The morphology of the first-person Kana words

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Abstract

Purpose – For the past few decades, Kana words were labeled as pseudo-verbs, incomplete verbs, untrue verbs, copular verbs and particles. These labels resulted from investigating different aspects of Kana words. However, previous research on the morphology of Kana words, such as Alanbari (1886), Bahloul (1993) and Mohammad (1998), only included some examples while overlooking other morphological realizations of the words. Such conclusions representing a whole morphological category may have resulted from the tendency to equate these words with verbs. In addition, studies such as Koskenniemi (1983) and Ratcliffe (1990) analyzed Arabic morphology while highlighting the nonconcatenative nature of the structures; they neglected that the inflectional elements are transfixed and not infixed. This created a gap that can be filled by answering the following questions: What is the morphological process that explains the inflection of Kana words? How similar are Kana words to verbs in Arabic? To answer these questions, different inflections of Kana words were considered utilizing McCarthy's (1981) approach to nonconcatenative morphology to demonstrate the interweaving of morphemes with the root structure. Also, to indicate how the roots of the Kana word are related to the inflected forms, the Eisele and Bisele (2002) approach to morphological rule writing was utilized. After meticulous investigations of the morphology of Kana words, the present study confirmed that they show similar morphological patterns to verbs when different parts of the affixes are interweaving within the root in a tansfixational pattern. The present study enhances the understanding of the morphological aspect of Kana words. Looking into Kana words from syntactic and semantic perspectives will provide a better understanding when comparing Kana words with verbs in Arabic. As the present study follows a meticulous analysis of Kana words, it demonstrates in part how Kana words work when referring to the first person and when in the indicative mood. This leaves space for future plans to consider the second and third persons in addition to the imperative mood. The significance of this research lies in addressing this gap by demonstrating that transfixation is the predominant process shaping Kana words. Unlike infixation, which simply inserts morphemes into a root, transfixation involves the interweaving of morphemes with the root structure, creating complex morphological patterns. This study builds upon Kaye's (2003) distinction between infixation and transfixation, applying it specifically to the morphological analysis of Kana words.

Design/methodology/approach – In MSA, the morphology of Kana words aligns closely with that of verbs, as previously noted by scholars such as Alanbari (1886), Bahloul (1993) and Mohammad (1998). These researchers presented samples of Kana words to illustrate their linguistic behavior in comparison to MSA verbs, highlighting that they share notable structural similarities. By analyzing naturally written data from Arabic books and utilizing methodologies such as McCarthy's (1981) autosegmental approach, this research further establishes that Kana words exhibit the derivational and inflectional characteristics typical of Arabic verbs. In this respect, it challenges traditional classifications that have often labeled Kana words as pseudo-verbs or incomplete verbs. This study analyzed 8,000 Arabic books from the Alshamela library, focusing on Modern Standard Arabic (MSA) linguistics from the past five decades. Approximately 6,000 relevant books yielded results for the morphological behavior of one-word Kana words, excluding two-word forms to avoid irrelevant tokens. Seven Kana words were examined, excluding the negation particle ليس (laisa). Each word's 42 derived forms were analyzed for person, gender, number, tense and mood, specifically the first person and indicative mood. The study utilized McCarthy's autosegmental representation to explore derivations and compared these with related content verbs using Eisele and Bisele's derivation rules.

Findings – By analyzing naturally written data from Arabic books and utilizing methodologies such as McCarthy's (1981) autosegmental approach, this research further establishes that Kana words exhibit the derivational and inflectional characteristics typical of Arabic verbs. In this respect, it challenges traditional classifications that have often labeled Kana words as pseudo-verbs or incomplete verbs. However, the current study also reveals that some specific structures of Kana words behave differently from established patterns. For instance, the first-person dual and plural present and future endings are typically marked by [-*u*], consistent with

the rules governing verbs in MSA. An exception arises when the root of a word ends with a vowel, in which case the ending is modified to [-i:]. Such exceptions may not be readily apparent without a thorough investigation of each word's morphological structure, which was undertaken for this study. This finding indicates that each attested morphological pattern must be meticulously analyzed to draw well-founded conclusions.

Research limitations/implications – The present study enhances the understanding of the morphological aspect of Kana words. Looking into Kana words from syntactic and semantic perspectives will provide a better understanding when comparing Kana words with verbs in Arabic. As the present study follows a meticulous analysis of Kana words, it demonstrates in part how Kana words work when referring to the first person and when in the indicative mood. This leaves space for future plans to consider the second and third persons in addition to the imperative mood.

Practical implications – The insights of this research provide a basis for future studies to explore the morphological behavior of Kana words in other grammatical persons and moods, contributing to a more nuanced understanding of Arabic grammar. However, labelling Kana words as verbs based solely on this first-person morphological analysis may be premature. A broader examination of Kana words from multiple linguistic perspectives – such as syntax, semantics and morphology – would yield a more accurate understanding of their nature. Thus, future research should aim to investigate Kana words across all grammatical persons and in various contexts to ascertain their full role within the Arabic language.

Originality/value – Previous research did not tackle all the structural patterns of Kana words, and transfixation for Kana words was rarely indicated. The present study analyzes the morphological patterns of each of the variants of Kana words, focusing on how transfixation occurs in these patterns. Overall, this study enhances the theoretical understanding of nonconcatenative morphology in Arabic, offering new insights into the intricate relationships between morphemes, roots and grammatical functions. In doing so, it lays the groundwork for continued exploration of the complexities of Arabic morphology, aiming to deepen the understanding of this linguistically rich language.

Introduction

Researchers tackling Arabic morphology attempted to capture the nonconcatenative nature of Arabic by indicating that the processes of infixation, transfixation, and modification are utilized when deriving and inflecting Arabic words (Ratcliffe, 1990; Kaye, 2003; Dendane, 2007, among others). To give a clear understanding of these processes, Broselow (2000) explains that transfixation and infixation are morphological processes in which a bound morpheme interrupts a root. The bound morpheme is also interrupted when transfixation occurs, but not by infixation. For example, the Arabic word [kataba][1] becomes [jakatubuna] and the English word spoonful becomes spoonsful when transfixation and infixation occur, respectively. Modification is a morphological process in which there is some change to the root sound.

Kana words and their sisters, as labeled by Arabic linguists, are classified within a category of words that are called النواسخ [alnawasix] "removers". They are "removers" in the sense that they remove الحركات [alharakat] "diacritics", which are marks that represent vowels occurring within and at word ends. Kana words work similarly by replacing the endings of the subject argument and subject predicator in the Arabic nominal sentence (Bumiza, 2009). Compare the following sentences.

كان الرجل مجتهداً

1. Kana   ar:aʒulumuʒtahidan
   Was   DEF-man-SG   diligent

   The man was diligent.

الرجلُ مجتهدٌ

2. ar:aʒulumuʒtahidun
   DEF-man-SG   diligent

   The man is diligent.

