a strong cold’.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of diseases* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of diseases*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of diseases* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of diseases*. For example, *ʾabraṣ* أبرص ‘leper; leprous’, *ʾaʿmā* أعمى ‘blind’, *kasīḥ* كسيح ‘lame’.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of diseases* and those of

the locative noun, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of diseases*.

Class 04: ***Verbs of social and personal behaviour***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to be wise, judicious', 'to have mercy upon' and 'to be generous, forgiving, tolerant'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of social and personal behaviour* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of social and personal behaviour*. For example, *ṣābir* صابر 'one who is patient', *bāxil* باخل 'one who is stingy', *kārim* كارم 'one who is generous'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of social and personal behaviour* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of social and personal behaviour*. For example, *maʾṯūr* مأثور 'gnomic (behaviour)', *maxdū ᶜ* مخدوع 'cheated', *mabrūṣ* مرؤوف 'merciful (behaviour)'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of social and personal*	

behaviour (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of social and personal behaviour*. For example, *ṣābir* صبور 'one who is so patient', *raʾūf* رؤوف 'affectionate', *mikrām* مكرام 'munificent'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of social and personal behaviour* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of social and personal behaviour*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of social and personal behaviour* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of social and personal behaviour*. For example, *ḥalīm* حليم 'clement; indulgent', *raḥīm* رحيم 'merciful', *xajil* خجِل 'shy'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of social and personal behaviour* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of social and personal behaviour*.

Class 05: ***Verbs of emotions***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and	These verbs refer to state entities. They describe a state which is permanent or will

intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as ‘to love’, ‘to hate’ and ‘to fear’.	last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of emotions* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of emotions*. For example, *ᶜāšiq* عاشق ‘one who is lover’, *kārih* كاره ‘one who is hater’, *qāliq* قالق ‘one who is anxious’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of emotions* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of emotions*. For example, *mabġūḍ* مبغوض ‘detested’, *majzūᶜ* مجزوع ‘anxious’, *maġḍūb* مغضوب ‘angry’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of emotions* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of emotions*. For example, *jazūᶜ* جزوع ‘anxious’, *baġāḍ* بغّاض ‘strong hater’, *ḥasūd* حسود ‘envious’.	
Compatibility with the instrumental noun	
There is no compatibility between the semantic features of *Verbs of emotions* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of emotions*.	
Compatibility with the qualificative adjective	

There is compatibility between the semantic features of *Verbs of emotions* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of emotions*. For example, *baġīḍ* بغيض 'hateful; repugnant', *ḥazīn* حزين'sad', *saʿīd* سعيد 'happy'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of emotions* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of emotions*.

Class 06: ***Verbs of colouring***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space. They are accessible by one of the five senses i.e. they can be seen, such as 'to be or become blue', 'to be or become black', and 'to be or become pale'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of colouring* (that involve concrete and state entities) and those of *the active participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of colouring*. For example, *bāhit* باهت 'pale', *qātim* قاتم 'dark', *zāriq* زارق 'blue'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of colouring* (that involve	

concrete and state entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of colouring*. For example, *maṣbūġ* مصبوغ 'dyed', *masūd* مَسُود 'black', *maxḍūb* مخضوب 'tinged'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of colouring* (that involve concrete and state entities) and those of *the active participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of colouring*. For example, *zarrāq* زرّاق 'one who makes something blue', *xaḍḍār* خضّار 'one who makes something green', *ṣaffār* صفّار 'one who makes something yellow'.

Compatibility with the instrumental noun

There is no compatibility between the semantic features of *Verbs of colouring* and those of *the instrumental noun*, where the features of the verbs involve concrete and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of colouring*.

Compatibility with the qualificative adjective

There is compatibility between the semantic features of *Verbs of colouring* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of colouring*. For example, *ʾazraq* أزرق 'blue', *ʾasḥam* أسحم 'black, *ʾaṣfar* أصفر 'yellow'.

Compatibility with the locative noun

There is compatibility between the semantic features of *Verbs of colouring* (that involve concrete and state entities) and those of *the locative noun* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of colouring*. For example, *maxḍarah* مخضرة 'a green place (meadow)', *maṣfar* مصفرة 'a yellowish place', *mazraq* مزرق 'a bluish place'.

Class 07 ***Verbs of bodily qualities***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as such as ‘to be or become hot or warm’, ‘to be or become soft, smooth’ and ‘to be or become big, large’.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of bodily qualities* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of bodily qualities*. For example, *nā ᶜim* ناعم ‘soft’, *kārih* بادن ‘fat’, *qāliq* ساخن ‘hot’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of bodily qualities* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of bodily qualities*. For example, *maṯqūl* مثقول ‘heavy’, *marqūq* مرقوق ‘thin’, *maḏūb* مذوب ‘melt’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of bodily qualities* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of bodily qualities*. For example, *ṯaqqāl* ثقّال ‘someone/something that makes something heavy’, *barrād* برّاد ‘someone/something that makes something cold’, *saxxān* سخّان ‘someone/something that makes something warm’.	

Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of bodily qualities* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of bodily qualities*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of bodily qualities* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of bodily qualities*. For example, *badīn* بدين 'obese; fat', *samīk* سميك 'thick', *ṣaġīr* صغير 'small; tiny'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of bodily qualities* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of bodily qualities*.

Class 08: ***Verbs of motion***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to come', 'to go', 'to leave' and 'to run'.	These verbs refer to event entities. They involve a change from one state to another. These verbs involve a movement from a location to another through a path. They involve a kind of functioning.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of motion* (that involve concrete and event entities) and those of *the active participle* (that may also involve	

concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of motion*. For example, *ʾātin* آتٍ 'one who is coming', *ḏāhib* ذاهب 'one who is going', *zāḥif* زاحف 'one who is crawling'.

Compatibility with the passive participle

There is compatibility between the semantic features of *Verbs of motion* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of motion*. For example, *maʿbūr* معبور 'crossed', *marjūʿ* مرجوع 'returned to', *mawfūd* موفود 'come to'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of motion* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of motion*. For example, *jawwāb* جوّاب 'frequent traveller', *ḏahhāb* ذهّاب 'frequent goer', *ṭayyār* طيّار 'pilot'.

Compatibility with the instrumental noun

There is compatibility between the semantic features of *Verbs of motion* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of motion*. For example, *sayyārah* سيّارة *'car'*, *misʿad* مِصْعَد *'elevator'*, and *darrājah* درّاجة *'bicycle'*.

Compatibility with the qualificative adjective

There is no compatibility between the semantic features of *Verbs of motion* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of motion*.

Compatibility with the locative noun

There is compatibility between the semantic features of *Verbs of motion* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete

and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of motion*. For example, *madxal* مدخل 'entry (way)', *maxraj* مخرج 'escape ; exit', and *ma^{c}bar* معبر 'corridor ; path'.

Class 09: ***Verbs of swimming***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to swim', 'to float' and 'to dive'.	These verbs refer to event entities. They involve a change from one state to another. These verbs refer to events that involve a kind of functioning.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of swimming* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of swimming*. For example, *sābiḥ* سابح 'one who is swimming', *ġāriq* غارق 'one who is drowning', *ġāṭis* غاطس 'one who is diving'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of swimming* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of swimming*. For example, *masbūḥ* مسبوح 'swum in', *maġṭjūs* مغطوس 'dived in', *maġrūq* مغروق 'drowned in'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of swimming* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of swimming*. For example, *sabbāḥ* سبّاح 'professional	

swimmer', *ᶜawwām* عوّام 'professional floater', *ġaṭṭās* غطّاس 'expert diver'.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of swimming* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of swimming*. For example, *ġawwāṣah* غواصة *'submarine'*, *ᶜawwāmah* عوّامة *'float'*, and *ġaṭṭāsah* غطّاسة *'diver'*.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of swimming* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of swimming*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of swimming* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of swimming*. For example, *masbaḥ* مسبح 'swimming pool', *maġṭas* مغطس 'bath ; bathtub', and *maġraq* مغرق 'a place of sinking'.

Class 10: ***Verbs of location/place***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to be or become narrow, tight, close', 'to be or become far, faraway, far-off, distant, remote' and 'be or become deep(er)'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.

Compatibility with the active participle
There is compatibility between the semantic features of *Verbs of location/place* (that involve concrete and state entities) and those of *the active participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of location/place*. For example, *sāḥiq* ساحق 'deep, *ᶜālin* عالٍ 'high', *wāsiᶜ* واسع 'wide'.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of location/place* (that involve concrete and state entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of location/place*. For example, *maᶜluw* مَعْلُوّ 'elevated', *maᶜmūq* معموق 'deep', *maqṣiy* مَقْصِي 'remote'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of location/place* (that involve concrete and state entities) and those of *the form of exaggeration* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of location/place*. For example, *mišrāq* مِشراق 'directed toward the east', *ᶜammāq* عمّاق 'very deeper', *wasūᶜ* وسوع 'dilatable'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of location/place* and those of *the instrumental noun*, where the features of the verbs involve concrete and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of location/place*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of location/place* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of location/place*. For example, *baᶜīd* بعيد 'remote; far',

qarīb قريب ‘nearby; close’, *ʿamīq* عميق ‘deep’.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of location/place* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of location/place*. For example, *mašriq* مشرق ‘orient, east; the eastern part of a country (place)’, *maġrib* مغرب ‘west; the western part of a country (place)’, and *maḍıq* مضيق ‘strait’.

Class 11: ***Verbs of violence and abuse***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as ‘to break, smash, crush’, ‘to hit’, and ‘to throw’.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of violence and abuse* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of violence and abuse*. For example, *qātil* قاتل ‘killer’, *kāsir* كاسر ‘breaker’, *ḍārib* ضارب ‘hitter’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of violence and abuse* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of violence and abuse*. For example, *majrūḥ* مجروح ‘wounded’, *maqrūṣ* مقروص ‘bitten’, *markūl* مركول ‘kicked’.	

Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of violence and abuse* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of violence and abuse*. For example, *qattāl* قتّال 'mortal', *jallād* جلاّد 'executioner', *ḍarrāb* ضرّاب 'beater'.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of violence and abuse* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of violence and abuse*. For example, *mirjam* مِرْجَم *'launcher'*, *mišnaqah* مِشْنَقة *'gibbet'*, and *miṣ ᶜ āq* مِصْعَاق '*electric stick*'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of violence and abuse* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of violence and abuse*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of violence and abuse* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of violence and abuse*. For example, *maḥraqah* محرقة 'a place of burning (holocaust)', *mašnaqah* مشنقة 'a place of gibbet', and *maṭ ᶜ an* مطعن 'a place of stabbing'.

Class 12: ***Verbs of mental process***	
The object entity	The situation entity
These verbs refer to abstract entities,	These verbs refer to state entities. They

expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as ‘to calculate’, ‘to look into’ and ‘to solve’.	describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of mental process* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of mental process*. For example, *bāḥiṯ* باحث ‘researcher’, *ḥāsib* حاسب ‘counter’, *ẓān* ظانٌّ ‘thinker’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of mental process* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of mental process*. For example, *mabḥūṯḥ* مبحوث ‘studied’, *mafrūḍ* مفروض ‘supposed’, *maḥsūb* محسوب ‘calculated’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of mental process* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of mental process*. For example, *baḥāṯ* بحّاث ‘superior researcher’, *ḥaffāẓ* حفّاظ ‘one who has strong memory’, *ḥallāl* حلاّل ‘(problem) solver’.	
Compatibility with the instrumental noun	
There is no compatibility between the semantic features of *Verbs of mental process* and those of *the instrumental noun*, where the features (object entity) of the verbs involve abstract entities, and those of the instrumental noun involves concrete entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of mental process*.	

Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of mental process* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of mental process*. For example, *faṭīn* فطين 'cleaver', *fahīm* فهيم 'discerning; erudite', *nabīh* نبيه 'astute; brilliant'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of mental process* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of mental process*.

Class 13: ***Verbs of financial transaction***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to discount', ' to borrow', and 'to earn'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of financial transaction* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of financial transaction*. For example, *bāʾiʿ* بائع 'seller', *dāʾin* دائن 'creditor', *rāhin* راهن 'wager'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of financial transaction* (that	

involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of financial transaction*. For example, *mabḥūṯḥ* مجرود 'stocktaken', *mafrūḍ* مفروض 'supposed', *maḥsūb* محسوب 'calculated'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of financial transaction* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of financial transaction*. For example, *bayyāʿ* بيّاع 'salesclerk', *qarrāḍ* قرّاض 'person who lends money', *ġaššāš* غشّاش 'deceitful person in business'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of financial transaction* and those of *the instrumental noun*, where the features (object entity) of the verbs involve abstract entities, and those of the instrumental noun involves concrete entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of financial transaction*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of financial transaction* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of financial transaction*. For example, *xasīr* خسير 'loser', *rafīʿ* رفيع 'high price', and *raxīṣ* رخيص 'cheap; inexpensive'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of financial transaction* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of financial transaction*.

