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Research Article

The Formation of Social Behavior Verbs in Arabic

Abdallah Al-Shdaifat[1 *].

[1]The University of Jordan, Amman, Jordan.

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*Corresponding author:
The University of Jordan, Amman, Jordan.
Email: a.shdaifat@ju.edu.jo.

Abstract

The present research examines Arabic verb forms in terms of their structural properties from a semantic perspective within the field of social behavior. Understanding these verb forms is essential for the deployment of e-dictionaries and the improvement of machine translation, both of which are critical applications of natural language processing (NLP). By adopting an analytical and statistical methodology, the study explores three key aspects: the morphological composition of each verb form, its syntactic behavior in relation to transitivity, and the frequency of augmented verb derivations. The analysis investigates the derivational patterns of the ten Arabic verb forms (Forms I to X) using 50 roots linked to the semantic domain of social behavior, verifying their occurrences in Arabic lexicons. The data is classified into inputs and outputs, with Form I—the fundamental base form in Arabic—serving as the input from which the nine augmented verb forms (Forms II to X) are derived. Verbs classified under Form I within the semantic domain of social behavior predominantly conform to the standard morphological pattern C1aC2uC3. In contrast, Forms II through X each adhere to distinct canonical structures, where the application of these patterns to a given root results in the derivation of augmented verbs. The analysis identifies a total of 238 verbs derived across Forms II to X. The study concludes that Form IV exhibits the highest frequency of derivation within this semantic category, whereas Form IX is the least derived. Additionally, the research examines the syntactic behavior of Forms I through X, revealing significant shifts in syntactic patterns across different forms. These findings establish a foundation for further investigation into other semantic fields, including verbs related to motion, social interaction, and cognitive processes.

Keywords: Arabic Morphology, Form-Based Derivation, Natural Language Processing, Social Behavior Verbs, Word Formation.

1. Introduction

1.1 Arabic verbal morphology

Morphologically, Arabic is characterized by its nonconcatenative structure, wherein word formation does not depend on the sequential addition or attachment of morphemes, unlike English, which is morphologically concatenative. Nonconcatenatively, however, Arabic utilizes mechanisms such as schematic modification, affixation, and gemination, to generate new verb

stems (Alshdaifat, 2014; Mashaqba et al., 2022). From a derivational standpoint, those stems are devided into thirteen distinct forms, which are conventionally denoted in modern linguistic research using Roman numerals (Forms I–XIII). Among these, the first ten forms are predominantly employed in Modern Standard Arabic (MSA). These verb stems conform to established morphological templates, consisting of designated slots for consonants and vowels, which encode not only lexical and functional meanings but also grammatical and syntactic information (cf. Watson, 2002; Mashaqba, et al. 2020).

The morphological composition of the Form I stem (CVCVC) consists of three root consonants, systematically interwoven with a specific vocalic pattern. In Arabic, the root functions as a bound morpheme composed of three consonants, incapable of existing independently as a word or stem. For instance, the verb stem *karum* ('to be generous') is derived from the root consonants *k-r-m*, with the vowels *-a-u-* inserted between them, as demonstrated in Figure (1).

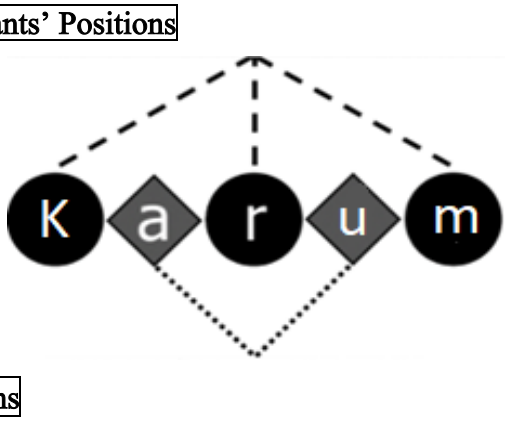

Figure (1): Form I pattern structure

Within the framework of perfect-imperfect model, Form I stem in Arabic exhibits six patterns which are morphologically distinct refer to Table (1). Such patterns are structured with three fixed slots for root consonants and two variable slots designated for vowels. Notably, the selection of a specific pattern by a given root follows an irregular process, often necessitating reference to classical Arabic lexicons, even for native speakers, to determine the correct morphological form. Further complicating this system, certain roots can generate multiple patterns. For example, the root *ḥ-s-b* produces three distinct Form I verb stems, each adhering to a different pattern: (1) *ḥasab - yaḥsub* ('to calculate'), (2) *ḥasub - yaḥsub* ('to be highborn'), and (3) *ḥasib - yuḥsab* ('to think'). These variations not only reflect semantic distinctions but also exhibit syntactic differences, as the first verb functions as transitive, whereas the second and third are intransitive.