In Sentence 1, the word [Kana] is equivalent to the copula "was". The word [ar:aʒulu] is the subject, and [muʒtahidan] is the predicator in the sentence. As the subject [ar:aʒulu] is the same

in both sentences, the predicator is slightly different, as it has the case ending [-an] when [kana] is used and the case ending [-un] when it is not.

Kana words were claimed to be incomplete, untrue, and pseudo-verbs, since they do not retain all the functions of verbs, such as not being followed by a word reflecting the agent and patient roles. They have also been labeled as copula verbs since they semantically present the predicator of the subject in a similar way to how the copula BE in English functions Linguists have also explored the types of sentences that Kana words introduce. Arabic sentences come in two types: verbal and nominal. The verbal sentence starts with a verb, followed by a subject, and then the object. The nominal, on the other hand, starts with a subject and then a predicator (Alsayid, 1990; Hindawi, 1992; Shaalan, 2005; Salem, 2009; AlShihry, 2017; Habash *et al.*, 2019; Abd Almawgood, 2019; Al-Kubaisi, 2020; Madi and Al-khalifa 2020).

Based on previous research, the classification of Kana words was only concluded based on a few examples of these words that were not occurring in natural discourse. Only a few such examples are not valid to make such a conclusion. This called for a thorough linguistic analysis of data collected from natural discourse. The present study attempted to answer the following questions by investigating every realization of non-compound Kana words in naturally occurring data:

(1) What is the morphological process that explains the inflection of Kana words?

(2) How similar are Kana words to verbs in Arabic?

Literature review

McCarthy (1981) observed that morphology is not only linear but also occurs by spreading morphemes within other morphemes in a nonconcatenative manner, indicating that morphology includes autosegmental layers. The default morphology of Arabic, explained through الميزان الصرفي *Almizan AlSarfi* "the Morphological Scale", shows how some forms are derivations of other forms. To give an example, in the Morphological Scale the word تساءل [tasaʔala] "wondered 3rd SG MASC" is derived from the tripartite verb root سأل [sʔl][2] "asked". McCarthy (1981) used Arabic examples to demonstrate how such morphological phenomena occur to interested linguists, including speakers of languages with a morphology that is concatenative. McCarthy's (1981) approach to analyzing nonconcatenative morphology is useful to show how Kana words are derived in a nonlinear manner, indicating how several layers work together to produce the derived words.

In another attempt at explaining Arabic morphology, Eisele and Bisele (2002) show how the roots are related to their respective derivative forms using morphological rules. These morphological rules are parallel to the Arabic Morphological Scale in that they indicate patterns of derivation from roots. To give an example, it is clear to see how the root [saʔala] is related to [jatasaʔalun] by considering the following morphological rule.

$$CvCvCv \rightarrow jataCvCvCv$$

Notice how morphemes such as [ja] and [ta] add elements to the word. In this specific example, the elements are inflectional [3]. The Eisele and Bisele (2002) approach helps to show how the root elements are dispersed within the derived words and how inflectional morphemes go with the root.

The nonconcatenative integration of Arabic morphemes into the root has been a subject of investigation for decades. In the 1980s and 1990s, respectively, Koskenniemi (1983) and Ratcliffe (1990) observed that Arabic verbs are formed on two different levels: the level of infixation, and the level of prefixation/suffixation. For example, the root [kataba] becomes [jaktubu] to indicate the singular second-person present tense, using the combination of vowels [CaCCuCu]. It then becomes [sajaktubu:na] to indicate the future tense, using the suffix [sa-], and the sound masculine plural, using the prefix [-una].

Dendane (2007) attempted to describe the Arabic inflectional and derivational verb system by arguing that one form transforms into another as a chain of derivations/inflections that result in the surface form. This opposes the idea that verbs have one root and all surface forms are transformed directly from the root. Dendane (2007) proposes a second approach that associates affixes with changes in mood, tense, person, number, and gender. Consider the following examples.

The chain morphology:

$$ktb \rightarrow jaktubu \rightarrow uktub$$

The direct morphology:

ktb

jaktubu   uktub

After some researchers noted the difference between regular infixation and the affixation of Arabic verbs, Kaye (2003) distinguished between infixation and transfixation. Kaye explained that both types of affixation interrupt the root of a verb, but they differ in the following way: infixes are inserted within the root without breaking apart, while transfixes split the root and enclose it within their structure.

Kana words have intrigued scholars for centuries. Recently, they have been reclassified as pseudo-verbs (Abd Almawgood, 2019) rather than true verbs (Alsayid, 1990). Previously, they were considered verbs for three reasons: they attach to pronoun markers (/t/,/a/,/w/), the feminine particle (/t/or/h/), and follow verb morphology—e.g. كان [kana] (past), يكون [jakun] (present), and كن [kun] (imperative) (Alanbari, 1886). While generally verb-like, ليس [laisa] is an exception, classified as a particle unless attached to pronouns (e.g. [laisat], [lasna], [lastum]) (Mohammad, 1998). Mohammad (1998) also notes they are incomplete verbs, modifying both the subject and predicate with specific vowel changes.

Furthermore, Bahloul (1993) demonstrates that the verb root [ktb] and tense are bound morphemes, as they do not occur independently from one another. The author illustrates this as below (Bahloul, 1993, p. 215).

a. ktb + -a-a-a -------> kataba   "He wrote."
          | |
     'write' 'perfect active'
b. ktb + ya-u-u ------> yaktubu   "He writes/is writing."
          | |
        'write' 'imperfect active'

The perfective morphemes [-a-a-a] and [ya-u-u] are nonconcatenatively added to the root to form perfect and imperfect active verbs (Bahloul, 1993). While Bahloul (1993) discusses the Arabic copula, including Kana words, the analysis lacks examples showing their internal structure.

Kana was also concluded to be a verb as it is parallel to both state and action verbs in Arabic. In this case, the first argument in the sentence is equivalent to the subject of the verb, and the second argument after the verb is equivalent to the object of the verb, as indicated by their endings (Hindawi, 1992).

Kana was also found to add the extended duration aspect (Salem, 2009). Consider the following sentence.

3.   كان الأكل لذيذا.

Kana	alʔaklu	laðiðan
Was	DEF-food	delicious

The food was delicious.

In Sentence 3, an extended experience of tasting delicious food was denoted by adding the word [kana].

Fasha (2017) found Kana to belong to an Arabic declension system that affects the case of nouns and the mood of verbs. Consider the following sentences.

4.   كانت السماء تمطر

Kanat	is:amaʕu	mumTiratan
Was	DEF-sky	rainy

The sky was raining.

5.   كان يلعب بالكرة

Kana	jalʕabu	bilkurati
Was	playing	with-ball

(He) was playing with the ball.

Sentence 4 exemplifies the use of Kana to modify the mood of the nominative case of the noun [is:amaʕu] "the sky". Sentence 5 represents how [kana] affects the actual (realis) mood of the verb [jalʕabu] "playing".