Class 14: ***Verbs of agriculture***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to sow', 'to irrigate, water', and 'to harvest'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of agriculture* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of agriculture*. For example, *ḥāriṯ* حارث 'plower, ploughman', *ḥāṣid* حاصد 'harvester', *zāriᶜ* زارع 'planter'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of agriculture* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of agriculture*. For example, *mazrūᶜ* مزروع 'planted', *maḥṣūd* محصود 'harvested', *marwiy* مروي 'watered'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of agriculture* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of agriculture*. For example, *baḏḏār* بذّار 'breeders seed', *ḥaffār* حفّار 'inscriber', *zarrāᶜ* زرّاع 'cultivator'.	
Compatibility with the instrumental noun	
There is compatibility between the semantic features of *Verbs of agriculture* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore,	

it is valid semantically to generate an instrumental noun from *Verbs of agriculture*. For example, *miḥrāṯ* مِحْرَاث 'plough', *ḥaṣṣādah* حصّادة 'mower', and *ḥaffārah* حفّارة 'digger'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of agriculture* and those of *the qualificative adjective,* where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of agriculture*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of agriculture* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of agriculture*. For example, *maštal* مشتل 'plant nursery', *maġras* مغرس 'a place of planting', and *mazraᶜah* مزرعة 'farm'.

Class 15: ***Verbs of desire and request***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to desire, wish', 'to beg', and 'to need'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of desire and request* (that involve abstract and state entities) and those of the *active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of desire and request*. For example, *ᶜāmil* آمِل 'hoper', *rāġib* راغب 'willing', *ṭāmiᶜ* طامع 'greedy'.	

Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of desire and request* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of desire and request*. For example, *maʾmūl* مأمول 'hoped', *marġūb* مرغوب 'desired', *maṭlūb* مطلوب 'required'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of desire and request* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of desire and request*. For example, *tawwāq* توّاق 'agog', *ṭamūḥ* طموح 'eager', *ṭallāb* طلاب 'demanding'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of desire and request* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of desire and request*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of desire and request* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of desire and request*. For example, *jašiᶜ* جشِع 'greedy', *ḥarīṣ* حريص 'eager', *ṭamiᶜ* طمِع 'avid'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of desire and request* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid

semantically to generate a locative noun from *Verbs of desire and request*.

Class 16: ***Verbs of intention***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to seek (to) ', 'to intend', 'to aim', and 'to intend'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of intention* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of intention*. For example, *ṭāmiḥ* طامح 'aspirant', *nāwin* ناوٍ 'intender', *sā ᶜ in* ساعٍ 'seeker'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of intention* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of intention*. For example, *maqṣūd* مقصود 'intended', *ma ᶜ niy* معني 'meant', *manwiy* منْوي 'proposed'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of intention* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of intention*. For example, *ṭamūḥ* طمّوح 'ambitious', *haddāf* هدّاف 'skilled marksman', *sa ᶜ ᶜāᵓ* سعّاء 'endeavorer'.	

Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of intention* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of intention*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of intention* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of intention*. For example, *ṭamiḥ* طمحٌ 'avaricious', *saᶜiyy* سعِيٌّ 'striving', *ᶜamid* عمِد 'determined'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of intention* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of intention*.

Class 17: ***Verbs of combining and constructing***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to build, construct', 'to collect', 'to sew', and 'to mix'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of combining and constructing* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to	

generate an active participle from *Verbs of combining and constructing*. For example, *bānin* بانٍ 'builder', *xāʾiṭah* خائطة 'sewer', *jāmiᶜ* جامع 'gatherer'.

Compatibility with the passive participle

There is compatibility between the semantic features of *Verbs of combining and constructing* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of combining and constructing*. For example, *mabniy* مبني 'built', *majmūᶜ* مجموع 'gathered', *marbūṭ* مربوط 'tied, attached'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of combining and constructing* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of combining and constructing*. For example, *jammāᶜ* جمّاع 'collector', *laḥḥām* لحّام 'solderer', *nassāj* نسّاج 'weaver'.

Compatibility with the instrumental noun

There is compatibility between the semantic features of *Verbs of combining and constructing* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of combining and constructing*. For example, *mixyaṯah* مِخْيَطة 'sewing machine', *mixlaṯ* مِخْلَط 'concrete mixer', and *milḥam* مِلحَم 'welding apparatus'.

Compatibility with the qualificative adjective

There is no compatibility between the semantic features of *Verbs of combining and constructing* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of combining and constructing*.

Compatibility with the locative noun

There is compatibility between the semantic features of *Verbs of combining and constructing* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of combining and constructing*. For example, *mabnā* مبنى 'building', *majmaᶜ* مجمع 'a place of meeting', and *maḥar* محشر 'insectary'.

Class 18: ***Verbs of sending and carrying***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to send, dispatch, forward', 'to carry, bear', and 'to ship'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of sending and carrying* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of combining and constructing*. For example, *šāḥin* شاحن 'shipper', *ḥāmil* حامل 'bearer', *sāḥib* ساحب 'puller'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of sending and carrying* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of sending and carrying*. For example, *mabᶜūṯ* مبعوث 'sent', *maḥmūl* محمول 'carried', *mašḥūn* مشحون 'shipped'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of sending and carrying*	

(that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of combining and constructing*. For example, *ḥammāl* حمّال 'carrier', *ᶜattāl* عتّال 'porter, bearer', *sawwāq* سوّاق 'driver'.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of sending and carrying* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of sending and carrying*. For example, *ḥammālah* حمّالة 'hand barrow', *misḥab* مِسْحَب 'drag', and *midfāᶜ* مِدْفَاع 'impeller'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of sending and carrying*. and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of sending and carrying*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of combining and constructing* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of combining and constructing*. For example, *mašḥan* مشحن 'a place of shipping', *majraf* مجرف 'a place of drifting (torrent)', and *maᶜbar* معبر 'passageway'.

Class 19: ***Verbs of Separating and Disassembling***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state	These verbs refer to event entities. They involve a change from one state

which is accessible to one or more of the five senses) that occupy physical space, such as ‘to open’, ‘to separate’, ‘to unscrew’, and ‘to divide’.	to another.

Compatibility with the active participle

There is compatibility between the semantic features of *Verbs of separating and disassembling* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of separating and disassembling*. For example, *ʿāzil* عازل ‘insulator’, *ṣādiʿ* صادع ‘crushing’, *sāḥiq* ساحق ‘destroyer’.

Compatibility with the passive participle

There is compatibility between the semantic features of *Verbs of separating and disassembling* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of separating and disassembling*. For example, *mabtūr* مبتور ‘cut off’, *maʿzūl* معزول ‘separated’, *maqsūm* مقسوم ‘divided’.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of separating and disassembling* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of separating and disassembling*. For example, *haddām* هدّام ‘demolisher; destroyer’, *šaṭār* شطّار ‘divider’, *qaṭāʿ* قطّاع ‘cutter’.

Compatibility with the instrumental noun

There is compatibility between the semantic features of *Verbs of separating and disassembling* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of separating and disassembling*. For example, *miftāḥ* مِفْتَاح *'key'*, *mifakk* مِفَكّ *'screw-driver'*, and *minšār* مِنْشَار *'saw'*.

Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of separating and disassembling* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of separating and disassembling*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of separating and disassembling* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of separating and disassembling*. For example, *ma ᶜ zal* معزل 'a place that is isolated', *mahdam* مهدم 'a place that is destroyed', and *mafṣal* مفصل 'a place that is divided'.

Class 20: ***Verbs of removing***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to extract', 'to remove, take away, take off', and 'to erase'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of removing* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of removing*. For example, *ḥāḏif* حاذف 'eliminator', *qāli ᶜ* قالع 'extractor', *nātif* ناتف 'plucker'.	

Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of removing* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of removing*. For example, *maḥḏūf* محذوف 'deleted', *maḥlūq* محلوق 'shaved', *manzūᶜ* منزوع 'extracted'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of removing* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of removing*. For example, *ḥallāq* حلاّق 'barber', *miḥḏāf* محذاف 'remover', *miqlāᶜ* مقلاع 'extractor'.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of removing* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of removing*. For example, *maḥḥāyah* محّاية 'eraser', *miqšaṭah* مِقْشَطة 'scraper', and *miknasah* مِكْنَسَة 'broom'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of removing* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of removing*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of removing* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of removing*. For example, *maqlaᶜ* مقلع 'quarry', *makšaṭ* مكشط 'a place that is scratched', and *mamsaḥ* ممسح 'a place that is wiped off'.

<table>
<tr><th colspan="2">Class 21: Verbs of bending</th></tr>
<tr><td>The object entity</td><td>The situation entity</td></tr>
<tr><td>These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as ‘to fold’, ‘to wrap up’ and ‘to turn’.</td><td>These verbs refer to event entities. They involve a change from one state to another.</td></tr>
<tr><td colspan="2">Compatibility with the active participle</td></tr>
<tr><td colspan="2">There is compatibility between the semantic features of Verbs of bending (that involve concrete and event entities) and those of the active participle (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from Verbs of bending. For example, ṯānin ثانٍ ‘someone/something that folds’, ḥārif حارف ‘someone/something that deviates’, lāff لافّ ‘someone/something that turns’.</td></tr>
<tr><td colspan="2">Compatibility with the passive participle</td></tr>
<tr><td colspan="2">There is compatibility between the semantic features of Verbs of bending (that involve concrete and event entities) and those of the passive participle (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from Verbs of bending. For example, maṭwiy مطوي ‘folded’, maqlūb مقلوب ‘turned’, malwiy ملوي ‘wrench’.</td></tr>
<tr><td colspan="2">Compatibility with the form of exaggeration</td></tr>
<tr><td colspan="2">There is compatibility between the semantic features of Verbs of bending (that involve concrete and event entities) and those of the form of exaggeration (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from Verbs of bending. For example, qallāb قلاّب ‘reversible; tiltable; tippable’, fattāl فتّال ‘twister’, laffāf لفّاف ‘wrapper’.</td></tr>
<tr><td colspan="2">Compatibility with the instrumental noun</td></tr>
</table>

There is compatibility between the semantic features of *Verbs of bending* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of bending*. For example, *miṭwā* مِطْوى 'bender', *laffāfah* لفافة 'roll', and *miṯnā* مَثْنَى 'wrap'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of bending* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of bending*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of bending* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of bending*. For example, *malaff* ملفّ 'a place of wrapping', *maṭwā* مطوى 'a place of folding', and *maqlab* مقلب 'a place of turning'.

Class 22: ***Verbs of decorating and transcribing***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to stamp, imprint, print', 'to draw, trace 'to polish, burnish', 'to hew (out), and 'to tattoo'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of decorating and transcribing* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to	

generate *the active participle* from *Verbs of decorating and transcribing*. For example, *ṭābiᶜ* طابع 'someone/something that prints', *rāsim* راسم 'someone/something that draws', *nāḥit* ناحت 'someone/something that sculptures'.

Compatibility with the passive participle

There is compatibility between the semantic features of *Verbs of decorating and transcribing* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of decorating and transcribing*. For example, *maxtūm* مختوم 'stamped', *manḥūt* منحوت 'sculpted', *maṭbūᶜ* مطبوع 'printed'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of decorating and transcribing* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of decorating and transcribing*. For example, *rassām* رسّام 'artist; portraitist', *dahhān* دهّان 'someone who paints', *naḥāt* نحّات 'carver; chiseler'.

Compatibility with the instrumental noun

There is compatibility between the semantic features of *Verbs of decorating and transcribing* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of decorating and transcribing*. For example, *mixtam* مِخْتَم 'stamp', *miṯbaᶜa* مِطْبَعة 'printer', and *naḥātah* نحّاتة 'machine sculpture'.

Compatibility with the qualificative adjective

There is no compatibility between the semantic features of *Verbs of decorating and transcribing* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of decorating and transcribing*.

Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of decorating and transcribing* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of decorating and transcribing*. For example, *marsam* مرسم 'a place of drawing (atelier)', *maktab* مكتب 'a place of writing (writing desk, office)', and *maṣbaġah* مصبغة 'dye works; dyehouse'.

Class 23: ***Verbs of measure***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to measure', 'to gauge', and 'to weigh'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of measure* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of measure*. For example, *qāʾis* قائس 'someone/something that gauges', *kāʾil* كائل 'someone/something that measures', *nāḥit* وازن 'someone/something that weights'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of measure* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of measure*. For example, *makıl* مَكِيل 'gauged', *maṣı ᶜ* مَصِيع	

‘measured’, *mawzūn* موزون ‘weighted’.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of measure* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of measure*. For example, *wazzān* وزّان ‘the person who weights’, *ḥāmil* كيّال ‘the person who gauges’, *qayyās* قيّاس ‘measurer’.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of measure* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of measure*. For example, *miqyās* مِقْيَاس 'gauge', *mikyāl* مِكْيَال 'scoop', and *mizān* مِيزَان 'scale'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of measure* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of measure*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of measure* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of measure*. For example, *makāl* مكال ‘a place of gauging’, *maqās* مقاس ‘a place that is measured’, and *mawzin* موزن ‘a place of weighing’.

Class 24: ***Verbs of quantity and size***	
The object entity	The situation entity

These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as such as ‘to increase, grow’, ‘to decrease, diminish’, and ‘to shrink, dwindle’.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of quantity and size* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of quantity and size*. For example, *zāʾid* زائد ‘something that increases’, *nāqiṣ* ناقص ‘something that decreases’, *nāḥit* فائض ‘something that raises’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of quantity and size* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of quantity and size*. For example, *maṣġūr* مصغور ‘small’, *mazıd* مزيد ‘increased’, *manqūṣ* منقوص ‘decreased’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of quantity and size* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of quantity and size*. For example, *qallāl* قلاّل ‘someone who decreases something’, *kaṯār* كثّار ‘someone who increases something’, *naqqāṣ* نقّاص ‘someone who diminishes something’.	
Compatibility with the instrumental noun	
There is no compatibility between the semantic features of *Verbs of quantity and size* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it	

is not valid semantically to generate an instrumental noun from *Verbs of quantity and size*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of quantity and size* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of quantity and size*. For example, *šaḥiḥ* شحيح 'scarce', *ġazīr* غزير 'copious; plenteous', *kabīr* كبير 'large'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of quantity and size* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of quantity and size*.