Table (1): Morphological patterns of Form I verb stem

Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5	Pattern 6
Perfect: $C_1aC_2aC_3$	Perfect: $C_1aC_2aC_3$	Perfect: $C_1aC_2aC_3$	Perfect: $C_1aC_2iC_3$	Perfect: $C_1aC_2aC_3$	Perfect: $C_1aC_2uC_3$
Imperfect: $yaC_1C_2uC_3$	Imperfect: $yaC_1C_2iC_3$	Imperfect: $yaC_1C_2aC_3$	Imperfect: $yaC_1C_2aC_3$	Imperfect: $yaC_1C_2iC_3$	Imperfect: $yaC_1C_2uC_3$
Root: ʔ-k-l	Root: ṣ-b-r	Root: z-h-d	Root: ħ-z-n	Root: ħ-s-b	Root: š-r-f
ʔakal	ṣabar	zahad	ħazin	ħasib	šaruf
yaʔkul	yasbir	yažhad	yaħzan	yaħsib	yašruf

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to eat	to be patient	to be ascetic	to be sad	to think	to be honorable

By following the morphological structure *C1aC2aC3* in the perfect tense, the first three patterns are primarily associated with transitive verbs and typically denote actions related to creation, labor, or movement. Conversely, patterns four and five, which conform to the structure *C1aC2iC3* in the same tense, predominantly convey temporary states and are largely linked to intransitive verbs. Pattern six, *C1aC2uC3*, is strictly linked to intransitive verbs and primarily signifies inherent or permanent qualities.

Derivationally, nine augmented verb stems are derived from Form I, which functions as the foundational base for the rest of the forms see Table (2). These root-originating forms are interconnected on the semantic level and collectively encapsulate an inherent lexical meaning. For example, the Form I verb *ḥasub* ('to be highborn') generates seven augmented forms: Form II *ḥassab*, Form III *ḥāsab*, Form IV *ʾḥsab*, Form V *taḥassab*, Form VI *taḥāsab*, Form VIII *iḥtasab*, Form IX *ʾḥsabb*, and Form X *ʾistaḥsab*.

Table (2): Patterns of Form I verb stem

Form	Pattern	Example
Form I	$C_1aC_2aC_3$	ṣabar 'to be patient'
Form II	$C_1aC_2C_2aC_3$	karram 'to honor someone'
Form III	$C_1āC_2aC_3$	bāġaḍ 'to hate'
Form IV	ʔ$aC_1C_2aC_3$	ʔabxal 'to be greedy'
Form V	$taC_1aC_2C_2aC_3$	tajallad 'to endure'
Form VI	$taC_1āC_2aC_3$	taʔaddab 'to be polite'
Form VII	ʔ$inC_1aC_2aC_3$	ʔinbasaṭ 'to become delighted'
Form VIII	ʔ$iC_1taC_2aC_3$	ʔiṣfarr 'to be yellow'
Form IX	ʔ$iC_1C_2aC_3C_3$	ʔiqtarab 'to come closer'
Form X	ʔ$istaC_1C_2aC_3$	ʔistahṭar 'to be reckless'

The derivational relationships among the augmented verb forms have been systematically analyzed. Watson (2006) states that "Forms II, III, and IV are derived from Form I through the extension of the stem, while Forms V and VI emerge through the prefixation of *ta-* to Forms II and III, respectively. Forms VII, IX, and X are generated through prefixation, whereas Form VIII is derived from Form I by inserting the infix */t/* immediately after the first root consonant. Moreover, no consonant root in MSA manifests all forms. However, certain verbs may display a degree of derivation in forms while lacking the fundamental base.

Thorough analysis of the Forms I–X is provided across three dimensions: (1) statistical determination of the frequency with which each augmented form is derived from the base form; (2) an exploration of the syntactic behaviour of the derived forms; and (3) an assessment of the proportion of augmented verb derivations.

1.2 Verbs of Social Behaviour

Alshdaifat (2021) has studied the semantic field of emotion semantically, morphologically and syntactically. Therefore, this research examines another semantic field to find similarities and differences between them. Verbs of social behaviour represent action words that articulate interactions, relationships, or behaviours among individuals or groups within a social framework. They specifically describe an individual's personal conduct in engaging with others see (Jawarneh,

2024). A strong correlation exists between a verb's morphological pattern and its semantic properties. In particular, Form I verb related to social behaviour typically adhere to a distinct morphological structure.

From a cross-linguistic perspective, verbs related to social behaviour encode subjective aspects of interpersonal relationships, cultural norms, and social roles. These verbs encompass the dynamics of communication, cooperation, and emotional exchange. For example, *collaboration* denotes the process of working collectively toward a shared objective, whereas *empathizing* emphasizes the ability to understand and experience another individual's emotions. Likewise, *negotiating* signifies the process of reaching a mutual agreement through discussion, while *confront* denotes directly addressing an issue or individual. These verbs capture the subtleties of human interaction, highlighting the intentions, emotions, and outcomes that shape social relationships. Their meanings are often context-dependent, reflecting the intricate nature of interpersonal connections.