Adding Kana changes the case ending of a sentence. This case ending change represents the change from nominative, without [Kana], to accusative when [kana] is added (Shaalan, 2005). Consider Sentences 6 and 7.

6.   كان المعلمون مجتهدين

Kana	almuʕalimun	muʒtahidina
were	DEF-teachers	diligent (ACC)

The teachers were diligent.

7.   *كان المعلمون مجتهدون

Kana	almuʕalimun	muʒtahiduna
were	DEF-teachers	diligent (NOM)

The teachers were diligent.

Notice how keeping the nominative case ending after adding [kana], as in Sentence 9, results in an incorrect sentence.

Kana words are also considered pseudo verbs (Habash *et al*., 2019), based on the fact that they work as overt copulas that govern both the topic and complement. The topic is always nominal while the predicate, or the compliment, can be a verbal clause, a nominal predicate, or a prepositional predicate. A verbal clause, a nominal predicate, and a prepositional predicate are given respectively in the examples below.

8.   كانت سارة تخيط الثوب.

kanat	saratu	taxiTu	uth:awba
was-FEM	Sara	sew-FEM-SG-PROG	DEF-dress

Sara was sewing the dress.

9.   كانت سارة خياطة.

kanat	saratu	xajaTatan
was-FEM	Sara	tailor-FEM

Sara was a tailor.

10.   كانت سارة في المشغل.

kanat	saratu	fi	ilmaʃʁali
was-FEM	Sara	in	DEF-workshop

Sara was in the workshop.

Notice that Kana and the subject are the same in the three structures.

There are three ways to indicate aspects in different Arabic dialects – i.e. using adverbs, context, or Kana words – and the latter method is neglected when conducting research. This exclusion of Kana words is due to these verbs highlighting the mood of the predicate more than the aspectual meaning of the action or state.

AlShihry (2017) illustrates that Kana words can be durative when expressing a habit that does not indicate location. Compare Sentence 11, expressing location, with Sentence 12, expressing a habit.

كان الولد في البيت .11

Kana	alwaladu	fi	ilbait
Was	DEF-boy-SG	in	DEF-house

The boy was in the house.

كان الولد يلعب بالكرة كل صباح .12

Kana	alwaladu	jalʕabu	bilkurati	kul:a	Sabaħ
Was	DEF-boy-SG	play-3rdSG	with-ball	every	morning

The boy used to play ball every morning.

When a Kana word and verb exist together in one sentence, a compound tense is created. Different meanings are produced by using different forms of the verb following Kana. For example, the imperfective verb adds the habitual, or past habitual aspect. In such cases, the imperfective carries the grammatical aspect while Kana carries the tense meaning (AlShihry, 2017). Reconsider Sentence 12.

Using [kana] adds the past tense to the perfective aspect denoted by [qad]. Without [kana], [qad] indicates the perfective aspect in the present tense (Eifan, 2017). Compare Examples 13 and 14.

أنا قد قلت لك دا الشي من قبل .13

Ana	gid	gultal:ak	daʃaj	min	gabl
I	PFV	say-1stSG-to you2ndSG	this-thing	since	before

I have already said this to you before.

كان قد راح قبل ما نوصل هناك .14

Kan	gid	raħ	gablma	nuSal	hinak
Kana	PFV	went-3rdSG	before-that	arrive-1stPL	there

He had already gone before we got there.

As Kana was claimed to be a copula, Chatar-Moumni (2011) found it to be a connective verb; that is, syntactically a full verb although it is semantically weak. Kana was concluded to be a bivalent verb that requires two essential arguments, the subject and its attribute, as in Sentence 15. The second argument in the sentence can be substituted with a verbal phrase, as in Sentence 16.

كان المدير موظفاً .15

Kana	almudiru	muwaZafan
Was	DEF-manager-SG-MASC	employee-SG-MASC

The manager was an employee.

كانت السيدة تطبخ .16

Kanat	as:ajidatu	taTbuxu
Was-FEM	DEF-lady-SG	cook-PROG-SG-FEM

The lady was cooking.

The word [kana] has also been claimed to be a non-present tense copula where the first noun following it retains the nominative case marking, while the second word, the predicator, takes the accusative case marking. Consider Sentences 17 and 18.

.تخيط سارة الثوب 17.

taxiTu	saratu	ith:awba
sew-FEM-SG-PROG	Sara-NOM	DEF-dress-ACC

Sara sews the dress.

.كانت سارة خياطة 18.

kanat	saratu	xajaTatan
was-FEM	Sara-NOM	tailor-FEM-ACC

Sara was a tailor.

Since the first word after [kana] retains the case marking with or without [kana] in the sentence, [kana] has no effect on the nominative being the default case (Alsaeedi, 2015).

Alsaeedi (2015) also claims that [kana] was a full verb then grammaticalized, while the copula [huwa] was a demonstrative and then grammaticalized. This is concluded from the fact that when using [huwa] in place of [kana] when tense is present, there is no change in the case marking in the following two words. Consider Examples 19 and 20.

19. المدير يكون أباً
Almudiru   jakunu aban
DEF-manager be   father
The manager is being a father.

20. المدير هو أبٌ
Almudiru   huwa   abun
DEF-manager be   father
The manager is a father.

Kana is used as a copula verb in Arabic that is not required by the passive voice form, while the progressive aspect is unlikely to be used with [kana] (Smirkou and Smirkou 2018). Consider Examples 21 and 22.

21. كان الطلاب يلعبون بالكرة
Kana   alTul:a:bu   jalʕabun   bilkurati
were   DEF-students playing   with-ball
The teachers were diligent.

22. * كانت الكرة لعبت
Kanat   ilkuratu   luʕibat
was   DEF-ball   played
The ball was played.

Kana can come with another verb in a construction that does not happen with other verbs, as in Sentence 23.

23. كان يكتب القصيدة
Kana   jaktubu   ulqaSidah
Was   writing   DEF-poem
(he) Was writing a poem.

This behavior of Kana is taken as being a clue that it is a particle and not a verb (Abd Almawgood, 2019).

Previous research tackling the morphology of Kana words investigated some of the inflections of the words, basing conclusions on a list of several examples at best. This leaves a gap in the literature to be filled by a thorough investigation of the structural morphology of Kana words. This study considered the different structures of the non-compound 1st person indicative Kana words.

Methodology

The analysis in the present study started by collecting all the relevant tokens from searching a collection of 8,000 books written in Arabic. This collection is accessible through the Alshamela Library search engine. To limit the search to only the relevant data, the search was modified to include the books published in the last five decades. This is significant, as the present study focuses on MSA. All the results were considered for analysis of the morphological behavior of Kana words. Kana words consist of one or two words, but only one-word Kana words were investigated in this study; the two-word Kana words were excluded because they could introduce irrelevant results, as the search engine might consider the two

words as separate units in an expression. This could potentially result in a more expanded collection of tokens, many of which would be irrelevant to the research focus.