Class 25: ***Verbs of stability***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to remain, stay', 'to live in', and 'to last, continue'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of stability* (that involve concrete and state entities) and those of *the active participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of stability*. For example, *bāqin* باقٍ 'someone/something that stays', *ṯābit* ثابت 'someone/something that is stable', *rākid* راكد 'someone/something that is stagnant'.	
Compatibility with the passive participle	

There is compatibility between the semantic features of *Verbs of stability* (that involve concrete and state entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of stability*. For example, *markūn* مركون 'stagnant', *maskūn* مسكون 'inhabited', *marsūx* مرسوخ 'solid'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of stability* (that involve concrete and state entities) and those of *the form of exaggeration* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of stability*. For example, *jaṯūm* جثوم 'someone who crouches in a place', *rakkād* ركّاد 'someone who stagnates in a place', *labāṯ* لبّاث 'someone who stays in a place'.

Compatibility with the instrumental noun

There is no compatibility between the semantic features of *Verbs of stability* and those of *the instrumental noun*, where the features of the verbs involve concrete and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of stability*.

Compatibility with the qualificative adjective

There is compatibility between the semantic features of *Verbs of stability* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of stability*. For example, *rakīn* ركين 'solid; steady', *waṭīd* وطيد 'firm', *ṣamid* صمد 'perpetual'.

Compatibility with the locative noun

There is compatibility between the semantic features of *Verbs of stability* (that involve concrete and state entities) and those of *the locative noun* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of stability*. For example, *maqarr* مقرّ 'domicile, flat', *maskan* مسكن 'house (residence)', and *mawṭin* موطن '(home) country; birthplace'.

Class 26: ***Verbs of creation***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to form, shape', 'to make, do, perform; to manufacture', and 'to create, make, form, fashion'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of creation* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of creation*. For example, *xāliq* خالق 'creator', *ṣāni*ᶜ صانع 'maker', *ṣāʾiġ* صائغ 'former'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of creation* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of creation*. For example, *maᶜmūl* معمول 'fabricated', *maskūn* مصنوع 'created', *maxlūq* مخلوق 'creature'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of creation* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of creation*. For example, *šāḥin* خلّاق 'GOD; the creator of the whole world', *ṣannāᶜ* صنّاع 'artificer; one who does skilled work with his hands', *waḍḍāᶜ* وضّاع 'producer'.	

Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of creation* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of creation*. For example, *mibnāʾ* مِبْناء 'builder', *mijʿal* مِجْعَل 'maker', and *miṣnaʿ* مِصْنَع 'creator'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of creation* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of creation*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of creation* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of creation*. For example, *maʿmal* معمل 'plant', *masnaʿ* مصنع 'manufactory', and *maṣāġ* مصاغ 'a place of forming (jewelry)'.

Class 27: ***Verbs of preparing***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to rub, scrub', 'to rinse, wash', 'to cook', and 'to knead'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of preparing* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from	

Verbs of preparing. For example, *xābiz* خابز ‘baker’, *ṭābix* طابخ ‘cooker’, *ġāsil* غاسل ‘washer’.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of preparing* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of preparing*. For example, *maxlūṭ* مخلوط ‘admixed’, *maxbūz* مخبوز ‘baked’, *maṭbūx* مطبوخ ‘cooked’.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of preparing* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of preparing*. For example, *xabāz* خبّاز ‘baker’, *ṭabbāx* طباخ ‘chef; head cook in a hotel,restaurant,etc’, *ᶜajjān* عجّان ‘perineum; kneader’.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of preparing* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of preparing*. For example, *xallāṭah* خلاطة 'blender', *ṯabbāxah* طبّاخة 'cooker', and *miᶜjan* مِعْجَن ‘kneading machine’.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of preparing* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of preparing*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of preparing* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of preparing*. For example, *maṭbax* مطبخ ‘kitchen’, *maxbaz* مخبز ‘bakehouse; bakery’, and *maᶜjan*

معجن ‘a place of kneading’.

Class 28: ***Verbs of ingesting***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as ‘to drink’, ‘to chew, masticate’, and ‘to digest (food)’.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of ingesting* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of ingesting*. For example, *ʾākil* آكل ‘eater’, *šārib* شارب ‘drinker’, *ḏāʾiq* ذائق ‘taster’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of ingesting* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of ingesting*. For example, *maʾkūl* مأكول ‘eaten’, *mablūʿ* مبلوع ‘swollen’, *mamḍūġ* ممضوغ ‘masticated’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of ingesting* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of ingesting*. For example, *šāḥin* شاحن ‘shipper’, *ḥāmil* حامل ‘bearer’, *sāḥib* ساحب ‘puller’.	
Compatibility with the instrumental noun	

There is compatibility between the semantic features of *Verbs of ingesting* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of ingesting*. For example, *raḍḍāᶜah* رضّاعة 'nursing bottle', *maṣṣāṣah* مصّاصة 'straw', and *milᶜaqah* ملعقة 'spoon'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of ingesting* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of ingesting*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of ingesting* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of ingesting*. For example, *mašrab* مشرب 'a place of drinking', *mahḍam* مهضم 'a place of digesting (food)', and *maʾkal* مأكل 'a place of eating'.

Class 29: ***Verbs of the five senses***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space. They may be technologically applied by electronic devices, such as 'to see', 'to hear', 'to touch', 'to taste' and 'to smell'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of the five senses* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from	

Verbs of the five senses. For example, *bāṣir* باصر ‘seer’, *sāmiᶜ* سامع ‘drinker’, *ḏāᵓiq* ذائق ‘taster’.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of the five senses* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of the five senses*. For example, *malmūs* ملموس ‘touchable’, *marᵓiy* مرئي ‘seen’, *mašmūm* مشموم ‘smelled’.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of the five senses* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of the five senses*. For example, *baṣṣār* بصّار ‘augur; someone who lays eyes on’, *lammās* لمّاس ‘someone who touches a lot’, *ḏawwāq* ذوّاق ‘a gourmand person; someone who enjoys good food and drink’.
Compatibility with the instrumental noun
There is partially compatibility between the semantic features of *Verbs of the five senses* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate some instrumental nouns from *Verbs of the five senses*. For example, مِبْصَار 'tachistoscope', *mijass* مِجَسّ 'stethoscope', and *sammāᶜah* سمّاعة 'speaker'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of the five senses* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of the five senses*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of the five senses* (that involve

concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of the five senses*. For example, *marʾā* مرأى 'sight; view of landscape', *malmas* ملمس 'a place of touch or contact', and *maḍāq* مذاق 'a place of tasting (in the mouth)'.

Class 30: ***Verbs of ruling and government***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to order, command', 'to rule, reign, dominate', and 'to head, lead'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of ruling and government* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of ruling and government*. For example, *ḥākim* حاكم 'ruler', *qāḍin* قاضٍ 'judge', *qāʾid* قائد 'leader'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of ruling* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of ruling*. For example, *ḥakkām* حكّام 'someone who rules strongly', *ʾammār* أمّار 'someone who commands a lot', *ʿaddāl* عدّال 'equitable; evenhanded; rightful'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of ruling* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from	

Verbs of ruling. For example, *šāḥin* شاحن ‘shipper’, *ḥāmil* حامل ‘bearer’, *sāḥib* ساحب ‘puller’.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of ruling and government* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of ruling and government*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of ruling and government* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of ruling and government*. For example, *ʿamīr* أمير ‘prince’, *raʾīs* رئيس ‘chief’, *ḥakīm* حكيم ‘sage’.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of ruling and government* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of ruling and government*.

Class 31: ***Verbs of the development of life***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as ‘to give birth’, ‘to grow up’, ‘to age, grow old’, and ‘to be youthful’.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	

There is compatibility between the semantic features of *Verbs of the development of life* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of the development of life*. For example, *rāšid* راشد 'adult', *šābb* شابٌّ 'young', *ʿāʾiš* عائش 'liver'.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of the development of life* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of the development of life*. For example, *mawlūd* مولود 'born', *mablūġ* مبلوغ 'mature', *mafniy* مفني 'died'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of the development of life* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of the development of life*. For example, *wallādah* ولّادة 'fruitful; producing offspring prolifically', *mawwāt* موّات 'someone who is nearly to die', *ballāġ* بلّاغ 'mature person'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of the development of life* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of the development of life*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of the development of life* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of the development of life*. For example, *walīd* وليد 'born',

harim هرِم ‘very aged’, *faṭīs* فطيس ‘dead; carcass’.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of ruling and government* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of ruling and government*.

Class 32: ***Verbs of uttering***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to the five senses except the hearing) that do not occupy physical space, such as ‘to read, recite’, ‘to narrate, relate, tell’, and ‘to say, tell; to speak’.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of uttering* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of uttering*. For example, *rāwin* راوٍ ‘reciter’, *qāriʾ* قارئ ‘speaker’, *qāṣṣ* قاصٌّ ‘narrator’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of uttering* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of uttering*. For example, *matluw* مَتْلُوّ ‘recited’, *maḥkiy* محكي ‘cited’, *maqūl* مقول ‘said’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of uttering* (that involve abstract	

and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of uttering*. For example, *qaṣṣāṣ* قصّاص 'storyteller', *xaṭṭāb* خطّاب 'orator; a person making a speech', *maddāḥ* مدّاح 'commender; person who praises a lot'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of uttering* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves abstract and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of uttering*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of uttering* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of uttering*. For example, *madīḥ* مديح 'panegyric', *qarīẓ* قريظ 'eulogy', *saji^{c}* سجِع 'assonant; rhymed'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of uttering* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of uttering*.

Class 33: ***Verbs of accepting***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to accept', 'to obey, follow',	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.

and ‘to be or become satisfied (with)’.	

Compatibility with the active participle
There is compatibility between the semantic features of *Verbs of accepting* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of accepting*. For example, *qābil* قابل ‘acceptant’, *rāḍin* راضٍ ‘satisfier’, *tābiᶜ* تابع ‘follower’.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of accepting* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of accepting*. For example, *masmūḥ* مسموح ‘allowed’, *maqbūl* مقبول ‘accepted’, *maʾḏūn* مأذون ‘permitted’.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of accepting* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of accepting*. For example, *qanūᶜ* قنوع ‘contented; satisfied’, *ḥāmil* سموح ‘permissive’, *qabbāl* قبّال ‘acceptor’.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of accepting* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of accepting*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of accepting* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative

adjective from *Verbs of accepting*. For example, *qani*^{c} قنِع ‘contented’, *samīḥ* سميح ‘tolerant, good-hearted’, *taba*^{c} تبعٌ ‘follower’.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of accepting* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of accepting*.

Class 34: ***Verbs of refusing and disobedience***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as ‘to accept’, ‘to obey, follow’, and ‘to be or become satisfied (with)’.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of refusing and disobedience* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of refusing and disobedience*. For example, *rāfiḍ* رافض ‘refuser’, *ʾābin* آبٍ ‘decliner’, *nākir* ناكر ‘denier’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of refusing* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of refusing*. For example, *majḥūd* مجحود ‘denied’, *marfūḍ* مرفوض ‘refused’, *mardūd* مردود ‘rejected’.	

Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of refusing* (that involve abstract and state entities) and those of *the form of exaggeration active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of refusing*. For example, *jaḥūd* جحود 'denier', *raffāḍ* رفّاض 'rejecter', *nabbāḏ* نبّاذ 'discarder'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of refusing and disobedience* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of refusing and disobedience*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of refusing and disobedience* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of refusing and disobedience*. For example, *ʾabiyy* أبيّ 'disdainful; haughty', *nakīṯ* نكيث 'infringer ; renege', *ʿaṣiyy* عصِيّ 'revolutionary, rebellious'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of refusing and disobedience* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of refusing and disobedience*.

Class 35: ***Verbs of preventing and prohibition***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which	These verbs refer to event entities. They involve a change from one state

is accessible to one or more of the five senses) that occupy physical space, such as ‘to veil, cover’, ‘to prevent, hinder, stop’, and ‘to jail, lock up’.	to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of preventing and prohibition* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of preventing and prohibition*. For example, *rādiᶜ* رادع ‘deterrent’, *ᶜāᵓiq* عائق ‘barrier’, *māniᶜ* مانع ‘prohibiter’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of preventing and prohibition* (that involve concrete and event entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of preventing and prohibition*. For example, *maᵓsūr* مأسور ‘inmate’, *maḥḍūr* محضور ‘prohibited’, *makbūḥ* مكبوح ‘controlled’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of preventing and prohibition* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of preventing and prohibition*. For example, *sajjān* سجّان ‘jailer’, *nahhāᵓ* نهّاء ‘forbidder’, and *mannāᶜ* منّاع ‘obstacle’.	
Compatibility with the instrumental noun	
There is compatibility between the semantic features of *Verbs of preventing and prohibition* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of preventing and prohibition*. For example, *mirbaṭ* مِرْبَط 'rope', *miᶜyaq* مِعْيَق 'barrier', and *mikbaḥ* مِكْبَح 'brake'.	
Compatibility with the qualificative adjective	
There is no compatibility between the semantic features of *Verbs of preventing and*	

prohibition and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of preventing and prohibition*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of preventing and prohibition* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of ingesting*. For example, *masjan* مسجن 'jail', *maḥjar* محجر 'a place of quarantine', and *maḥbas* محبس 'concentration camp'.