In literary and linguistic studies, the semantics of verbs related to social behaviour constitute a significant area of research within linguistics and cognitive science. This field of inquiry explores how individuals conceptualize and articulate social interactions, providing insights into the cognitive and cultural frameworks that shape human communication (see Jawarneh, 2024). Verbs associated with social behaviour, such as *cooperation*, *arguing*, *persuade*, and *deceiving*, encode distinct patterns of agency, intentionality, and causality, thereby shaping the way events and relationships are perceived (Levin, 1993). Research has demonstrated that the semantic properties of these verbs significantly impact sentence structure and interpretation, particularly in the assignment of argument roles (e.g., subjects and objects) within discourse (Jackendoff, 1990). For example, verbs such as *help* and *assistance* convey cooperative intent and are typically used with animate agents, whereas verbs like *manipulate* or *deceive* reflect a more intricate interplay of social cognition and power dynamics (Kemmer, 1993). Moreover, research in psycholinguistics has shown that the processing of social behaviour verbs engages specific cognitive and neural mechanisms linked to theory of mind and empathy (Holtgraves, 2008). This underscores the profound relationship between verb semantics and human social cognition, emphasizing that language functions not only as a communicative medium but also as a lens through which social understanding and interaction are conceptualized.

Alshdaifat (2015) conducted a semantic analysis of social behaviour verbs based on two primary categories: the object entity and the situation entity. The object entity refers to a subclass of verbs associated with abstract concepts, conveying non-physical, intangible meanings that are imperceptible to the five senses and do not occupy physical space, such as *to love*, *to hate*, and *to fear*. In contrast, the situation entity encompasses verbs that denote states, describing conditions that are either permanent or persist for a significant duration.

2. Material and methodology

The data of the study are divided into two main parts: (i) a corpus of 50 triconsonantal roots associated with social behaviour selected from Alshdaifat semantic verb classification (Alshdaifat 2015) and (ii) a total of 238 derived verbs from Forms II to X generated from these roots. The selection of the 50 roots was based on their relevance to semantic interactions, making sure that these roots represent a wide range of verbs within the domain of social behavior. While each root theoretically allows for the derivation of nine augmented verb forms, yielding a potential total of

450 derived stems, only 238 verbs are documented in Arabic dictionaries. This corresponds to an average of 4.76 derived verbs per Form I verb related to social behaviour.

Through a semantic template, Alshdaifat (2015) categorized Form I verbs into 44 distinct semantic classes, one of which comprises verbs of social behaviour, encompassing 87 verb roots. In this study, this classification has been refined to include 50 roots specifically associated with social behaviour. Following Alshdaifat's framework with certain modifications, these 50 verb roots were selected based on specific inclusion and exclusion criteria. A key criterion for selection was the presence of a derived qualificative adjective governed by the morphological pattern $C^1aC^2īC^3$, such as *karīm* ('generous') and *baxīl* ('greedy').

Verbal derivatives

This study demonstrates that morphologically deriving verbs in Arabic follow two stages: (1) the transformation from root to the first form, which serves as the base stem, and (2) the derivation from Form I to the augmented verb stems (the rest of the forms); demonstrated in Figures (3 and 4), as well as Table (3). Furthermore, the study posits that the first form stem functions as the foundational input, from which nine possible derived verb stems emerge as the outputs of the derivational process. Such derivation follows established canonical patterns, yet generating from the form stem is not always possible for the rest of the forms. In other words, a particular root might have absent derived forms from Arabic dictionaries. This indicates variability in the derivational process, as not every root yield all possible derived forms. The following two figures illustrate this phenomenon: (1) from the root *n.b.l* (to be noble), seven derived verb forms are attested, as shown in Figure (3); whereas (2) from the root *r.ġ.b* (to desire'), only two derived forms exist, as depicted in Figure (4).

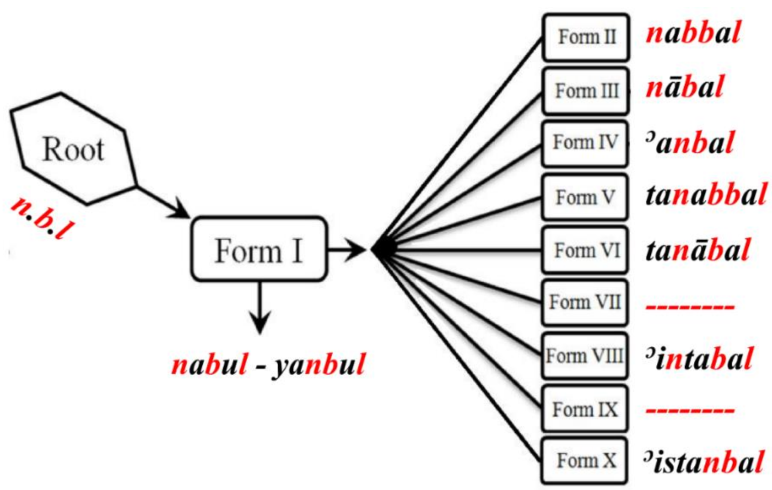

Figure (2): Verbal derivation from the root n.b.