For each of the Kana words, 42 derived forms were investigated. These forms indicate the following.

(1) Person (first only)

(2) Gender (no gender distinction for the first person)

(3) Number (singular, and dual/plural)

(4) Tense (past, present, and future)

(5) Mood (indicative only)

When excluding the compound Kana words, the rest are eight one-word Kana words. One of them is the Kana word ليس [laisa] "not", which works as a negation particle. This word, ليس [laisa] "not", was also excluded as it does not show all the inflections and derivations that the others do and, hence, is not helpful in the current analysis. The remaining seven Kana words were the ones considered in the present study.

The attested structural behaviors of Kana words were represented using McCarthy's (1981) autosegmental representation to explain how Kana words are derived in a nonlinear way. Utilizing this approach is necessary for demonstrating how the different parts responsible for the derivation render the derived/inflected form in a nonconcatenative type of morphology. Each of the Kana words was also contrasted with a content verb containing the same vowel/ consonant combination, which is done to compare structure. Using Eisele and Bisele's (2002) derivation rules, the current study demonstrated Kana word derivations from the root. This is important for scalar demonstration which is the approach followed by Arabic grammarians as Eisele and Bisele (2002) indicate. Both McCarthy's (1981) and Eisele and Bisele (2002) approaches help identify the structural nonconcatenative patterns of the Kana words and allow an accessible comparison platform [4]. The sound symbols used in this study are based on the transcription conventions detailed in the charts provided in Appendix.

Analysis

This section demonstrated the morphological processes when inflecting Kana words and the similarities of those words to Arabic verbs. The analysis of Kana words included 42 tokens. This number resulted from three verb tenses and two grammatical numbers [5], as the dual and plural examples were matching, of the seven Kana words. The Kana words showed patterns that indicate differences and similarities; the differences were both internal and external [6], which reflects the nonconcatenative morphology of MSA.

One-word Kana words, of which there were seven in total, were compared to some similar verbs in MSA. Three of them were quadripartite and four were tripartite [7]. The first three verbs in the list below are the quadripartite and the last four are the tripartite verbs.

		word	Phonological transcription	meaning
Quadripartite verbs	1.	أصبح	ʔaSbaħa	is/become/remain
	2.	أضحى	ʔaDħa:	become (in the forenoon)
	3.	أمسى	ʔamsa:	become (in the evening)
Tripartite verbs	4.	بات	ba:ta	become (at night)
	5.	صار	Sa:ra	become
	6.	كان	ka:na	is/become
	7.	ظل	Zal:a	remain

The quadripartite verbs have the root phonemes in the onset and nucleus positions of the first and the third syllables, while the second syllable marks the first-person singular.

The past-tense first-person singular, both the masculine and feminine, of the quadripartite Kana words are derived by advancing the onset consonant of the third syllable to become the

coda of the second syllable, أصبحت [ʔaS.baħ.tu] "is/become/remain", or by adding the approximant [j] as the coda of the second syllable, as in أضحيتُ [ʔaD.ħaj.tu] "become (in the forenoon)" and أمسيتُ [ʔam.saj.tu] "become (in the evening)". In addition, one open syllable is added as a suffix to all three words to contribute to marking the first-person singular. See Table 1 and Rule (1).

$$\text{CVC\$CV(\$CV)} \rightarrow \text{CVC\$CVC\$CV} \qquad \text{Rule (1)}$$

The first-person singular masculine and feminine tripartite Kana words retain the onset, coda, and nucleus positions of the root phonemes. An exception to this is found with the geminate root ظلَّ [Zal.:a] "remain", which has an added syllable with an epenthetic vowel occupying the nucleus position of the second syllable and is surrounded by two consonants [l], representing the geminate members in Table 2. The first-person singular is marked using the suffix [-tu] in all forms of the Kana words considered.

The nongeminate root has two open syllables, becoming one closed and one open syllable when deriving the past-tense first-person singular for both the masculine and feminine form of the tripartite Kana words. The geminate root, on the other hand, consists of a closed and an open syllable, with the first and third syllables becoming open and the second syllable becoming closed. Consider Rule (2).

$$\text{CV}\{\alpha\text{\$CV}, \beta\text{C\$CV}\} \rightarrow \text{CV}\{\alpha\text{C\$CV}, \beta\text{\$CVC\$CV}\} \qquad \text{Rule (2)}$$

The present-tense quadripartite first-person singular masculine and feminine Kana words have the onset and nucleus of the first syllable, and the nucleus of the second syllable occurring only with the three-syllable word أصبح "is/become/remain" [ʔuS.bi.ħu] to mark the present tense.

Table 1. Morphology of the quadripartite past-tense first-person singular Kana words

first-person	Singular	Masculine and feminine	Past				ʔ	a	S	b	a	ħ				t	u	أصبحت	is/become/remain
							ʔ	a	D	ħ	a	j				t	u	أضحيتُ	become (in the forenoon)
							ʔ	a	m	s	a	j				t	u	أمسيتُ	become (in the evening)

Source(s): The author

Table 2. Morphology of the tripartite past-tense first-person singular Kana words

first-person	Singular	Masculine and feminine	Past				b	i	t			:	u	بتُّ	become (at night)
							S	i	r			t	u	صرت	become
							k	u	n			t	u	كنت	Is/become
							Z	a		l	a	l	t	u	ظللت	Remain

Source(s): The author

The last syllable, either second or third, marks the first-person singular. When the word has two syllables, the second has a lengthened vowel – as in the words أضحي [ʔuD.ħi:] "become (in the forenoon)" and أمسي [ʔum.si:] "become (in the evening)". Consider Table 3.

The quadripartite present-tense first-person singular Kana words are derived from the root by replacing the non-round vowel [a] in the first syllable nucleus position with a round one [u]. In addition, this particular derivation process involves replacing the vowels in the second-syllable nucleus position into a high-front vowel [i], and having a round vowel replace the nucleus of the third syllable of the word أصبح "is/become/remain" [ʔuS.bi.ħu] or lengthening the second syllable vowel of the words أضحي [ʔuD.ħi:] "become (in the forenoon)" and أمسي [ʔum.si:] "become (in the evening)". This implies that the quantity of syllables and constituents are retained after derivation while the quality of these changes. Consider Table 3 and Rule (3).

$$\text{CVC\$CV}(\alpha\text{\$CV}) \rightarrow \text{CVC\$CV}(\alpha\text{\$CV}) \qquad \text{Rule (3)}$$

A prefix is added to derive the present tense first-person singular masculine and feminine tripartite Kana words. This syllable has the glottal stop as its onset and the vowel [a] as its nucleus. This syllable participates in marking the past tense and the first-person singular. The round vowel [u] as the nucleus of the final syllable also participates in marking the first-person singular. The Kana word with the geminate root أظل [ʔa.Zal.:u] "remain" has a second closed syllable, while the other words do not. This results from the original root geminate phoneme being separated to form the coda of the second syllable and the onset of the third in the derived form. Consider Table 4.