Class 36: ***Verbs of occurrence and progressing***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to become', 'to happen, take place, occur', and 'to be complete'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of occurrence and progressing* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of occurrence and progressing*. For example, *ḥādiṯ* حادث 'incident', *bādiʾ* بادئ 'starter', *wāqiʿ* واقع 'occurring'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of occurrence and progressing* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive	

participle from *Verbs of occurrence and progressing*. For example, *mabdūʾ* مبدوء ‘started’, *matmūm* متموم ‘completed’, *masbūq* مسبوق ‘precedented’.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of occurrence* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of occurrence*. For example, *sabbāq* سبّاق ‘earliest’, *šarrāʿ* شرّاع ‘initiator’, *baddāʾ* بدّاء ‘originator’.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of occurrence and progressing* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of occurrence and progressing*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of occurrence and progressing* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of occurrence and progressing*. For example, *ḥadīṯ* حديث ‘modern’, *ʾaṯīl* أثيل ‘deep-rooted; firmly established’, *qadīm* قديم ‘ancient; old’.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of occurrence and progressing* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of occurrence and progressing*.

Class 37: ***Verb of appearance***

The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as ‘to appear’, ‘to emerge, rise, show’, ‘to well, well up’, and ‘well out’.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verb of appearance* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verb of appearance*. For example, *bāʾin* بائن ‘clear’, *ẓāhir* ظاهر ‘apparent’, *wāḍiḥ* واضح ‘obvious’.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verb of appearance and progressing* (that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verb of appearance*. For example, *makšūf* مكشوف ‘exposed’, *maẓhūr* مظهور ‘appeared’, *mašhūd* مشهود ‘observed’.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verb of appearance* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verb of appearance*. For example, *waḍḍāḥ* وضّاح ‘transparent; obvious; evident’, *saṭṭāʿ* سطّاع ‘manifest’, *nabbāʿ* نبّاع ‘stemming’.	
Compatibility with the instrumental noun	
There is no compatibility between the semantic features of *Verb of appearance* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verb of appearance*.	

Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verb of appearance* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verb of appearance*. For example, *jahīr* جهير 'stentorian', *ẓahīr* ظهير 'seeming', *jaliyy* جليّ 'clear'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verb of appearance and progressing* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verb of appearance*.

Class 38: ***Verbs of disappearing and ending***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to disappear, vanish', 'to sink down, fall down, collapse', and 'to hide; to be hidden'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of disappearing and ending* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of disappearing and ending*. For example, *bāʾid* بائد 'extinct', *zāʾil* زائل 'evanescent', *fārigẖ* فارغ 'empty'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of disappearing and ending*	

(that involve abstract and state entities) and those of *the passive participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of disappearing and ending*. For example, *maxfiy* مخفي 'disappeared', *manfūq* منفوق 'exhausted', *manḍūb* منضوب 'depleted'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of disappearing and ending* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of disappearing and ending*. For example, *ʾaffāl* أفّال 'declining', *xammād* خمّاد 'inactive', *naḍḍāb* نضّاب 'exhaustible'.

Compatibility with the instrumental noun

There is no compatibility between the semantic features of *Verbs of disappearing and ending* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of disappearing and ending*.

Compatibility with the qualificative adjective

There is compatibility between the semantic features of *Verbs of disappearing and ending* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of disappearing and ending*. For example, *kamīn* كمين 'covered', *xafiyy* خفِيّ 'hidden', *ʾafil* أفِل 'evanescent'.

Compatibility with the locative noun

There is no compatibility between the semantic features of *Verbs of disappearing and ending* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of disappearing and ending*.

Class 39: ***Verbs of bodily movements***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to kneel down', 'to lie down', and 'to sit down'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of bodily movements* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of bodily movements*. For example, *jālis* جالس 'sitting', *rāki*^{c} راكع 'kneeling', *wāqif* واقف 'standing'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of bodily movements* (that *Concrete* and *Event* entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of bodily movements*. For example, *majlūs* مجلوس 'sit down', *mawqūf* موقوف 'standee', *markū*^{c} مركوع 'kneeled (down)'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of bodily movements* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of bodily movements*. For example, *qa*^{c} ^{c}*ād* قعّاد 'someone who sits down a lot', *waqqāf* وقّاف 'someone who stands up a lot', *barrāk* برّاك 'someone who kneels down a lot'.	
Compatibility with the instrumental noun	
There is compatibility between the semantic features of *Verbs of bodily movements* and those	

of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of bodily movements*. For example, *mijlasah* مِجْلَسَة 'seat', *minḥaḍ* مِنْهَض 'crutch', and *miwṭaʾah* مِوطَأَة 'footrest'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of bodily movements* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of bodily movements*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of bodily movements* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of bodily movements*. For example, *masjid* مسجد 'mosque; a place of kneeling in worship (God)', *majlis* مجلس 'council, seat', and *marqas* مرقص 'ballroom'.

Class 40: ***Verbs of taking and giving***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to take, pick up', to bring', and 'to obtain, get'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of taking and giving* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of taking and giving*. For example, *ʾāxiḏ* آخذ 'taker', *jālib* جالب 'bringer', *nāʾil* نائل 'getter'.	

Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of taking and giving* (that *Concrete* and *Event* entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of taking and giving*. For example, *majlūb* مجلوب 'brought', *maksūb* مكسوب 'gained', *mamnūḥ* ممنوح 'granted'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of taking and giving* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of taking and giving*. For example, *wahhāb* وهّاب 'donor; grantor', *ʾaxxāḍ* أخّاذ 'taker', *sarrāq* سرّاق 'thief'.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of taking and giving* and those of *the instrumental noun*, where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of taking and giving*. For example, *mirjaᶜ* مِرْجَع 'retrieval', *ḥaṣṣālah* حصّالة 'moneybox', *mijlab* مِجْلَب 'bring'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of taking and giving* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of taking and giving*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of taking and giving* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of taking and giving*. For example, *marjiᶜ* مرجع 'a place of returning', *majlab* مجلب 'a place of bringing', and *maʾxaḍ* مأخذ 'a place of taking'.

Class 41: ***Verbs of human sounds***	
The object entity	The situation entity
These verbs refer to concrete entities in terms of they are accessible to one of the five senses where they can be heard, but they express non-physical, unseen and intangible meanings that do not occupy physical space, such as 'to cry, weep', 'to snort' and 'to sing, chant, warble'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of human sounds* (that involve concrete and state entities) and those of *the active participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of human sounds*. For example, *bākin* باكٍ 'crier', *ṣāʾiḥ* صائح 'yeller', *ḍāḥik* ضاحك 'laughter'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of human sounds* (that *Concrete* and *State* entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of human sounds*. For example, *maṣrūx* مصروخ 'yelled', *mašdiy* مشدي 'sung', *mahtūf* مهتوف 'shouted'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of human sounds* (that involve concrete and state entities) and those of *the form of exaggeration* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of human sounds*. For example, *nawwāḥ* نوّاح 'someone who wails loudly', *ḥāmil* صدّاح ' someone who shouts loudly', *šaxxār* شخّار 'someone who snorts loudly'.	
Compatibility with the instrumental noun	

There is no compatibility between the semantic features of *Verbs of human sounds* and those of *the instrumental noun,* where the features of the verbs involve concrete and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of human sounds*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of human sounds* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of human sounds*. For example, *ʾanīn* أنين 'moan', *ṣafīr* صفير 'whistling', *ṣarīx* صريخ 'shrieking; yelling'.
Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of human sounds* and those of *the locative noun*, where the features (object entity) of the verbs involve entities that can only be heard, but cannot be seen or touched, and those of the locative noun involves concrete entities that can be seen or touched. Therefore, it is not valid semantically to generate a locative noun from *Verbs of human sounds*.

Class 42: ***Verbs of sounds made by animals***	
The object entity	The situation entity
These verbs refer to concrete entities in terms of they are accessible to one of the five senses where they can be heard, but they express non-physical, unseen and intangible meanings that do not occupy physical space, such as 'to roar', 'to howl, yelp, yowl', and 'to coo'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of sounds made by animals* (that involve concrete and state entities) and those of *the active participle* (that may also involve	

concrete and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of sounds made by animals*. For example, *zāʾir* زائر 'lion which roars', *nābiḥ* نابح 'dog which barks', *nāhiq* ناهق 'donkey which brays'.

Compatibility with the passive participle

There is compatibility between the semantic features of *Verbs of sounds made by animals* (that *Concrete* and *State* entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of sounds made by animals*. For example, *mazʾūr* مزؤور 'roared (at)', *manbūḥ* منبوح 'barked (at)', *manhūq* منهوق 'brayed (at)'.

Compatibility with the form of exaggeration

There is compatibility between the semantic features of *Verbs of sounds made by animals* (that involve concrete and state entities) and those of *the form of exaggeration* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of combining and constructing*. For example, *zaʾār* زأّر 'a roaring (lion)', *ṣahhāl* صهّال 'a neighing (horse)', *mawwāʾ* موّاء 'a meowing (cat)'.

Compatibility with the instrumental noun

There is no compatibility between the semantic features of *Verbs of sounds made by animals* and those of *the instrumental noun,* where the features of the verbs involve concrete and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of sounds made by animals*.

Compatibility with the qualificative adjective

There is compatibility between the semantic features of *Verbs of sounds made by animals* (that involve concrete and state entities) and those of *the qualificative adjective* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of sounds made by animals*. For example, *hadīl* هديل 'whoop', *nahīq* نهيق 'braying', *naʿīq* نعيق 'cooing'.

Compatibility with the locative noun

There is no compatibility between the semantic features of *Verbs of sounds made by animals* and those of *the locative noun*, where the features (object entity) of the verbs involve entities that can only be heard, but cannot be seen or touched, and those of the locative noun involves concrete entities that can be seen or touched. Therefore, it is not valid semantically to generate a locative noun from *Verbs of sounds made by animals*.

Class 43: ***Verbs of bodily care***	
The object entity	The situation entity
These verbs refer to concrete entities, expressing tangible meanings (of an action, event, or state which is accessible to one or more of the five senses) that occupy physical space, such as 'to shave, shave off', 'to comb (the hair)', 'to darken the (edges of the) eyelids with kohl'.	These verbs refer to event entities. They involve a change from one state to another.
Compatibility with the active participle	
There is compatibility between the semantic features of *Verbs of bodily care* (that involve concrete and event entities) and those of *the active participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate an active participle from *Verbs of bodily care*. For example, *ḥāliq* حالق 'shaver', *lābis* لابس 'wearer', *ṣābiġ* صابغ 'dyer'.	
Compatibility with the passive participle	
There is compatibility between the semantic features of *Verbs of bodily care by animals* (that *Concrete* and *Event* entities) and those of *the passive participle* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of bodily care*. For example, *maḥlūq* محلوق 'shaved', *maṣbūġ* مصبوغ 'coloured (hair)', *malbūs* ملبوس 'weared'.	
Compatibility with the form of exaggeration	
There is compatibility between the semantic features of *Verbs of bodily care* (that involve concrete and event entities) and those of *the form of exaggeration* (that may also involve	

concrete and event entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of bodily care*. For example, *ḥalūq* حلوق 'someone who shaves a lot', *ṣabūġ* صبوغ 'someone who dyes (her/his hair) a lot', *labbās* لبّاس 'someone who wears a lot'.
Compatibility with the instrumental noun
There is compatibility between the semantic features of *Verbs of bodily care* and those of *the instrumental noun,* where both of them involves concrete and event entities. Therefore, it is valid semantically to generate an instrumental noun from *Verbs of bodily care*. For example, *miṣbaġ* مِصْبَغ 'dyer', *mikḥalah* مِكْحَلة 'arabic kohl bottle', and *minzaᶜ* مِنْزَع 'tweezer'.
Compatibility with the qualificative adjective
There is no compatibility between the semantic features of *Verbs of bodily care* and those of *the qualificative adjective*, where the features (situation entity) of the verbs involve event entities, and those of the qualificative adjective involves state entities. Therefore, it is not valid semantically to generate a qualificative adjective from *Verbs of bodily care*.
Compatibility with the locative noun
There is compatibility between the semantic features of *Verbs of bodily care* (that involve concrete and event entities) and those of *the locative noun* (that may also involve concrete and event entities). Therefore, it is valid semantically to generate a locative noun from *Verbs of bodily care*. For example, *malbas* ملبس 'a place of wearing (changing) clothes', *maḥlaq* محلق 'a place of shaving; barbershop', and *maṣbaġ* مصبغ 'a place of dyeing hair'.

Class 44: ***Verbs of winning***	
The object entity	The situation entity
These verbs refer to abstract entities, expressing non-physical, unseen and intangible meanings (which are not accessible to any of the five senses) that do not occupy physical space, such as 'to earn, gain, win, profit', 'to excel, overtop', and 'to overcome, defeat'.	These verbs refer to state entities. They describe a state which is permanent or will last for a significant time.