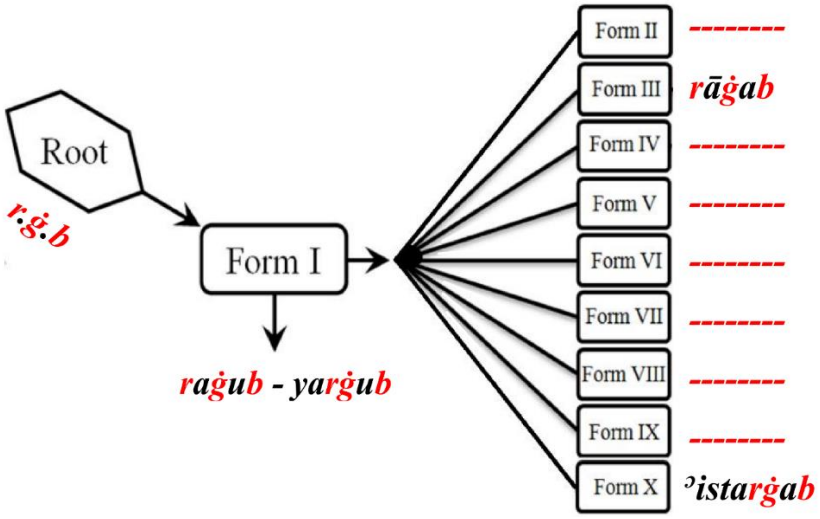

Figure (3): Verbal derivation from the root r.ġ.b

Such exception in the derivation of the nine forms results in under generation and overgeneration of forms where the former occurs when a valid semantic verb is not derived thus not appearing in related Arabic dictionaries, whereas the latter arises when an invalid semantic verb is derived, despite lacking linguistic acceptability within the lexicon.

In Figure (2), a notable example of frequently derived verb forms is observed in the root n-b-l (‘to be noble’), from which all possible forms are presented except forms seven and nine as they are not semantically acceptable to be derived from this root. Notably, the derivation of Form VII is rare in relation to verbs of social behaviour, while no instance of Form IX has been documented in this category. This absence may be attributed to the semantic constraints of Form IX, which is predominantly associated with concepts related to color, aesthetics, and physical impairment.

Table (3): Verbal derivation of Form I – Form X

Form	Root	Pattern	Derived form	English Gloss
Form I	b-h-j	$C_1aC_2aC_3$	bahağ	‘to feel happy’
Form II	b-h-j	$C_1aC_2C_2aC_3$	bahhağ	‘to make someone happy’
Form III	b-h-j	$C_1āC_2aC_3$	bāhağ	‘to be happy with someone’
Form IV	b-h-j	$ʔaC_1C_2aC_3$	ʔabhağ	‘to make someone happy’
Form V	b-h-j	$taC_1aC_2C_2aC_3$	tabahhağ	‘to feel happy’
Form VI	b-h-j	$taC_1āC_2aC_3$	tabāhağ	‘to be pleased with someone’
Form VII	h-m-q	$ʔinC_1aC_2aC_3$	ʔinhamaq	‘to be stupid’
Form VIII	b-h-j	$ʔiC_1taC_2aC_3$	ʔibtahağ	‘to rejoice at’
Form IX	ḥ-s-b	$ʔiC_1C_2aC_3C_3$	ʔiḥsabb	‘to strongly assume’
Form X	b-h-j	$ʔistaC_1C_2aC_3$	ʔistabhağ	‘to be or become rejoiced’

The following sections present a comprehensive analysis of Forms II, III, IV, V, VI, VII, VIII, and X. This analysis encompasses three key aspects: (1) the word-formation processes involved in deriving each form of the verb, (2) their syntactic behaviour, particularly in relation to transitivity, and (3) the statistical distribution of derived verbs, examining the percentage of augmented verb forms successfully generated from Form I roots.

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Form II analysis

The morphological structure of Form II follows a distinct pattern, represented as C1aC2C2aC3 and yuC1aC2C2iC3 in the perfect and imperfect tense respectively. From a syllabic perspective, this form consists of two heavy syllables, each following a CVC structure. Form II is generated from Form I through the gemination of the second root consonant. Its structural composition consists of four consonant slots and two vowel slots, as illustrated in Figure (5). An analysis of a corpus comprising 50 roots reveals that 41 of them, accounting for 82%, successfully generate Form II verb stems that are documented in Arabic dictionaries, whereas the remaining 9 do not appear in lexicographic records.

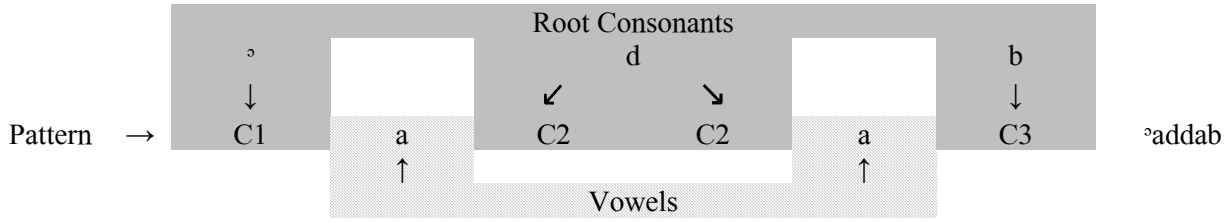

Figure (4): Pattern-root representation of Form II

In contrast to Form I verb of Social Behaviour, Form II verbs exhibit a fundamental shift in syntactic behaviour, as all instances of Form II are transitive. For example, the Form I verb *adaba* ('to give a banquet') functions as an intransitive verb, whereas its Form II counterpart *ʾaddab* ('to educate') is transitive, demonstrating a syntactic transformation associated with verb derivation.