The tripartite Kana words change from having two syllables to three when deriving the present tense first-person singular. Consider Rule (4).

Table 3. Morphology of the quadripartite present-tense first-person singular Kana words

first-person	Singular	Masculine and feminine	present		ʔ	u	S	b	i				ħ	u			أصبح	is/become/remain
					ʔ	u	D						ħ	i	:		أضحي	become (in the forenoon)
					ʔ	u	m						s	i	:		أمسي	become (in the evening)

Source(s): The author

Table 4. Morphology of the tripartite present-tense first-person singular Kana words

first-person	Singular	Masculine and feminine	present		ʔ	a	b	i	:			t	u			أبيث	become (at night)
					ʔ	a	S	i	:			r	u			أصير	become
					ʔ	a	k	u	:			n	u			أكون	Is/become
					ʔ	a	Z	a	l			:	u			أظل	Remain

Source(s): The author

$$\text{CV}\{\$\text{CV}, \text{C}\$\text{CV}\} \rightarrow \text{CV}\$\text{CV}\{\text{V}, \text{C}\}\$\text{CV} \qquad \text{Rule (4)}$$

The future-tense tripartite and quadripartite first-person singular masculine and feminine Kana words are similar to the present-tense tripartite and quadripartite first-person singular masculine and feminine words. The only difference between them is an added prefix [sa-] to indicate the future tense, which is the future marker in all the considered forms in the present paper. Consider Tables 5 and 6 and Rules (5) and (6).

$$\text{CVC}\$\text{CV}(\alpha\$\text{CV}) \rightarrow \text{CV}\$\text{CVC}\$\text{CV}(\alpha\$\text{CV}) \qquad \text{Rule (5)}$$

$$\text{CV}\{\$\text{CV}, \text{C}\$\text{CV}\} \rightarrow \text{CV}\$\text{CV}\$\text{CV}\{\text{V}, \text{C}\}\$\text{CV} \qquad \text{Rule (6)}$$

The past-tense tripartite and quadripartite first-person plural Kana words are phonetically similar to the past-tense tripartite and quadripartite first-person singular Kana words. As for the plural derivations, the last vowel is lengthened. Compare Tables 7 and 8 with Tables (1) and (2).

The derivation process of the past tense tripartite and quadripartite first-person plural of the feminine and masculine words is identical to the derivation process of the past-tense tripartite and quadripartite first-person singular, feminine and masculine; the only difference is the lengthened vowel at the end of the plural masculine word. Compare Rules (7) and (1) and Rules (8) and (2).

$$\text{CVC}\$\text{CV}(\$\text{CV}) \rightarrow \text{CVC}\$\text{CVC}\$\text{CVV} \qquad \text{Rule (7)}$$

$$\text{CV}\{\alpha\$\text{CV}, \beta\text{C}\$\text{CV}\} \rightarrow \text{CV}\{\alpha\text{C}\$\text{CV}, \beta\$\text{CVC}\$\text{CV}\}\text{V} \qquad \text{Rule (8)}$$

Table 5. Morphology of the quadripartite future-tense first-person singular Kana words

				s	a	ʔ	u	S	b	i					ħ	u		سأصبح	is/become/remain
first-person	Singular	Masculine and feminine	future	s	a	ʔ	u	D							ħ	i	:	سأضحي	become (in the forenoon)
				s	a	ʔ	u	m							s	i	:	سأمسي	become (in the evening)

Source(s): The author

Table 6. Morphology of the tripartite future-tense first-person singular Kana words

				s	a	ʔ	a	b	i	:				t	u		سأبيت	become (at night)
first-person	Singular	Masculine and feminine	future	s	a	ʔ	a	S	i	:				r	u		سأصير	become
				s	a	ʔ	a	k	u	:				n	u		ساكون	Is/become
				s	a	ʔ	a	Z	a	l			:	u			سأظل	Remain

Source(s): The author

Table 7. Morphology of the quadripartite past-tense first-person plural Kana words

first-person	plural	Masculine and feminine	Past				ʔ	a	S	b	a	ħ				n	a	:	أصبحنا	is/become/remain
							ʔ	a	D	ħ	a	j				n	a	:	أضحينا	become (in the forenoon)
							ʔ	a	m	s	a	j				n	a	:	أمسينا	become (in the evening)

Source(s): The author

Table 8. Morphology of the tripartite past-tense first-person plural Kana words

first-person	plural	Masculine and feminine	Past			b	i	t				n	a	:	بتنا	become (at night)
						S	i	r				n	a	:	صرنا	become
						k	u	n		:	a	:	كنّا	Is/become
						Z	a	l	a	l	n	a	:	ظللنا	Remain

Source(s): The author

The first-person plural present quadripartite Kana word derivation processes are evident in the onset and nucleus positions of the first syllable, and the nucleus of the second syllable only with the three-syllable word نصبح "is/become/remain" [nuS.bi.ħu] to mark the present tense. The first and last syllable together mark the first-person plural. Alternatively, with two-syllable words, the second syllable has a lengthened vowel, as in the words نضحي [nuD.ħi:] "become (in the forenoon)" and نمسي [num.si:] "become (in the evening)". Consider Table 9.

A prefix is added to derive the present tense first-person singular tripartite Kana words. This prefix is an open syllable that has the glottal stop as its onset and the vowel [a] as its nucleus. This syllable contributes to indicating the present tense and the first-person plural. The round vowel [u] as the nucleus of the final syllable also participates in marking the first-person plural. The Kana word with the geminate root نظل [na.Zal.:u] "remain has a second closed syllable, while the other words do not. This results from the original geminates in the root being separated as the coda of the second syllable and the onset of the third. Consider Table 10.

Table 9. Morphology of the quadripartite present-tense first-person plural Kana words

first-person	plural	masculine and feminine	Present			n	u	S	b	i				ħ	u		نصبح	is/become/remain
						n	u	D						ħ	i	:	نضحي	become (in the forenoon)
						n	u	m						s	i	:	نمسي	become (in the evening)

Source(s): The author

Table 10. Morphology of the quadripartite present-tense first-person plural Kana words

first-person	plural	Masculine and feminine	Present		n	a	b	i	:				t	u		نبيت	become (at night)
					n	a	S	i	:				r	u		نصير	become
					n	a	k	u	:				n	u		نكونُ	Is/become
					n	a	Z	a	l				:	u		نظل	Remain

Source(s): The author

The future forms of the first-person plural quadripartite and tripartite Kana words are derived by adding the prefix [sa-] to the present form. This is the same as deriving the future forms of the first-person singular quadripartite and tripartite Kana words. Consider Tables (11) and 12 and compare them to Tables 9 and 10.