Compatibility with the active participle
There is compatibility between the semantic features of *Verbs of winning* (that involve abstract and state entities) and those of *the active participle* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate an active participle from *Verbs of winning*. For example, *rābiḥ* رابح 'winner', *ġālib* غالب 'overcomer', *nājiḥ* ناجح 'successful'.
Compatibility with the passive participle
There is compatibility between the semantic features of *Verbs of winning* (that *Concrete* and *State* entities) and those of *the passive participle* (that may also involve concrete and state entities). Therefore, it is valid semantically to generate a passive participle from *Verbs of winning*. For example, *maġlūq* مغلوب 'conquered', *maġnūm* مغنوم 'gained', *mahzūm* مهزوم 'defeated'.
Compatibility with the form of exaggeration
There is compatibility between the semantic features of *Verbs of winning* (that involve abstract and state entities) and those of *the form of exaggeration* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a form of exaggeration from *Verbs of winning*. For example, *rajjāḥ* رجّاح 'preponderant; superior', *qahhār* قهّار 'conqueror; victor', *ġannām* غنّام 'gainer'.
Compatibility with the instrumental noun
There is no compatibility between the semantic features of *Verbs of winning* and those of *the instrumental noun*, where the features of the verbs involve abstract and state entities, and those of the instrumental noun involves concrete and event entities. Therefore, it is not valid semantically to generate an instrumental noun from *Verbs of winning*.
Compatibility with the qualificative adjective
There is compatibility between the semantic features of *Verbs of winning* (that involve abstract and state entities) and those of *the qualificative adjective* (that may also involve abstract and state entities). Therefore, it is valid semantically to generate a qualificative adjective from *Verbs of winning*. For example, *faḍīl* فضيل 'favorite', *rabīḥ* ربيح 'winner', *hazīm* هزيم 'defeated'.

Compatibility with the locative noun
There is no compatibility between the semantic features of *Verbs of winning* and those of *the locative noun*, where the features (object entity) of the verbs involve abstract entities, and those of the locative noun involves concrete entities. Therefore, it is not valid semantically to generate a locative noun from *Verbs of winning*.

Chapter Six

Computational Morphology

6.1 Introduction

This chapter concerns the formation of nominal derivatives from a computational linguistic perspective. It discusses the importance of computational morphology and its branches, including morphological analysis and morphological generation. Morphological generation problems are taken into consideration, specifically the overgeneration problem. The chapter then deals with overgeneration in the formation of nominal derivatives, as well as our solution to the overgeneration problem. The computational application of generating nominal derivatives is presented. The chapter ends with an evaluation of the performance and accuracy of our model (see section 2.8 that discusses literature of computational linguistics on Arabic morphology).

6.2 Computational morphology

One subfield of computational linguistics [15] is computational morphology. This is concerned with the development of a computational application (based on theoretical frameworks) to analyse a word within a given text, such as determining the given word's grammatical category (part of speech, whether it is a verb, noun or adjective), and determining its morphological features (e.g. voice, mood, case, gender, number, person) (Sawalha 2011: 4).

Computational morphology lies at the heart of computational linguistics due to its significant interactions with syntax and semantics. Therefore, applications of computational morphology contribute to the work of other more advanced computational applications. For example, computational morphological applications such as root extraction, stem extraction, and part-of-speech tagging are the basis of higher applications involved in information retrieval, machine translation and speech recognition. In addition,

15. The terms "Computational Linguistics", "Natural Language Processing", and "Language Engineering" are usually used as synonyms (cf. Kiraz 2001: 15). However, "Computational Linguistics" refers to a branch of linguistics that deals with the theories and computational techniques applied to solve linguistic problems from a computational perspective, whereas "Natural Language Processing" and "Language Engineering" refer to a research area with computational linguistics that is limited to the computational implementing (programming) of natural languages by pure computational processes.

computational morphology is affected by orthographic issues due to the variation in the shapes of several letters in Arabic depending on the position in the word (cf. Habash 2010: 65).

Due to the complexity of the nonconcatenative structure of Arabic morphology, computational handling of Arabic morphology has been a challenge to researchers. Arabic morphological analysis and generation have been the focus of attention of researchers over the last two decades. Research on computational morphology has focused in general on morphological analysis rather than morphological generation. This is partly due to the fact that the stage of analyzing and understanding morphological structure comes before the stage of generating further morphological structures, thus morphological generation can be described as a reverse process in terms of the outcome of morphological analysis and can be used as an input for generating another linguistic form. In other words, "the analyzer reads the inflected surface form of each word in a text and provides its lexical form while Generation is the inverse process" (Jayan, Rajeev & Rajendran, 2011: 15). For example, the morphological analysis of the (input) word *kātib* كاتب 'writer' is the active participle of the verb *katab* كتب 'to write'. In a reversed way, morphological generation creates the active participle *kātib* كاتب 'writer' from the verb *katab* كتب 'to write'.

Theoretical morphological approaches are reflected in computational works. For example, the autosegmental approach (McCarthy 1979, 1981) has been used in many computational attempts to handle Arabic morphology, specifically in the models written by finite state technology (Beesley 1990, 1996, 1998; Kiraz 1994, 2001). An example of the largest system of Arabic morphology built by finite-state technology is the Xerox Morphological Analysis and Generation System (Beesley 1998). Within this system, using a lexicon and rule compilers, automatic intersection processes are performed by interdigitating of triliteral roots and patterns to generate new forms.

Computational systems for nonconcatenative morphologies have mainly been implemented based on finite-state technology since the 1980s. This is defined as a mathematical input-output model by which computational programs accompanied with sequential logic circuits are designed. Furthermore, the advantage of implementing two-level morphology (such as root and pattern) within a finite-state transducer makes the morphological system bidirectional; thus it can be used for analysis and generation.

The computing of the morphological analysis and generation faces challenges that stem from the nonconcatenative (nonlinear) nature of Arabic morphology. Unlike many European languages that can construct a word by linearly concatenating morphemes (such as *un-break-able*), Arabic relies on mainly nonconcatenative morphological processes in word formation. A stem such as *kātib* كاتب 'writer' is constructed by interdigitating the three root consonants *k-t-b* with the pattern *CāCiC*. After this, prefixes and suffixes can be attached to the stem *kātib* كاتب 'writer' to become *ʾal-kātib-ūn* الكاتبون 'the writers'. Another challenge is the orthographic structure of the Arabic script where Arabic words are typically written without diacritics (short vowels). This lack of diacritics frequently causes morphological and syntactic ambiguity; for example the non-vowelled word علم can refer to the nouns *ʿalam* عَلَم 'flag' or *ʿilm* عِلْم 'science', or to the verbs عَلَّم *ʿallam* 'to teach', عُلِم *ʿulim* 'it is known', and عَلِم *ʿalim* 'to know'.

Habash (2010: 67) argues that a number of requirements should be considered in building a computational morphological system (analyser and generator). These are "(1) coverage of the language of interest in terms of both lexical coverage (large scale) and coverage of morphological and orthographic phenomena (robustness); (2) the surface forms are mapped to/from a deep level of representation that abstracts as much as possible over language-specific morphological and orthographic features; (3) full reversibility of the system so it can be used as an analyzer or a generator; (4) usability in a wide range of natural language processing applications such as MT or IR; and finally, (5) availability for the research community".

6.2.1 Morphological analysis

Morphological analysis is concerned with analyzing the components of a given word that include prefixes, stems and suffixes. The analysis includes providing all possible (valid and invalid) morphological solutions of the grammatical categories, as well as providing linguistic features such as person, gender, number and voice (Habash 2004). The morphological analysis applications are largely dedicated to the inflectional level of morphology rather than its derivational level where information related to tense, aspect, person, and number are provided. For example, the morphological analysis of the Arabic word *kātibūn* كاتِبون 'writers' is the active participle *writer* plus the *-ūn* plural morpheme ACTIVE PARTICIPLE-writer + Plural-*ūn*.

The morphological analysis applications involve processes that handle both the function and the form of a given word. The function-based approach provides the morphosyntactic information of the input words, while the form-based process analyzes the input words in terms of their morphemic components (prefix, stem and suffix).

The computational morphological analysis techniques are inspired by accepted theoretical approaches to Arabic morphology, including the root-based and stem-based approaches. Within the root-based approach, a given word is analyzed as the integration of a sequence of root consonants and a pattern in addition to prefixes and suffixes. Within this integration, (usually) three root consonants are inserted in certain slots in a pattern. By contrast, the stem-based approach analyzes a given word as composed of prefix, stem and suffix. These components are recognized by checking them against lists of the prefixes, stems and suffixes stored in lexicons (cf. Attia 2008: 26-27).

The morphological analysis applications perform many tasks. These applications include morphological analyzers, lemmatizers, pattern matching algorithms and stemmers (cf. Sawalha 2011: 6). The morphological analyzers produce all possible analyses of a given word out of context (Beesley 1998; Buckwalter 2002, 2004; Boudlal et al. 2010). The stemmers and root-extractors generally extract the root/stem of a given word by removing the suffixes and prefixes, and then by matching the rest of the word against a list of verbal and nominal patterns (Khoja 1999; Al-Shalabi et al. 2003). The lemmatisers determine the lemma of a given word by considering its context and by recognizing its part of speech,

basic form and dictionary entry (Dichy 2001; Al-Shammari and Lin 2008). The pattern-matching algorithms identify the templatic pattern and vocalic melody of a given word (Dichy and Farghaly 2003; Al-Shalabi 2005).

6.2.2 Morphological generation

Morphological generation has received less attention than morphological analysis despite the fact that both experience the same challenges that stem from the rich and complex morphology of Arabic. Morphological generation is concerned with generating all possible word-forms from a given root/stem. It also provides grammatical information regarding their grammatical category and morphological features.

Morphological generation serves at two levels of Arabic morphology. First is generation at the inflectional level, which aims to generate inflected forms of a stem/word. At this level, prefixes and/or suffixes are attached to a stem/word without changing its grammatical category, such as the definite article prefix *ʾal-* الـ, the plural form suffix *-ūn* ـون, and the feminine form suffix *-ah* ـه as in *ʾal-rābiḥ* الرابح 'the winner', *rābiḥūn* رابحون 'winners', and *rābiḥ-ah* رابحة 'feminine winner' respectively. Buckwalter's Arabic Morphological Analyzer (Buckwalter 2002) can be used for morphological generation at the inflectional level of morphology. It can generate inflected word forms by concatenating prefixes and suffixes to a stem which is taken as the base form. This system includes a prefix database (299 entries), a suffix database and a stem database (82,158 entries). The concatenation of the prefixes and suffixes to a given stem is governed by morphological compatibility tables.

Cavalli-Sforza, Soudi & Mitamura (2000) have presented a computational model for Arabic morphological generation based on a concatenative strategy. Their model is restricted to building a morphological generator for verbal morphology, based on morphological transformational rules that handle the stem change in different prefix/suffix contexts; thus, the generator is simpler and smaller. They exclude infixation and pattern change from the generation of the inflectional level of morphology as they rely only on the concatenation of morphemes to generate inflected word forms by prefixing and suffixing affixes to a stem.

Secondly is generation at the derivational level of morphology, which aims to generate new words from a root/stem. At this level, the new word that is the output of the generation may have a different grammatical category from the input of the generation, which here can be either a root or a stem. For example, *dāris* دارس 'learner', is an agent noun derived from a word from a different grammatical category, the verb *daras* درس 'to learn'. The Xerox Morphological Analysis and Generation System (Beesley 1996, 1998) performs morphological generation at the derivational level. It generates a stem by automated interdigitating of triliteral roots into patterns. For example, the pattern *maCCūC* such as *maʾkūl* مأكول 'eaten' has three C slots into which the three radical consonants of the root (*ʾ-k-l*) are inserted respectively.

6.2.2.1 Undergeneration problem

Undergeneration is a shortcoming that occurs when the morphological generation applications fail to generate a valid word form. Sawalha (2011: 77) describes undergeneration as a "problem [that] happens when the generation cannot generate all possible vocabulary of the language". The undergeneration problem can occur at both derivational and inflectional levels of morphology. The occurrence of this problem at the derivational level is more critical than its occurrence at the inflectional level, as the former leads to a lack of generation of a stem that may represent a whole grammatical category, while the latter leads to a lack of generation of inflected word forms of the same stem. The undergeneration problem may also involve non-derived words that are not governed or controlled by morphological patterns.

The solution to the undergeneration problem must be to increase the coverage of the morphological generation applications. Sawalha (2011: 77) argues that "in theory, any morphological generation program for Arabic will suffer from both over-generation and under-generation problems unless it has been provided with a comprehensive database that contains all the non-generated vocabulary". To enhance this coverage, Sawalha (2011: 307) relies on "using the traditional Arabic lexicons text as a corpus … the corpus contains a large number of words (14,369,570) and word types (2,184,315), and the possibility of finding the different forms of the derived words of a given root".

6.2.2.2 Overgeneration problem

Overgeneration occurs when morphological generation applications generate invalid word forms. These forms are correctly generated according to the word-formation rules of the language, but they are invalid semantically and are not a part of real language. Sawalha (2011: 77) argues that "[t]he over-generation problem results in many lexical entries which are correctly structured but are not part of the real language vocabulary".

The problem of overgeneration may occur at both derivational and inflectional levels of morphology. At the derivational level, the generation application generates an invalid stem that represents a grammatical category, such as an instrumental noun from the verb *karih* كره 'to hate'. At the inflectional level, the generation applications produce invalid forms of a valid/invalid stem, such as adding the sound plural suffix *-ūn* ـون to the stem *ṣabūr* صبور 'patient'.

A clear example of the overgeneration problem is found in the Xerox Morphological Analysis and Generation System (Beesley 1996, 1998). The system includes some 5,000 roots and 400 patterns, and a word stem is generated by interdigitating a root with a specific pattern. Here, the question is: what criteria have been adopted to apply a pattern to a root? According to Beesley (1996: 89), "[t]here are perhaps 5000 Arabic roots in common usage, and about 400 phonologically distinct patterns, most of which are ambiguous. Each root can legally combine with only a small subset of the phonologically distinct patterns, an average of about seventeen or eighteen, and this decidedly derivational process must be controlled by old-fashioned lexicography".