Form III analysis

The Form III verb stem adheres to the structure *C1āC2aC3* and *yuC1āC2iC3* in the perfect and imperfect aspect. Syllabically, this form is generated lengthening the vowel, resulting in a structure composed of two heavy syllables (*CVV* and *CVC*). Regarding vowel melody, the pattern is established by integrating the vowels *-ā-a-* among the consonants, as depicted in Figure (6). Among verbs of Social Behaviour, the derivation of Form III occurs in 28 out of 50 Form I verbs, corresponding to a derivational rate of 56%.

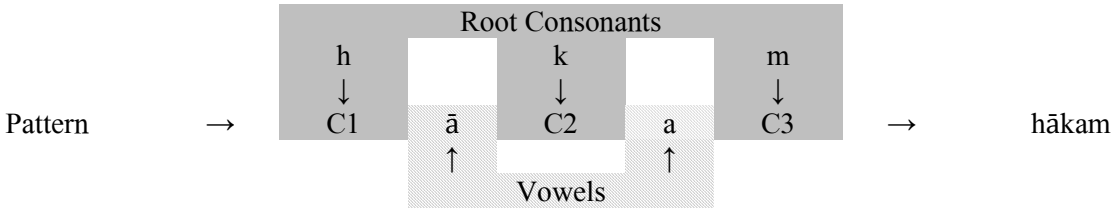

Figure (5): Pattern-root representation of Form III

Form III exclusively consists of transitive verbs, aligning with the transitivity pattern observed in Form II. All 28 Form III verbs derived from social behaviour roots exhibit transitivity. For instance, *rāfaq* ('to associate with') is derived from the first form of the verb *rafiq* ('to treat with kindness'). However, six of these verbs demonstrate contextual flexibility, functioning as either transitive or intransitive depending on usage. An example is *sāmah* ('to forgive'), which originates intransitively from the first form of the verb *samuh* ('to be magnanimous').

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Form IV analysis

The fourth form is derived through the morphological structure *ʾaC1C2aC3* and *yuC1C2iC3* in the perfect and imperfect tense respectively. Syllabically, this structure consists of two heavy syllables (CVC and CVC). A distinguishing feature of this form is the presence of a prefix that includes an initial glottal stop and a vowel infix, as demonstrated in Figure (7). Analysis of the corpus reveals that 44 out of the 50 selected roots successfully generate Form IV verbs

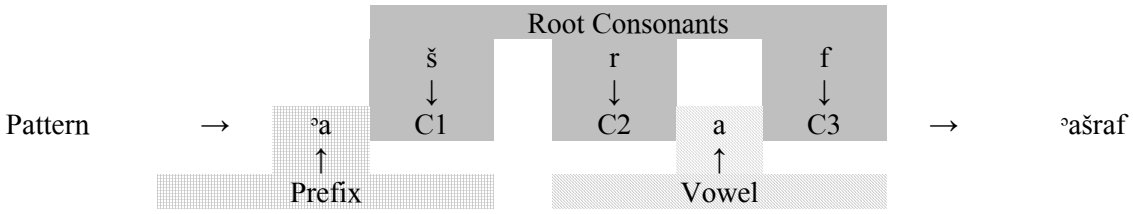

Figure (6): Pattern-root representation of Form IV

The majority of Form IV verbs associated with social behaviour exhibit transitivity, with only two exceptions being intransitive. The prefix *(ʾa-)* is recognized as transitiviser, as it transforms intransitive first forms into transitive Form IV. To illustrate, the transitive Form IV verb *ʾašraf* ('to supervise') is derived from the intransitive Form I verb *šaruf* ('to be honorable'), demonstrating this shift in syntactic behaviour. The two intransitive Form IV verbs lack emotional connotations, despite their corresponding Form I verbs being classified within the domain of Social Behaviour. These verbs include *ʾalhaf* ('to be stingy'), which is derived from the Form I verb *lahif* ('to grieve for'), and *ʾahāb* ('to call out'), originating from the Form I verb *hāb* ('to fear').

Form V analysis

The morphological structure of the Form V verb stem follows the pattern *taC1aC2C2aC3* and *yataC1aC2C2aC3* in the perfect tense and imperfect tense respectively. It is formed by prefixing *ta-* to the Form I root resulting in the duplication of the second root consonant, as exemplified by the verb *tabassal* (to scowl'), shown in Figure (8). Syllabically, this form follows the structure CV/CVC/CVC, beginning with a light syllable (CV) and followed by two heavy syllables (CVC). A total of 64 verbs has been derived from the 50 selected roots. While Buckley (2004), along with Ryding (2005), Mashaqba (2015) and al Huneety (2015), assert that the fifth form of verbs originate from second forms, this research identifies 16 Form V verbs of social behaviour that do not have corresponding Form II derivations. For instance, the Form V verb *taraffaq* (to proceed or go slowly') exists independently without an associated Form II counterpart.