Rules (9)–(12) are identical to Rules (3)–(6), respectively, which indicates the same morphological derivations of the present and future tenses of first-person plural quadripartite and tripartite Kana words with those of the present and future tenses of first-person singular quadripartite and tripartite Kana words.

$$\text{CVC\$CV}(\alpha\text{\$CV}) \rightarrow \text{CVC\$CV}(\alpha\text{\$CV}) \qquad \text{Rule (9)}$$

$$\text{CV}\{\text{\$CV}, \text{C\$CV}\} \rightarrow \text{CV\$CV}\{\text{V}, \text{C}\}\text{\$CV} \qquad \text{Rule (10)}$$

Table 11. Morphology of the quadripartite future-tense first-person plural Kana words

first-person	Plural	Masculine and feminine	future	s	a	n	u	S	b	i				h	u		سنصيح	is/become/remain
				s	a	n	u	D						h	i	:	سنضحي	become (in the forenoon)
				s	a	n	u	m						s	i	:	سنمسي	become (in the evening)

Source(s): The author

Table 12. Morphology of the tripartite future-tense first-person plural Kana words

first-person	Plural	Masculine and feminine	future	s	a	n	a	b	i	:				t	u		سنبيت	become (at night)
				s	a	n	a	S	i	:				r	u		سنصير	become
				s	a	n	a	k	u	:				n	u		سنكون	Is/become
				s	a	n	a	Z	a	l				:	u		سنظل	Remain

Source(s): The author

$$\text{CVC\$CV}(\alpha\text{\$CV}) \rightarrow \text{CVCVC\$CV}(\alpha\text{\$CV}) \qquad \text{Rule (11)}$$

$$\text{CV}\{\text{\$CV}, \text{C\$CV}\} \rightarrow \text{CVCV\$CV}\{\text{V}, \text{C}\}\text{\$CV} \qquad \text{Rule (12)}$$

The past tense first-person dual masculine and feminine quadripartite Kana words are phonetically identical to the past tense first-person dual masculine Kana words. However, the same suffix [-na:] functions as the first-person quadripartite plural and dual masculine and feminine Kana words, marking the morphological feature thereof. Compare Tables 7 and 13.

The past tense first-person dual masculine and feminine tripartite Kana words are also phonetically identical to the past tense first-person plural masculine Kana words. Notice that the suffix [-na:] is used for different functions in these different forms. Compare Tables (8) and 14.

The past tense first-person dual masculine and feminine quadripartite Kana words are derived by closing the second syllable and adding an open syllable with a lengthened vowel, or just lengthening the third syllable with the three-syllable word أصبحنا [ʔaS.baħ.na:] "is/become/remain". Consider Table (13) and Rule (13).

$$\text{CVC\$CV}(\text{\$CV}) \rightarrow \text{CVC\$CVC\$CVV} \qquad \text{Rule (13)}$$

The past tense first-person dual masculine and feminine tripartite Kana words are derived by closing the first syllable with the nongeminate root word, or by adding a vowel and a consonant in the nucleus and coda positions, respectively, of the second syllable and lengthening the third syllable. See Table (14) and Rule (14).

Table 13. Morphology of the quadripartite past-tense first-person dual Kana words

Source(s): The author

Table 14. Morphology of the tripartite past-tense first-person dual Kana words

Source(s): The author

$$CV\{\alpha\$CV, \beta C\$CV\} \rightarrow CV\{\alpha C\$CV, \beta\$CVC\$CV\}V \qquad \text{Rule (14)}$$

The present tense quadripartite first-person dual masculine and feminine Kana words are derived by replacing the glottal stop in the root with the prefix [nu-] in all the quadripartite Kana words, and adding the vowels [i] and [u] in the nucleus positions of the second and third syllables, respectively, of نصبح [nuS.bi.ħu] "is/become/remain", and adding the lengthened vowel [i] in the nucleus position of the second syllable of the quadripartite Kana words نضحي [nuD.ħi:] "become (in the forenoon)" نمسي [num.si:] "become (in the evening)". See Table 15 and Rule (15).

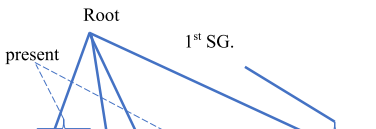$$CVC\$CV(\alpha\$CV) \rightarrow CVC\$CV(\alpha\$CV) \qquad \text{Rule (15)}$$

The present tense tripartite first-person dual masculine and feminine Kana words are derived by adding the prefix [na-] as the first syllable and ending the word with the vowel [u] in the nucleus position of the third syllable. Lengthening patterns in the roots are retained in the derived forms. The lengthened vowel existing originally as the nucleus of the first syllable in the root, is retained in the derived form, as in the words نبيت [na.bi:.tu] "become (at night)", نصير [na.Si:.ru] "become", and نكونُ [na.ku:.nu] "become". On the other hand, the geminate [l] sound that occupies the coda position of the first syllable and the onset of the second in the root ظل [Zal.:a] "remain", occupies the coda position of the second syllable and the onset of the third syllable. Consider Table 16 and Rule (16) (see Table 18).

$$CV\{\$CV, C\$CV\} \rightarrow CV\$CV\{V, C\}\$CV \qquad \text{Rule (16)}$$
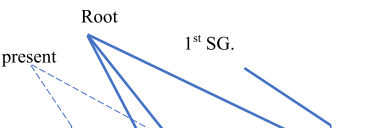
Table 15. Morphology of the quadripartite present-tense first-person dual Kana words

first-person	Dual	Present		n	u	S	b	i					ħ	u		نصبح	is/become/remain
first-person	Dual	Present		n	u	D							ħ	i	:	نضحي	become (in the forenoon)
first-person	Dual	Present		n	u	m							s	i	:	نمسي	become (in the evening)

Source(s): The author

Table 16. Morphology of the tripartite present-tense first-person dual Kana words

first-person	Dual	Present		n	a	b	i	:				t	u	نبيت	become (at night)
first-person	Dual	Present		n	a	S	i	:				r	u	نصير	become
first-person	Dual	Present		n	a	k	u	:				n	u	نكونُ	become
first-person	Dual	Present		n	a	Z	a	l				:	u	نظل	Remain

Geminate Root

Source(s): The author

Table 17. Morphology of the quadripartite future-tense first-person dual Kana words

first-person	Dual	Masculine and feminine	future	s	a	n	u	S	b	i				ħ	u		سنصبح	is/become/remain
				s	a	n	u	D						h	i	:	سنضحي	become (in the forenoon)
				s	a	n	u	m						s	i	:	سنمسي	become (in the evening)

Source(s): The author

Table 18. Morphology of the tripartite future-tense first-person dual Kana words

first-person	Dual	Masculine and feminine	future	s	a	n	a	b	i	:			t	u		سنبيت	become (at night)
				s	a	n	a	S	i	:			r	u		سنصير	become
				s	a	n	a	k	u	:			n	u		سنكون	Is/become
				s	a	n	a	Z	a	l		:	u			سنظل	Remain

Source(s): The author

The future tense quadripartite and tripartite first-person dual masculine and feminine Kana words are identical to the future quadripartite and tripartite first-person plural masculine words, respectively. They are also similar to the present quadripartite and tripartite first-person dual masculine and feminine Kana words with the addition of the prefix [sa-], which marks the future tense for all considered forms in the present paper. Consider Tables and Rules (17) and (18) and compare them to Tables and Rules (11) and (12), respectively.

$$CVC\$CV(\alpha\$CV) \rightarrow CV\$CVC\$CV(\alpha\$CV) \qquad \text{Rule (17)}$$

$$CV\{\$CV, C\$CV\} \rightarrow CV\$CV\$CV\{V, C\}\$CV \qquad \text{Rule (18)}$$

Due to the nonconcatenative nature of MSA, the morphemes indicating tense, number, and person are interwoven within the root of the Kana words, except for the future tense morpheme [sa-], which is suffixed to the equivalent present tense Kana verb. Compare the following examples.