Beesley clarifies that it is not valid to interdigitate all 5,000 roots with all 400 patterns. He states that the criteria for applying a pattern to a root rely on "old-fashioned lexicography". This requires manual or automatic checking of the validity of all the generated forms to determine if the word is in actual use (newspapers, magazines, all print media and, published dictionaries). However, there are no details provided by Beesley regarding that.

Although Beesley states that only an average of "seventeen or eighteen" patterns can be applied to each root, this does not prevent overgeneration. He also refers (1996: 90, 91) to "the lexicon codings" where "each root [is] coded to restrict the patterns with which it can

in fact co-occur". In fact, what Beesly refers to is not applicable as he has not given any details about it.

In this regard, Attia (2008: 39) argues that there is "overgeneration in word derivation. The distribution of patterns for roots is not even, and although each root was hand-coded in the system to select from among the 400 patterns, the task is understandably tedious and prone to mistakes". In addition Sawalha (2011: 32) points out that "[t]he major disadvantages of Xerox are: overgeneration in word derivation due to uneven distribution of patterns for roots...". It is probable that overgeneration occurs more commonly where computational morphological applications adopt a root-based approach; generation by the stem-based approach is, as I argue later (in the conclusion), theoretically more controlled and targeted.

The overgeneration problem is clearly found in two computational applications for Arabic verb generation, namely Qutrub: Arabic verbs conjugator[16] and Verbix verb conjugator[17]. Both generate invalid inflected forms for any input verb/root. Qutrub takes various forms of verbs as the input, and then provides vowelled inflected forms that involve the tense/aspect, person, voice, mood, gender and number. Verbix takes triliteral roots only as the input, and then provides perfect and imperfect forms in the singular, dual and plural cases.

6.3 Overgeneration in the formation of nominal derivatives

In theory, the overgeneration problem occurs in the generation of three types of nominal derivative: the instrumental noun, the qualificative adjective, and the locative noun (see sections 5.2.4, 5.2.5, 5.2.6, 5.3.4, 5.3.5, and 5.3.6). By contrast, the overgeneration problem does not occur in generating the active participle (agent noun), the passive participle, or the form of exaggeration (see sections 5.2.1, 5.2.2, 5.2.3, 5.3.1, 5.3.2, and 5.3.3), because the semantic features of these nominal derivatives allow for broader application.

The generation of the instrumental noun from the following verb classes leads to overgeneration (the next section 6.4 provides the reason):

16. Available online at: http://qutrub.arabeyes.org/.
17. Available online at: http://www.verbix.com/languages/arabic.shtml/.

1. Verbs of the state of the body
2. Verbs of body parts
3. Verbs of diseases
4. Verbs of social interaction
5. Verbs of emotions
6. Verbs of colouring
7. Verbs of bodily qualities
8. Verbs of locations/places
9. Verbs of mental process
10. Verbs of financial transactions
11. Verbs of desire and request
12. Verbs of intention
13. Verbs of quantity and size
14. Verbs of stability
15. Verbs of ruling and government
16. Verbs of the development of the life
17. Verbs of uttering
18. Verbs of accepting
19. Verbs of refusing and disobedience
20. Verbs of occurrence and progressing
21. Verb of appearance
22. Verbs of disappearing and ending
23. Verbs of human sounds
24. Verbs of sounds made by animals
    Verbs of winning

The generation of the qualificative adjective from the following verb classes leads to overgeneration (the next section 6.4 provides the reason):

1. Verbs of motion
2. Verbs of swimming
3. Verbs of violence and abuse
4. Verbs of agriculture
5. Verbs of combining and constructing
6. Verbs of sending and carrying
7. Verbs of separating and disassembling
8. Verbs of removing
9. Verbs of bending
10. Verbs of decorating and transcribing
11. Verbs of measure
12. Verbs of creation
13. Verbs of preparing
14. Verbs of ingesting
15. Verbs of the five senses
16. Verbs of preventing and prohibition
17. Verbs of bodily movements
18. Verbs of taking and giving
19. Verbs of bodily care

The generation of the locative noun from the following verb classes leads to overgeneration (the next section 6.4 provides the reason):

1. Verbs of the state of the body
2. Verbs of diseases
3. Verbs of social interaction
4. Verbs of emotions
5. Verbs of bodily qualities
6. Verbs of mental process
7. Verbs of financial transactions
8. Verbs of desire and request
9. Verbs of intention
11. Verbs of ruling and government
12. Verbs of the development of the life
13. Verbs of uttering
14. Verbs of accepting
15. Verbs of refusing and disobedience
16. Verbs of occurrence and progressing
17. Verb of appearance
18. Verbs of disappearing and ending
19. Verbs of human sounds

10. Verbs of quantity and size
20. Verbs of sounds made by animals
21. Verbs of winning

6.4 Our solution to the overgeneration problem of nominal derivatives

This study provides a model to control the word formation of nominal derivatives. Our model handles the components of word formation of the nominal derivatives as inputs and outputs: the inputs are Form I verbs and the outputs are six types of nominal derivative. Form I verbs (the inputs) are classified semantically and syntactically into 44 verb classes (see chapter 4). This model uses the notions of the object entity (concrete and abstract entities) and situation entity (state and event entities) (see section 5.3) in order to tag and describe both inputs and outputs, i.e. the verb classes are tagged to determine the validity or invalidity of deriving the nominal derivatives.

Both the 44 classes of verbs (the inputs) and the nominal derivatives (the outputs) are tagged and described in terms of the object entity as concrete or abstract entities; and in terms of the situation entity as state or event entities (see figure 11 in the conclusion). As stated earlier, this study has determined that the overgeneration problem is found only in three types of nominal derivative: the instrumental noun, the qualificative adjective and the locative noun. The constraints on deriving them are expressed as follows:

- The instrumental noun refers to concrete and event entities, given that its formation requires it to be only generated from a verb that is similarly tagged as concrete and event, such as the verb *ġasal* غسل 'to wash', whose instrumental noun is *ġassālah* غسالة 'washing machine'. Therefore, if the instrumental noun is generated from verbs that are not tagged only as concrete and event, it has been overgenerated.

- The qualificative adjective refers to concrete/abstract and state entities, given that its formation requires to be generated from a verb that is similarly tagged as concrete/abstract and state, such as the verb *kabur* كبر 'to be big' whose qualificative adjective is *kabır* كبير 'big'. Therefore, if a qualificative adjective is generated from verbs that are not tagged as concrete/abstract and state, it has been overgenerated.

- The locative noun refers to concrete and state/event entities, given that its formation requires to be generated from a verb that is similarly tagged as concrete and state/event, such as the verb *laᶜib* لعب ‘to play’ whose locative noun is *malᶜab* ملعب ‘playground’. Therefore, if the qualificative adjective is generated from verbs that are not tagged only as concrete/abstract and state, it has been overgenerated.

There is no overgeneration problem in generating the active participle, the passive participle, and the form of exaggeration, due to they may be tagged for both concrete and abstract entities in terms of the object entity, and may tagged for both state and event in terms of the situation entity, thus, the compatibility between the semantic features of these three nominal derivatives and the semantic features of all the verb classes is achieved. i.e. with some nominals within this class taking concrete entities, and some taking abstract entities: for example, the active participle *ḍārib* ضارب ‘beater, hitter’ refers to a concrete object entity, while the active participle *ḥālim* حالم ‘dreamer’ refers to an abstract object entity; although certain types of nominal derivatives may be tagged for state and event in terms of the situation entity, with some nominals within this class taking a state situation entity, and some taking an event situation entity: for example, the active participle *ḍārib* ضارب ‘beater, hitter’ refers to an event situation entity, while the active participle *ḥālim* حالم ‘dreamer’ refers to a state situation entity.

6.5 The computational application of nominal derivatives[18]

This study presents a computational application for retrieving the nominal derivatives of Form I verbs. It includes 980 Form I verbs and 7,374 stems of nominal derivatives. The application was built using the Microsoft Access 2007/2010 database. The application consists of two parts, a retriever and an applicability checker. By inputting a triliteral verb (Form I), the first part executes the querying process to retrieve the required data from the database. The output data can be classified into four types as shown in table 28:

Table 28: The output data of the computational application

General information	1. transliteration 2. the class of verb
Syntactic information	3. imperfective form 4. transitive/intransitive
Semantic information	5. concrete/abstract and state/event 6. English meaning
Nominal derivatives	7. the active participle 8. the passive participle 9. the form of exaggeration 10. the instrumental noun 11. the qualificative adjective 12. the locative noun 13. the noun of instance 14. the *mīmī maṣdar* 15. the noun of manner

The second part of the application involves a programming code to provide further information based on specific data in the database. This information indicates whether or not the instrumental noun, the locative noun and the qualificative adjective outputs are applicable where the semantic compatibility criteria is satisfied. This part of the application seeks to answer three questions:

- Is the instrumental noun applicable?

18. The application was designed by collaboration with Abdullah Alfaifi, PhD reasearcher at the School of Computing / University of Leeds.

- Is the locative noun applicable?
- Is the qualificative noun applicable?

The application answers these questions by conducting an *if* statement which checks four features of the verb query, *concrete*, *abstract*, *state* and *event*. Based on some specific cases of these features, the applicability is shown as follows:

1. If the verb has the features *concrete* and *event* then the instrumental noun is applicable.
2. If the verb has the features *concrete* and *state*/*event* then the locative noun is applicable.
3. If the verb has the features *concrete*/*abstract* and *state* then the qualificative noun is applicable.

For instance, the verb *karih* كره 'hate' is tagged as abstract and state, therefore, the generation of its instrumental noun and locative noun is not applicable, while its qualificative noun is applicable, as shown in the following figure:

Figure 9: The interface of the computational application

The application and its databases will be particularly beneficial in many respects. The database can be reused in building or improving other computational morphological applications, as it includes classified (tagged) data at various levels of analysis. Morphologically, the data can be reused as morphological lexicons for a morphological analyzer and generator including 980 Form I verbs and 7374 stems representing six types of nominal derivative. For a further level of generation, the application can be expanded to

involve inflectional morphology to generate all inflicted words of nominal derivative stems. By adding valid morphological affixes to each stem, inflected plural forms and feminine forms can be generated.

Semantically, wordNet applications can benefit from the application's data of 980 verbs classified into 44 semantic classes, the tagging of the verbs as concrete/abstract and state/event, an English glossary of the 980 verbs, and the lists of semantically related stems. Syntactically, the application's data classifies verbs into transitive and intransitive. The semantic information can be useful in practice for computational linguistic analysis purposes in future research. Furthermore, the application can be used for teaching and learning the Arabic word formation system.

6.6 Evaluation

This section aims to evaluate the performance of the model that we have developed to generate valid nominal derivatives from Form I verbs. Specifically, the evaluation is dedicated to three types of nominal derivative: the instrumental noun, the qualificative adjective, and the locative noun. These three types suffer from the overgeneration problem, so evaluation aims to measure the accuracy of predicting valid nominal derivatives in order to determine the extent to which overgeneration has been avoided.

The sample that has undergone evaluation comprises 150 verbs and three types of their nominal derivatives (potentially 450): the instrumental noun, the qualificative adjective, and the locative noun. These 150 verbs were randomly selected from all 44 verb classes. Only one or two of the three nominal derivatives are predicted to be generated from each verb. If the generation of a nominal derivative is predicted, then it is represented as YES, while if it is not predicated it is represented as NO. For each verb's derivative, YES or NO is predicted according to our model's criteria, as follows:

- The prediction of the instrumental noun is represented as YES if the verb is concrete and event. Otherwise, its prediction is represented as NO.
- The prediction of the qualificative adjective is represented as YES if the verb is concrete/abstract and state. Otherwise, its prediction is represented as NO.
- The prediction of the locative noun is represented as YES if the verb i concrete and state/event. Otherwise, its prediction is represented as NO.

The prediction of 450 nominal derivatives (YES or NO) has been checked manually by searching three resources:

- Sawalha's Arabic root-meaning search[19], representing traditional dictionaries.
- Arabdict[20], representing modern dictionaries.
- arTenTen12 corpus[21] (Sketchengine), representing the largest Arabic corpus.

19. Available online at: http://www.comp.leeds.ac.uk/cgi-bin/scmss/arabic_roots.py
20. Available online at: http://www.arabdict.com/ar/
21. It contains 5,794,161,583 words, and is available online at: https://the.sketchengine.co.uk/bonito/run.cgi/first_form?corpname=preloaded/artenten12;

At this stage, binary data is held in two lists. The first list refers to whether the nominal derivative is generated or not; YES means that generation of the predicted nominal derivative is valid, and NO means that its generation is not valid. The second list refers to whether the nominal derivative is found in one of the three mentioned resources: YES means that the nominal derivative is real and found, while NO means that it is not real and not found. Table 29 shows the evaluation data:

Table 29: The evaluation data

#	Verb	Concreate	Abstract	State	Event	Derivitives	Generated	Found	Cases
1	أرق *ʾariq*	NO	YES	YES	NO	Instrumental	NO	NO	TN
						Locative	NO	NO	TN
						Qualificative	YES	YES	TP
2	أنَّ *ʾann*	NO	YES	YES	NO	Instrumental	NO	NO	TN
						Locative	NO	NO	TN
						Qualificative	YES	YES	TP
3	بتر *batara*	YES	NO	NO	YES	Instrumental	YES	NO	FP
						Locative	YES	NO	FP
						Qualificative	NO	NO	TN
4	حكم *ḥakam*	NO	YES	YES	NO	Instrumental	NO	NO	TN
						Locative	NO	NO	TN
						Qualificative	YES	YES	TP
5	بخل *baxula*	NO	YES	YES	NO	Instrumental	NO	NO	TN
						Locative	NO	NO	TN
						Qualificative	YES	YES	TP

Confusion matrix formulas are used to measure quantitatively the accuracy of predicting derivatives correctly as well as the degree of overgeneration. Confusion matrix elements are represented in table 30:

Table 30: Confusion matrix elements

		PREDICTED CLASS	
		Class=Yes	Class=No
ACTUAL CLASS	Class=Yes	True Positive (TP)	False Negative (FN)
	Class=No	False Positive (FP)	True Negative (TN)

- True Positive (TP): represents the case in which the generated nominal derivative is predicted correctly, where it is found and used in real language.