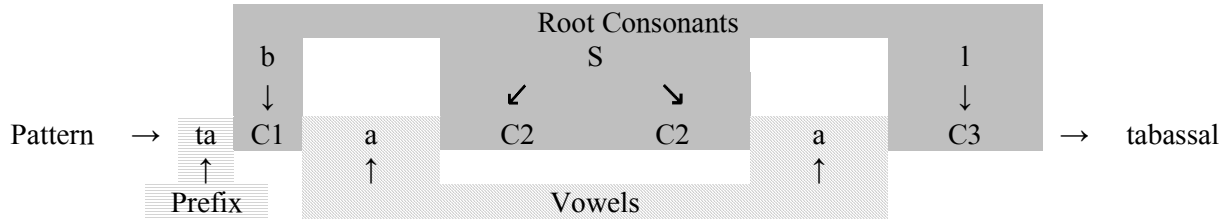

Figure (7): Pattern-root representation of Form V

In contrast to Forms II, III, and IV, which predominantly exhibit transitivity, Form V verbs are primarily intransitive. There were 40 intransitive derived Form V verbs and24 transitive verbs out of 64. A notable syntactic distinction of Form V is that certain verbs exhibit structural behaviour different from the previously derived forms. To illustrate, the intransitive Form V verb

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tahakkam (‘to control’) is derived from the transitive Form I verb *hakum* (‘to be wise’), demonstrating a shift in syntactic behaviour.

Form VI analysis

Form VI verbs follow the morphological structure *taC1āC2aC3* and *yataC1āC2aC3* in the perfect and imperfect tense respectively. This form is derivationally formed from Form I through the prefixation of *ta-* and the application of melodic overwriting with the vowel sequence *ā-a*, as exemplified by the verb *tahāsab* (‘to settle a mutual account’), illustrated in Figure 9. Compared to previous verb forms, Form VI exhibits a lower frequency of derivation, with only 32 instances. Contrary to previous studies (e.g., Watson, 2006), which suggest that Form VI originates from Form III, this study identifies 13 Form VI verbs that do not have corresponding Form III counterparts.

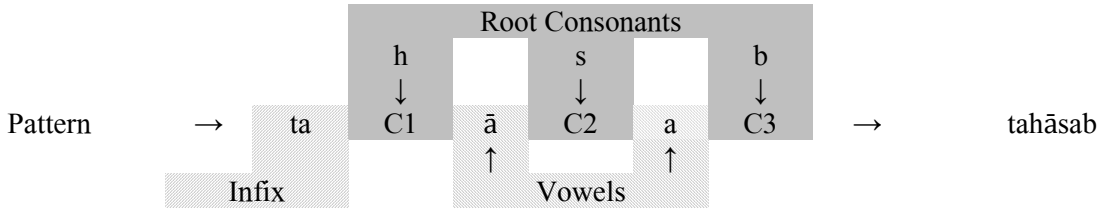

Figure (8): Pattern-root representation of Form VI

Most Form VI verbs exhibit intransitivity, with 28 out of 32 following this pattern. To illustrate, the verb *takāram* (‘to act generously’) originates from the transitive Form I verb *karum* (‘to be precious’). On the other hand, only four Form VI verbs function as transitive, demonstrating a deviation from the general syntactic behaviour of this form, such as the verb *talaṭafa* ‘treat with kindnesses.

Form VII analysis

These are derived from Form I by adding *ʾin-* and applying melodic overwriting with the vocalic melody *-a-a-*, as exemplified by the verb *ʾinfasad* (‘to go bad’), illustrated in Figure 10. It is morphologically patterned for the perfect tense as *ʾinC1aC2aC3*, while the imperfect tense follows the pattern *yanC1aC2iC3*. Among the various verb forms analyzed, Form VII has the lowest number of derived verbs related to Social Behaviour, with only 12 attested instances.

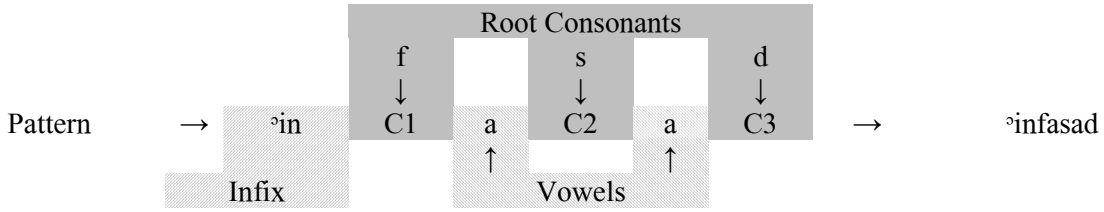

Figure (9): Pattern-root representation of Form VII

All 12 Form VII verbs related to social behaviour exhibit intransitivity. In many instances, these verbs originated from transitive Form I verbs. For example, the Form VII verb *insaram* (‘to pass’) originates from the transitive Form I verb *sarum* (to be or become severe’). This shift in

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syntactic behaviour highlights the morphological and semantic impact of the *ʾin-* prefix in altering the argument structure of the base verb.