	FIRST-PERSON PRESENT			*FIRST-PERSON FUTURE*		
PLURAL	نبيت	*na.biː.tu*	'become (at night)'	سنبيت	*sa.na.biː.tu*	'become (at night)'
DUAL	نظل	*na.Zal.ːu*	'Remain'	سنظل	*sa.na.Zal.ːu*	'Remain'
SINGULAR	أصير	*ʔa.Siː.ru*	'become'	سأصير	*sa.ʔa.Siː.ru*	'become'

This morphological process is represented by the following Rule.

PRE to FUT derivation

$$CV(C)CV(C)CV \rightarrow saCV(C)CV(C)CV \qquad \text{Rule (19)}$$

The grammatical gender markers are not distinctive for the first-person Kana words. The dual and plural numbers are also not distinctive for the first-person Kana words.

As for morphemes marking other aspects of the verb, some patterns where morphemes participate in representing some aspects of the verbs were found. For example, the first phoneme [ʔ] of the quadripartite first person singular present tense Kana word is part of the root and participates in marking the present tense, while the first phoneme [n] in the quadripartite first person plural present tense Kana word is also marking the present.

Compare أصبح [ʔuS.bi.ħu] and نُصبح [nuS.bi.ħu] "is/become/remain", both the singular and plural. Another phoneme that participates in marking the present is the vowel [u] occupying the coda position of the first syllable. A third participant is the vowel [i] in the nucleus position of the second syllable in the three-syllable word أصبح [ʔuS.bi.ħu] and نُصبح [nuS.bi.ħu] "is/become/remain", both the singular and plural.

The combination of plural/dual and present/future requires the nasal [n] in the onset position of the first syllable of the present tense and the second of the future tense. This can be seen in نصبح [nuS.bi.ħu] is/become/remain (first person plural masculine and feminine present tense) and سنصبح [sa.nuS.bi.ħu] is/become/remain (first person plural masculine and feminine future tense), for example.

With the exception of the past tense tripartite verbs, the first syllable nucleus of the past and present tenses, as well as the first syllable following the future tense prefix, was occupied by either [a] or [u]. The [a] vowel indicates a single morpheme derivation, either as part of the root or as an additional morpheme. In contrast, the [u] vowel indicates a two-morpheme derivation. This is evident when comparing a quadripartite without a prefix, a quadripartite with a prefix, a tripartite with a prefix, and a tripartite without a prefix. When the future prefix [sa-] is there, the vowel [u] is used for the quadripartite, and the vowel [a] is used for the tripartite. When the root is used as the initial syllable, the vowel [a] is used for the quadripartite. Consider Table 19.

Notice how with the Kana word أصبح [ʔuS.bi.ħu] is/become/remain and its derivatives, [a] is used for the past tense, while nothing is added for bit.:u بِتُّ "become (at night)", since this

Table 19. Illustration of the first syllable alternating vowels, [a] or [u] in Kana words

													Arabic	Gloss
first-person	Singular	Past			?	a	S	b	a	ħ	t	u		أصبحت	is/become/remain
	Singular	present			?	u	S	b	i		ħ	u		أصبح	is/become/remain
	Singular	future	s	a	?	u	S	b	i		ħ	u		أصبح	is/become/remain
	Dual and plural	Past			?	a	S	b	a	ħ	n	a	:	أصبحنا	is/become/remain
	Dual and plural	Present			n	u	S	b	i		ħ	u		نصبح	is/become/remain
	Dual and plural	future	s	a	n	u	S	b	i		ħ	u		سنصبح	is/become/remain
	Singular	Past						b	i	t	:	u		بتُّ	become (at night)
	Singular	present			?	a		b	i	:	t	u		أبيتُ	become (at night)
	Singular	future	s	a	?	a		b	i	:	t	u		سأبيتُ	become (at night)
	Dual and plural	Past						b	i	t	n	a	:	بتنا	become (at night)
	Dual and plural	Present			n	a		b	i	:	t	u		نبيت	become (at night)
	Dual and plural	future	s	a	n	a		b	i	:	t	u		سنبيتُ	become (at night)

Source(s): The author

vowel is part of the root. However, when the present/future morpheme is added, the [a] becomes [u] in أصبح [ʔuS.bi.ħu] "is/become/remain" and only [a] is added in bit.:u بتَّ "become (at night)".

An added sound as the onset of the first-person present and future tense Kana words, in the first syllable of the present tense and second syllable of the future tense, was found to be a glottal stop [ʔ] or a nasal [n]. Although there is also a glottal stop [ʔ] in the onset of the first syllable with the quadripartite past tense Kana words, this is part of the root [8]. The glottal stop participates in indicating the singular and the nasal participates in indicating the plural and dual. See Table 20.

The endings of the Kana words are mostly [u], except for the dual and plural past tense and when the root ends in a vowel, i.e. أضحي [ʔuD.ħi:] "become (in the forenoon)" and أمسي [ʔum.si:] "become (in the evening)". The [-a:#] ending represents tense and number while the [-i:] ending reflects the phonotactic of Arabic. Consider Rule (20).

$$u\# \rightarrow i : \#/\#CVC\$C\_\#$$

Rule (20)

Notice that an epenthetic vowel is usually placed at the end of the words that do not end with a vowel when followed by another word. Such a vowel is not original in the root and hence, differs from the one that ends the Kana words represented by Rule (20).

In addition to the [u] marker alone, the singular past tense Kana words end with [-tu], as in أضحيتُ [ʔaD.ħaj.tu] "become (in the forenoon)" and ظللت [Za.lal.tu] "remain". What's more, the past tense dual and plural first-person Kana words end with [-na:], as in أصبحنا [ʔaS.baħ.na:] "is/ become/remain" and صرنا [Sir.na:] "become". This means that the endings [u], [tu], and [na:] participate in marking the first person generally, while the endings [tu] and [na:] contribute to marking the singular and plural past tense first-person Kana words, respectively.