- False Positive (FP): represents the case in which the generated nominal derivative is predicted correctly, but is not found and used in real language.
- True Negative (TN): represents the case in which the generated nominal derivative is predicted to be not generated, and is not found and used in real language.

  The values of the evaluation data are 213 cases of true positive, 16 cases of false positive, and 221 cases of the true negative. These values are represented in Table 31:

Table 31: The values of the confusion matrix elements

	PREDICTED CLASS		
ACTUAL CLASS		Class=Yes	Class=No
	Class=Yes	213	0
	Class=No	16	221

Three confusion matrix formulas can be applied to analyze the result of the evaluation:

(1) Precision criteria formula, defined as follows:

$$Precision = \frac{\text{TP}}{\text{TP} + \text{FP}}$$

Precision: 213 / (213 + 16) = 93%

(2) Specificity criteria formula defined as follows:

$$Specificity = \frac{\text{TN}}{\text{TN} + \text{FP}}$$

Specificity: 221 / (221 + 16) = 93.2%

(3) Accuracy criteria formula defined as follows:

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}$$

Accuracy: (213+221) / (213+221+16+0) = 96.4%

According to the evaluation results, the following facts are inferred:

- The percentage of overgeneration in our model is 3.55%. In contrast, the percentage of the potential overgeneration, in the case of generating all the nominal derivatives from all the verbs, is 52.6%, as follows:

$$(TN+FP) * 100 / (TP+TN+FP)$$

$$(221+16)=237 * 100 / (213+221+16) = 52.6\%$$

- The percentage of our total accuracy is 96.4%. This percentage includes two cases: first, the nominal derivatives that are correctly predicted to be generated, and are found and used in real language; secondly, the nominal derivatives that are correctly predicted to be not generated, and are not found and used in real language.

With respect to the errors analysis, 3.55%, these errors represent the overgenerated cases. The nominal derivatives in these cases are generated according to semantic and morphological rules, but they are not found or used in real language. The absence of a word in the real language does not mean that it is necessarily invalid. This study considers the nominal derivatives theoretically valid by analogy with other semantically similar forms that share the same semantic features in terms of concrete, abstract, state and event.

Here are some of the overgenerated nominal derivatives and justification for their validity:

- The instrumental noun *mibtar* مبتر generated from the verb *batar* بتر 'to cut off, sever, lop off'. This verb is tagged as concrete and event, thus its instrumental noun is valid by analogy with other instrumental nouns such as *miqaṣṣ* مقص 'scissors' and *qaṭṭāᶜah* قطّاعة 'cutter'. These instrumental nouns share a similar meaning and are generated from verbs that are also tagged as concrete and event.
- The instrumental noun *mimzij* ممزج generated from the verb *mazaj* مزج 'to mix, mingle, blend'. This verb is tagged as concrete and event, thus its instrumental noun is valid by analogy with other instrumental nouns such as *xallāṭah* خلاّطة 'mixer' and *miᶜjan* معجن 'kneading machine'. These instrumental nouns share a similar meaning and are generated from verbs that are also tagged as concrete and event.
- The locative noun *mabḏar* مبذر generated from the verb *baḏar* بذر '*to sow, seed, strew*'. This verb is tagged as concrete and event, generating a valid locative noun by analogy with other locative nouns such as *mazraᶜah* مزرعة 'farm' and *maštal*

مشتل ‘plantation’ that are generated from semantically related verbs, and are tagged as concrete and event.

Conclusion

This study consisted of six chapters and a conclusion. The first chapter described the linguistic tradition of the Arabic language and introducing the research topic, discussing the research problem, questions, motivation and contribution, and the thesis structure. Chapter two presented the theoretical background and research context, and Chapter three the research methodology. Chapter four provided a classification of Arabic verbs, while Chapter five presented the morphological, prosodic and semantic analysis of the nominal derivatives. Finally, Chapter six dealt with the formation of the nominal derivatives from a computational linguistic perspective.

This study has three main novel contributions to knowledge that would be particularly beneficial to morphologists, prosodic phonologists, and computational linguists:

- The study has provided an unprecedented Arabic verb classification on semantic and syntactic basis. The significance of this classification originates from: benefiting from the semantic features and the syntactic behaviour of a given verb class in order to control the formation of its valid nominal derivatives; providing tagged linguistic data, semantically and syntactically, that can be used in other future research from different perspectives.
- The study has presented a prosodic morphological account of analyzing and describing the word formation processes and prosodic structure of nominal derivatives, within which the input of word formation is Form I verb while the output stem is a nominal derivative. The study has provided three pieces of practical evidence in favour of the stem-based approach.
- The study has developed a semantic model to avoid the overgeneration problem that is found in computational linguistic applications. This model has determined the compatibilities (harmony) between the semantic features of verb classes and the semantic features of nominal derivatives in order to determine the valid forms.

The analysis began with the establishment of an Arabic verb classification in which 980 Form I verbs were divided into 44 classes (see Chapter four). Verbs were allocated a class according to their semantic features and syntactic behaviour. Semantically, the verbs in each class share related meanings and semantic functions. In addition, semantic relations

such as synonyms, antonyms, polysemy, and hyponym were taken into consideration. Syntactically, the verbs in each class share syntactic behaviour in terms of their transitivity and syntactic frames.

At the morphological and prosodic level, the study has given an account of analyzing and describing the formation of nominal derivatives that are categorized as: the active participle (agent noun), the passive participle, the form of exaggeration, the instrumental noun, the qualificative adjective, and the locative noun. Morphologically, the word formation of nominal derivatives was analyzed and described using the stem-based approach where the input stem is a Form I verb and the output stem is a nominal derivative. Prosodically, the analysis describes the word formation processes and prosodic structures of the nominal derivatives. The word formation processes in the formation of the nominal derivatives involve a series of templatic changes, including: reduplication of initial/final moras, (mora) $m\mu$-prefixation, (mora) μ-suffixation, disassociation of vowels, mora association, and finally melodic overwriting.

The prosodic representation of templatic changes that occur on the input stem, were exemplified by diagrams (prosodic trees) showing the stages of derivation of the nominal derivatives from their Form I verb stems. In addition, the prosodic structure of the nominal derivatives were analyzed within these levels: the syllabic, moraic and, foot levels. The final consonant in the prosodic templates of the nominal derivatives can be either extrametrical or extrasyllabic. It is extrametrical if the final syllable of the nominal derivative is *CVC*, while it is considered extrasyllabic if the final syllable is *CVVC*.

This study concludes that it is both unnecessary and insufficient to consider the root(-based approach) in the formation of nominal derivatives. The formation of nominal derivatives depends completely on the verbal stem rather than the root. The instrumental noun, the locative noun, and the qualificative adjective cannot be derived from the root, since stem information is required in their derivation. Here, the study provides three pieces of evidence in favour of the stem-based approach:

First, transitivity (transitive and intransitive) features are essential to determine whether a nominal derivative is valid to be derived or not in two cases: (i) The instrumental noun is only derived from a transitive verb (Form I stem), such as the verb *kanas* كنس 'to sweep, broom' from which the instrumental noun *miknasah* مكنسة 'broom' is derived. (ii) The qualificative adjective is only derived from an intransitive verb (Form I stem), such as the verb *saʿid* سعد 'to be happy' from which the qualificative adjective *saʿīd* سعيد 'happy, glad' is derived.

Second, the vocalic melody of the stem (Form I verb) is vital in deriving the locative noun. The default template of the locative noun is $maC_1C_2aC_3$, such as *malʿab* ملعب 'playground' that is derived from the verb *laʿib* لعب 'to play'. However, the locative noun takes the template $maC_1C_2iC_3$ in case the imperfective stem has the vowel -i- (after the second consonant), as in *jalas – yajlis* ($C_1aC_2aC_3 – yaC_1C_2iC_3$) جلس 'to sit' that from which the locative noun *majlis* مجلس 'council'. Since the root lacks a vocalic melody, it cannot be considered in the formation of locative nouns. Additionally, the transitivity of a Form I verb may be reflected in the vocalic melody. Where the vocalic melody of the Form I verb is /u/ in the perfective and imperfective, then the verb is predicted to be intransitive. This is useful in the formation of qualificative adjectives which are only derived from intransitive verbs, as well as in the formation of the instrumental noun where its verb should be transitive.

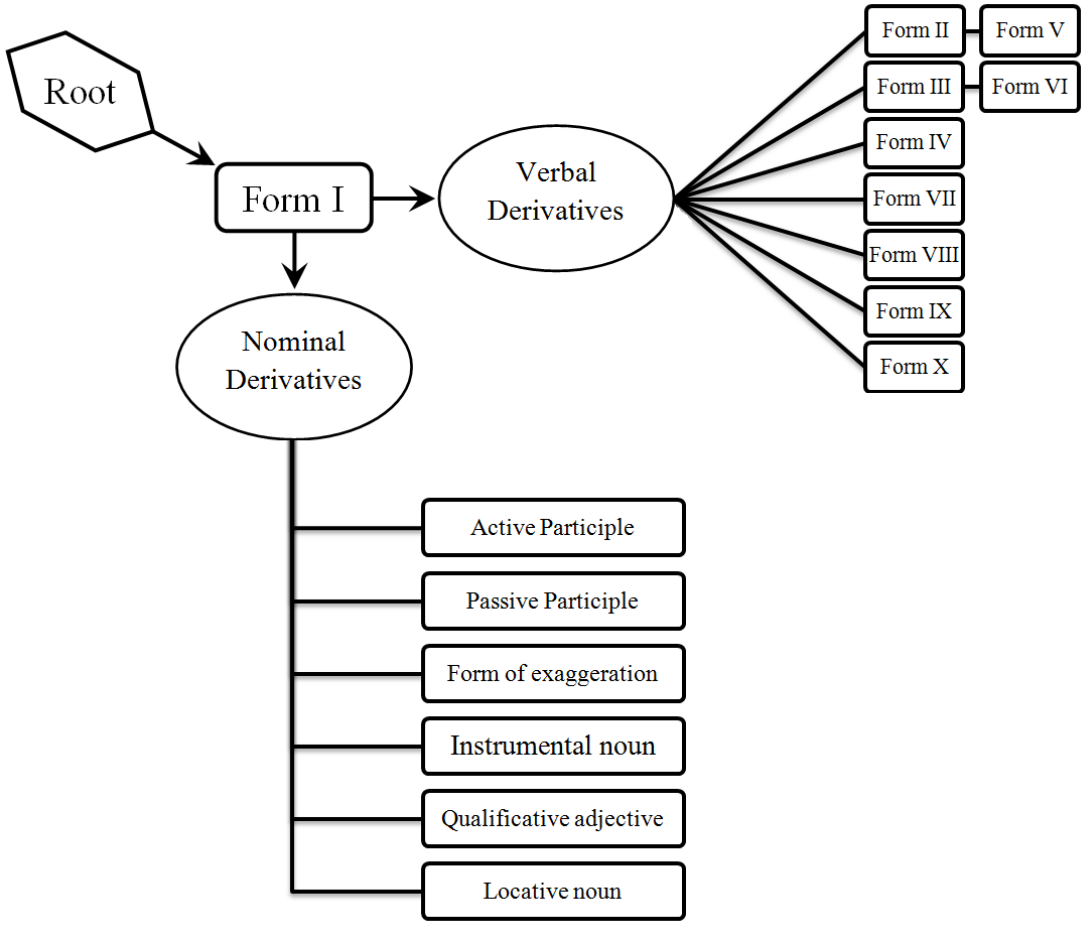
Third, In Arabic, there are fifteen verb forms, of which ten are common in Modern Standard Arabic. Each of these verb forms has its specific nominal derivatives from the other verb forms. For instance, the root *k-t-b* is associated with eight verbal stems that have eight different active and passive participles as shown in Table 32, and since no single root is associated with all verbal forms, the root *ḏ-k-r* for Form V and *s-w-d* for Form IX. Therefore, the root cannot be taken into consideration in deriving the nominal derivatives.