Form VIII analysis

Form VIII verbs follow the morphological pattern *ʾiC₁taC₂aC₃* and *yuC₁āC₂iC₃* for the perfect and imperfect tense respectively. Syllabically, these verbs consist of four syllables: an initial heavy syllable (*CVC*) and a formation of three light syllables (*CV, CV, CV*). Their derivation involves prefixing *ʾi-*, infixing *-t-*, and applying melodic overwriting with the vocalic sequence *-a-a-*. An example of this pattern is the verb *ʾihtakam* (‘to appeal’), as demonstrated in Figure 11. Among the 50 roots analyzed, 39% yielded Form VIII verbs.

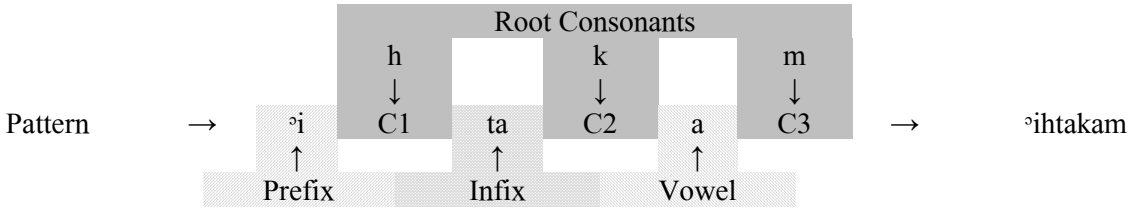

Figure (10): Pattern-root representation of Form VIII

Form VIII verbs associated with social behaviour predominantly exhibit intransitivity, with 25 verbs classified as intransitive compared to 14 transitive counterparts. In certain instances, intransitivity of Form VIII originates from Form I transitivity. For example, the verb *ʾihtaqar* ‘to despise’ is derived from the transitive Form I verb *haqur* ‘to be or become low’.

Form X analysis

The final form follows the morphological structure *ʾistaC1C2aC3* and *yastaC1C2iC3* in the perfect and imperfect tense respectively. Structurally, it consists of three heavy syllables (CVC, CVC, and CVC), represented as *ʾis/taC1/C2aC3*. This one is derived from Form I through the addition of the *ʾista-* prefix and the modification of the vocalic melody to *-a-*. Found in Figure 12, the verb *ʾistahqar* (‘to despise’) is derived from the Form I verb *haqur* (‘to be or become low’). The proportion of Form X verbs derived from the 50 roots is 26%.

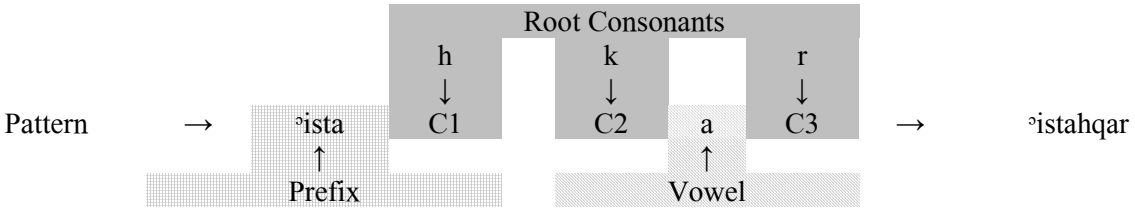

Figure (11): Pattern-root representation of Form X

Form X verbs related to social behaviour predominantly exhibit transitivity, with 16 verbs classified as transitive, such as *ʾistarfaq* (‘to seek kindness or gentleness’), while 10 are intransitive, such as *ʾistakram* (‘to act generously’). In many instances, the syntactic behaviour of Form X verbs remains unchanged upon derivation. That is, if a Form X verb originates from an intransitive Form I verb, it retains its intransitivity. For example, *ʾistanba* (‘to behave like a noble person or to act with dignity and prestige’) remains intransitive, aligning with its Form I root *nabul* (‘to be noble’).

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3. Conclusion

This study has conducted an in-depth analysis of the morphological formation of Arabic verbs within the semantic domain of Social Behaviour, based on the premise that verbs within the same semantic field exhibit consistent morphological and syntactic patterns. The analysis of Form I verbs of social behaviour reveals a strong correlation between semantic properties and the morphological pattern $C_1aC_2uC_3$, wherein these verbs are predominantly intransitive. In contrast, their augmented counterparts primarily exhibit transitivity, highlighting a systematic relationship between verb derivation and syntactic behaviour.

The derivation of augmented verbs in Arabic follows a systematic application of canonical patterns to a given root, resulting in the formation of verbs from Form II to Form X. However, this study has identified variability in the derivation process, as not all augmented forms can be generated from every root. This variation is evident in the differing number of derivable verb forms from distinct roots. For instance, the root *h.s.b* (to be highborn') yields eight derived verb forms, whereas the root *r.≤.l* ('to be or become low') produces only three, underscoring the selective nature of verbal augmentation in Arabic.