Table 32: The nominal derivatives of the verbal forms

Root	Verbal stem		Active Participle	Template	Passive Participle	Template
k-t-b	I	*katab*	*kātib*	$C_1āC_2iC_3$	*maktūb*	$maC_1C_2ūC_3$
k-t-b	II	*kattab*	*mukattib*	$muC_1aC_2C_2iC_3$	*mukattab*	$muC_1aC_2C_2aC_3$
k-t-b	III	*kātab*	*mukātib*	$muC_1āC_2iC_3$	*mukātab*	$muC_1āC_2aC_3$
k-t-b	IV	*ʾaktab*	*muʾaktib*	$muʾaC_1C_2iC_3$	*muʾaktab*	$muʾaC_1C_2aC_3$
ḏ-k-r	V	*taḏakkar*	*mutaḏakkir*	$mutaC_1aC_2C_2aC_3$	*mutaḏakkar*	$mutaC_1aC_2C_2aC_3$
k-t-b	VI	*takātab*	*mutakātib*	$mutaC_1āC_2iC_3$	*mutakātab*	$mutaC_1āC_2a\ C_3$
k-t-b	VII	*ʾinkatab*	*munkatib*	$mun\ C_1aC_2iC_3$	*munkatab*	$munC_1aC_2aC_3$
k-t-b	VIII	*ʾiktatab*	*muktatib*	$muC_1C_2aC_2iC_3$	*muktatab*	$muC_1C_2aC_2aC_3$
s-w-d	IX	*ʾiswadd*	*muswadid*	$muC_1C_2aC_3iC_3$	*muswadad*	$muC_1C_2aC_3aC_3$
k-t-b	X	*ʾistaktab*	*mustaktib*	$mustaC_1C_2iC_3$	*mustaktab*	$mustaC_1C_2aC_3$

As shown in the above table, the active participle and passive participle differ according to their verbal form stems. Each of the ten mentioned verbal forms has its unique active/passive participle. The Form I stem is the input from which Forms II, III, IV, VII, VIII, IX, and X are derived, while Form V is derived from Form II, and Form VI from Form III, as shown in Figure 10.

Figure 10: Two stages of derivation



This study reaches the conclusion that there are two stages of derivation, as illustrated in Figure 10. First is the derivation from the root, i.e. deriving the Form I stem from the root. At this stage, the root-based approach can be utilized. Second is the derivation from the Form I stem, which is considered the base form, from which verbal derivatives and nominal derivatives are derived, with emphasis on the fact that each verbal derivative has its unique nominal derivatives.

The Form I stem has six different templates (see Table 33), therefore there three Form I stems can be derived from the same root. For example, from the root *ḍ-r-b* three Form I verb stems are derived: *ḍarab* ضَرَب يضْرِب 'to hit', *ḍarib* ضَرِب يضْرَب 'to be corrupted', and *ḍarub* ضَرُب يضْرُب 'to be strong'. The verb *ḍarab* ضَرَب يضْرِب 'to hit' is a transitive verb from which an instrumental noun can be derived, while the verbs *ḍarib* ضَرِب يضْرَب 'to be corrupted' and *ḍarub* ضَرُب يضْرُب 'to be strong' are intransitive and can be derived from a qualificative noun, not an instrumental noun. Therefore, relying on the root-based

approach causes an overgeneration problem if there are two or more Form I stems of the same root.

Table 33: Form I stem templates

Form I	Perfect template	Imperfect template
ḏahab ذهَب ‘to go’	$C_1aC_2aC_3$	$yaC_1C_2aC_3$
ḍarab ضرَب ‘to hit’	$C_1aC_2aC_3$	$yaC_1C_2iC_3$
katab كتَب ‘to write’	$C_1aC_2aC_3$	$yaC_1C_2uC_3$
fariḥ فرِح ‘to be happy’	$C_1aC_2iC_3$	$yaC_1C_2aC_3$
ḥasib حسِب ‘to think’	$C_1aC_2iC_3$	$yaC_1C_2iC_3$
šaruf شرُف ‘to be noble’	$C_1aC_2uC_3$	$yaC_1C_2uC_3$

The current study concludes that only four or five valid nominal derivatives can be derived from a given verb, not all six types. The derivation of an invalid nominal derivative causes the overgeneration problem that is involved in computational linguistic applications. The current study determines that overgeneration occurs in three types of nominal derivative: the instrumental noun, the qualificative adjective and the locative noun.

There is no overgeneration problem in deriving the active participle, the passive participle or the form of exaggeration, as they may be tagged for either concrete or abstract entities in terms of the object entity, and may be tagged for either state or event in terms of the situation entity; thus, compatibility between the semantic features of these three nominal derivatives and the semantic features of all the verb classes is achieved. That is, some nominals within this class take concrete entities, and some take abstract entities: for example, the active participle *ḍārib* ضارب ‘beater, hitter’ refers to a concrete object entity, while the active participle *ḥālim* حالم ‘dreamer’ refers to an abstract object entity. Similarly, certain types of nominal derivative may be tagged for state and event in terms of the situation entity, with some nominals within this class taking a state situation entity, and some taking an event situation entity. For example, the active participle *ḍārib* ضارب ‘beater, hitter’ refers to an event situation entity, while the active participle *ḥālim* حالم ‘dreamer’ refers to a state situation entity.

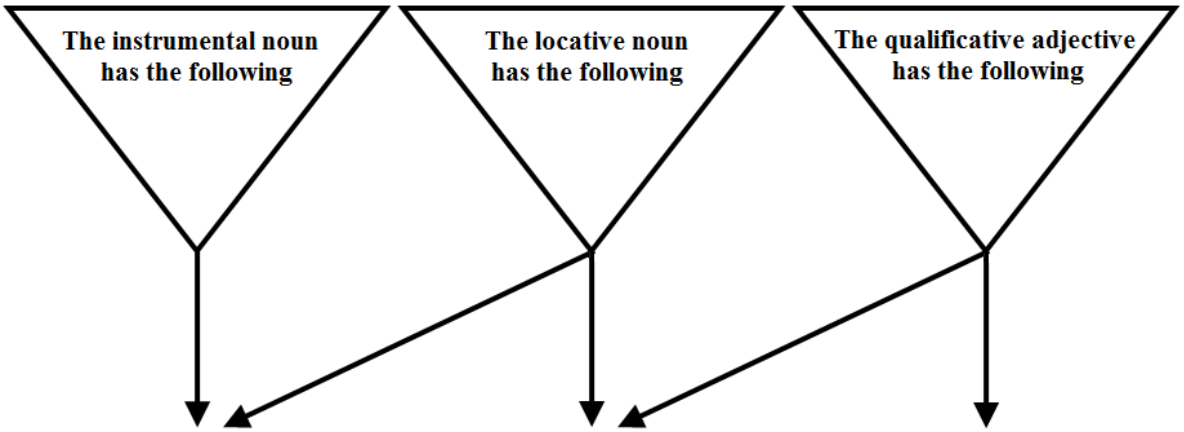
The study considers that reliance on the root-based approach instead of on the stem-based approach may cause overgeneration if there are two or more Form I stems of the same root. For example, the root *b-t-r* ب ت ر has two Form I verb stems[22]: *batar* $C_1aC_2aC_3$ / *ya*$C_1C_2aC_3$ بتر 'to cut off' (transitive) and *batir* $C_1aC_2iC_3$ / *ya*$C_1C_2iC_3$ بتر 'to be amputated' (intransitive). From the former stem only the instrumental noun and the locative noun can be derived, while from the latter only the qualificative adjective can be derived. Therefore, reliance on the stem-based approach allows for syntactic features (transitive and intransitive) that govern the formation of nominal derivatives, namely the instrumental noun and qualificative adjective.

To avoid the overgeneration problem, the current study developed its own model, based on: classifying 980 Form I verbs semantically and syntactically into 44 classes; and determining the compatibility between the semantic features of the verbs of each of the 44 classes and the semantic features of each type of nominal derivative. For each class of verbs, the compatibility with each type of the six nominal derivatives is determined in terms of object entities (concrete and abstract) and situation entities (state and event). There is compatibility between the semantic features of the active participle, the passive participle, and the form of exaggeration on one hand, and the semantic features of the 44 verb classes (comprising all 980 verbs) on the other. Therefore, no overgeneration occurs in these three nominal derivatives.

By contrast, overgeneration may occur in deriving the instrumental noun, the qualificative adjective, and the locative noun from some verb classes. That is because there is no compatibility between the semantic features of these three nominal derivatives and the semantic features of some verb classes. In Figure 11, the 44 verb classes are categorized into three groups according to their semantic features. Figure 11 clarifies and determines the compatibilities between the verb classes on one hand, and the instrumental noun, qualificative adjective and locative noun on the other.

22. See Table 33 that icludes Form I stem templates.

Figure 11: Nominal derivatives compatibilities



Semantic Features	
Concrete	YES
Abstract	NO
State	NO
Event	YES

The following verb classes have the above semantic features, therefore the instrumental noun and the locative noun can be derived from them:

- Verbs of motion
- Verbs of swimming
- Verbs of violence and abuse
- Verbs of agriculture
- Verbs of combining and constructing
- Verbs of sending and carrying
- Verbs of separating and disassembling
- Verbs of removing
- Verbs of bending
- Verbs of decorating and transcribing
- Verbs of measure
- Verbs of creation
- Verbs of preparing
- Verbs of ingesting
- Verbs of the five senses
- Verbs of preventing and prohibition
- Verbs of bodily movements
- Verbs of bodily care

Semantic Features	
Concrete	YES
Abstract	NO
State	YES
Event	NO

The following verb classes have the above semantic features, therefore the locative noun and qualificative adjective can be derived from them:

- Verbs of body parts
- Verbs of colouring
- Verbs of locations/places
- Verbs of stability

Semantic Features	
Concrete	NO
Abstract	YES
State	YES
Event	NO

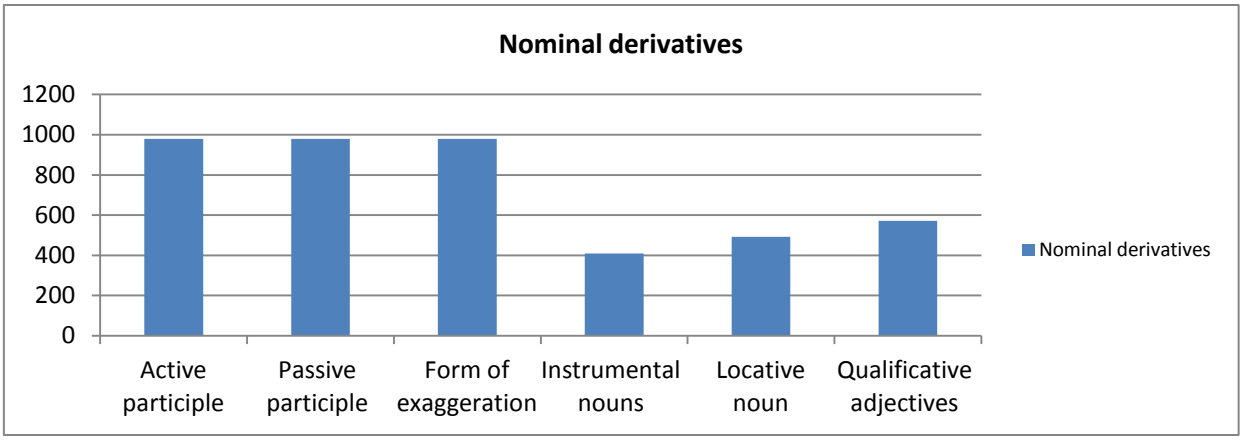
The following verb classes have the above semantic features, therefore only the qualificative adjective can be derived from them:

- Verbs of the state of the body
- Verbs of diseases
- Verbs of social interaction
- Verbs of emotions
- Verbs of bodily qualities
- Verbs of mental process
- Verbs of financial transactions
- Verbs of desire and request
- Verbs of intention
- Verbs of quantity and size
- Verbs of ruling and government
- Verbs of the development of life
- Verbs of uttering
- Verbs of accepting
- Verbs of refusing and disobedience
- Verbs of occurrence and progressing
- Verb of appearance
- Verbs of disappearing and ending
- Verbs of human sounds
- Verbs of sounds made by animals
- Verbs of winning

The current study characterizes: the instrumental noun as having the semantic features concrete and event, which requires derivation only from verbs that have the same features (concrete and event); the locative noun as having the semantic features concrete and state/event, which requires derivation only from verbs that have the same features (concrete and state/event); and the qualificative adjective as having the semantic features concrete/abstract and state, which requires derivation only from verbs that have the same features (concrete/abstract and state).

Figure 12 shows the proportions of the total number of valid nominal derivatives that can be derived from the 980 verbs in the 44 classes: 409 valid derived instrumental nouns, 492 valid derived locative nouns, and 571 valid derived qualificative adjectives.

Figure 12: The numbers of valid nominal derivatives



The current study concludes that three kinds of nominal derivatives can be found in Arabic: (i) nominal derivatives that are semantically and grammatically valid and in common use, such as *kātib* 'writer' (active participle), *maktūb* 'message' (passive participle), *maktab* 'office' (noun of place); (ii) nominal derivatives that are semantically and grammatically valid but not in common use, such as the locative noun, and instrumental nouns derived from verbs of combining and constructing; and (iii) nominal derivatives that are grammatically valid, but are not valid semantically, and are not in common use, such as the locative noun, and the instrumental noun of verbs of desire and request and verbs of intention.

Recommendations

Recommendations for future study include improving the rules for deriving nominal derivatives that have been examined and implemented in the form of generation algorithms for building a morphological generator. The database of that generator can be expanded to include a larger number of verbs as inputs and other derivatives such as the verbal forms as outputs. In addition to generation at the derivational level, the inflectional level could be taken into consideration to generate inflected words from the output stem, such as a plural form, a feminine form, and a definite form.

In view of the shortcomings in the content of traditional and modern dictionaries, where not all valid words are found, the study suggests development of an online (updatable) dictionary of nominal derivatives. In addition, most Arabic dictionaries do not normally indicate the grammatical category of their lexical entries. An online dictionary could provide default definitions of the nominal derivatives, combining two parts: first, a functional semantic meaning of the nominal derivative, and secondly, a basic meaning of (the base form) Form I verb presented in dictionaries. The derivatives could be linked with the Modern Standard Arabic corpus to indicate their usage.

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