In light of derivationally augmented verbs within the semantic field of social behaviour, data analysis reveals significant variation in their formation, as illustrated in Figure 12. The highest percentage of derivations is observed in Form IV (88%), followed by Form II (82%), Form V (80%), Form X (62%), Form VI (58%), Form III (56%), Form VIII (42%), Form VII (4%), and finally, Form IX (2%). The notably low percentage of derivations in Form IX can be attributed to its semantic constraints, as it is primarily associated with concepts related to color, beauty, and disability. Further research is required to explore other semantic fields and their specific tendencies toward particular verbal forms.

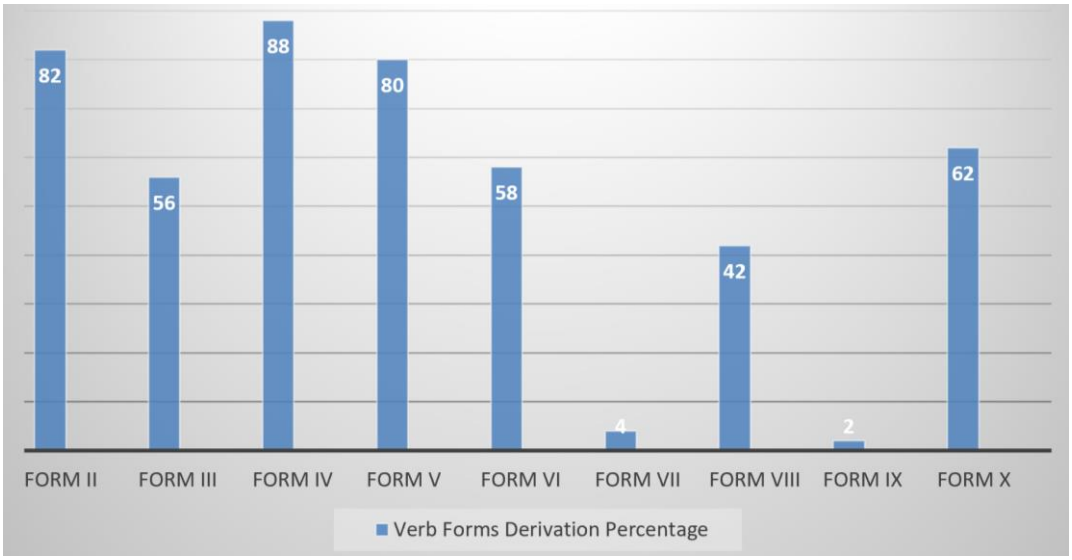

Figure (13): Variation in driving the augmented forms (From 11 – From X)

cholars like Ryding (2005) have acknowledged a correlation between Form III and Form VI. However, the findings of this study indicate that not all Form VI verbs are necessarily derived from their corresponding Form III counterparts. This conclusion is supported by the observation that only 13 roots serve as the basis for the derivation of Form VI verbs, highlighting a more limited dependency than previously assumed.

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From a syntactic perspective, this study has analyzed the transitivity patterns of each verbal form. The base form (Form I) is entirely intransitive, whereas the augmented forms exhibit a strong tendency toward transitivity. The percentage of transitive verbs varies across forms: Form II (100%), Form III (100%), Form IV (88.6%), and Form X (78%). Conversely, certain forms demonstrate a tendency toward intransitivity, including Form V (77.5%), Form VI (93.2%), and Form VIII (52.4%). These findings highlight the systematic influence of verb augmentation on syntactic behaviour (for details on transitivity effect of verb forms in Arabic, see Mashaqba, et al. 2020c).

The findings of this study have raised several questions that warrant further investigation, particularly in relation to verbs within other semantic domains, such as motion, social interaction, mental processes, and color-related verbs. Additionally, these results hold potential significance for researchers engaged in natural language processing (NLP) applications, including the development of verb wordnets, ontologies, and electronic dictionaries (Sawalha et al., 2025; Sawalha et al. ,2025; Yagi et al., 2025).

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Ethical Declarations

This study was conducted in accordance with the principles of academic integrity and research ethics. Since the research did not involve human participants, there was no need for informed consent or other participant-related ethical procedures. However, all data sources and materials used in the research were handled responsibly and with due regard for intellectual property rights. The research process adhered to the principles of accuracy, transparency, and reliability to ensure the integrity of the findings.

Data Availability Statement

The datasets collected and analyzed during this study are available from the researcher upon request.

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Conflict of Interest

The researcher declares no conflict of interest.

Author Contributions

- Abdallah Al-Shdaifat conceptualized and designed the study, in addition to collecting and analyzing the data.
- The first draft of the manuscript was written by Abdallah Al-Shdaifat.

- The researcher reviewed and edited the text and approved the final version for publication.

Consent for Publication

The researcher agrees to submit this paper for publication and awaits the editorial decision after the peer-review process, agreeing to its publication. He also confirms that this work has not been previously published and has not been submitted to any other journal for consideration.

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