Notice also that when the last sound in the root is the same as the first sound of the added morpheme, a gemination environment is created. This occurs without following the epenthesis rule, which states that consonant clusters can be separated by an epenthetic vowel, as in the past tense Kana words: بتَّ [bit.:u] "become (at night)", كنَّا [kun.:a:] "is/become".

Other variations in the first-person Kana words are realized internally. Consider Table 21.

Kana words do not contain consonant clusters. Their syllables have consonant onsets and are open unless a consonant cluster is potentially following. In that case, the syllable is closed to prevent such a cluster. Consider Tables 22 and 23.

The double vertical lines indicate the syllable boundary, meaning the [ħ] sound is at the onset of the third syllable in the first example, and the coda in the second example of the أصبح [ʔaS.ba.ħa] "is/become/remain" verbs. The [l] sound is the coda of the first example and the onset of the second example in the ظلَّ [Zal.:a] "remain" verbs.

Table 20. Inflectional glottal stop and nasal alternations in Kana words

first-person	Singular	Past			ʔ	a	m	s	a	j	t	u	أمسيتُ	become (in the evening)
	Singular	Past						k	u	n	t	u	كنت	Is/become
	Singular	present			ʔ	u	m				s	i	:	أمسي	become (in the evening)
	Singular	present			ʔ	a		k	u	:	n	u	أكون	Is/become
	Singular	future	s	a	ʔ	u	m				s	i	:	سأمسي	become (in the evening)
	Singular	future	s	a	ʔ	a		k	u	:	n	u	سأكون	Is/become
	Dual and plural	Past			ʔ	a	m	s	a	j	n	a	:	أمسينا	become (in the evening)
	Dual and plural	Past						k	u	n	:	a	:	كنَّا	Is/become
	Dual and plural	Present			n	u	m				s	i	:	نمسي	become (in the evening)
	Dual and plural	Present			n	a		k	u	:	n	u	نكونُ	Is/become
	Dual and plural	future	s	a	n	u	m				s	i	:	سنمسي	become (in the evening)
	Dual and plural	future	s	a	n	a		k	u	:	n	u	سنكون	Is/become

Source(s): The author

Table 21. Internal realizations of variations in the first-person Kana words

first-person	Number	Tense	1	2	3	4	5	6	7	8	9	10	11	12	13	Arabic	Meaning
first-person	Singular	Past			ʔ	a	S	b	a	ħ			t	u		أصبحت	is/become/remain
					ʔ	a	D	ħ	a	j			t	u		أضحيتُ	become (in the forenoon)
					ʔ	a	m	s	a	j			t	u		أمسيتُ	become (in the evening)
first-person	Singular	Past						b	i	t			:	u		بتُّ	become (at night)
							S	i	r				t	u		صرت	become
							k	u	n				t	u		كنت	Is/become
							Z	a		l	a	l	t	u		ظللت	Remain
first-person	Singular	present			ʔ	u	S	b	i				ħ	u		أصبح	is/become/remain
					ʔ	u	D						ħ	i	:	أضحي	become (in the forenoon)
					ʔ	u	m						s	i	:	أمسي	become (in the evening)
first-person	Singular	present			ʔ	a		b	i	:			t	u		أبيتُ	become (at night)
					ʔ	a		S	i	:			r	u		أصير	become
					ʔ	a		k	u	:			n	u		أكون	Is/become
					ʔ	a		Z	a	l			:	u		أظل	Remain
first-person	Singular	future	s	a	ʔ	u	S	b	i				ħ	u		أصبح	is/become/remain
			s	a	ʔ	u	D						ħ	i	:	أضحي	become (in the forenoon)
			s	a	ʔ	u	m						s	i	:	أمسي	become (in the evening)
first-person	Singular	future	s	a	ʔ	a		b	i	:			t	u		سأبيتُ	become (at night)
			s	a	ʔ	a		S	i	:			r	u		ساصير	become
			s	a	ʔ	a		k	u	:			n	u		ساكون	Is/become
			s	a	ʔ	a		Z	a	l			:	u		ساظل	Remain
first-person	Dual/plural	Past			ʔ	a	S	b	a	ħ			n	a	:	أصبحنا	is/become/remain
					ʔ	a	D	ħ	a	j			n	a	:	أضحينا	become (in the forenoon)
					ʔ	a	m	s	a	j			n	a	:	أمسينا	become (in the evening)
first-person	Dual/plural	Past						b	i	t			n	a	:	بتنا	become (at night)
							S	i	r				n	a	:	صرنا	become
							k	u	n				:	a	:	كنّا	Is/become
							Z	a		l	a	l	n	a	:	ظللنا	Remain
first-person	Dual/plural	Present			n	u	S	b	i				ħ	u		نصبح	is/become/remain
					n	u	D						ħ	i	:	نضحي	become (in the forenoon)
					n	u	m						s	i	:	نمسي	become (in the evening)
first-person	Dual/plural	Present			n	a		b	i	:			t	u		نبيت	become (at night)
					n	a		S	i	:			r	u		نصير	become
					n	a		k	u	:			n	u		نكونُ	Is/become
					n	a		Z	a	l			:	u		نظل	Remain
first-person	Dual/plural	future	s	a	n	u	S	b	i				ħ	u		سنصبح	is/become/remain
			s	a	n	u	D						ħ	i	:	سنضحي	become (in the forenoon)
			s	a	n	u	m						s	i	:	سنمسي	become (in the evening)
first-person	Dual/plural	future	s	a	n	a		b	i	:			t	u		سنبيتُ	become (at night)
			s	a	n	a		S	i	:			r	u		سنصير	become
			s	a	n	a		k	u	:			n	u		سنكون	Is/become
			s	a	n	a		Z	a	l			:	u		سنظل	Remain

Source(s): The author

Table 22. [aSbaħa] examples of open and closed syllable alternation to prevent consonant clusters

first-person	Number	Tense	1	2	3	4	5	6	7	8	11	12	13	Arabic	Meaning
first-person	Singular	present			ʔ	u	S	b	i		ħ	u		أصبح	is/become/remain
first-person	Dual/plural	Past			ʔ	a	S	b	a	ħ	n	a	:	أصبحنا	is/become/remain

Source(s): The author

Table 23. [Zal:a] examples of open and closed syllable alternation to prevent consonant clusters

first-person	Dual/plural	Future	s	a	n	a	Z	a	l			:	u	سنظل	Remain
first-person	Singular	past					Z	a	l	a	l	t	u	ظللت	Remain

Source(s): The author

These variations depend on whether the root is combined with the person, number, or tense morphemes in a concatenative language such as Arabic.

This section primarily focuses on the structure and morphemes of several Kana words, with an emphasis on the first-person forms. Such a focus allows for a more detailed analysis while setting the stage for subsequent research that could extend the investigation to the remaining grammatical persons of these words.

Discussion

Previous research has analyzed Kana words from different perspectives. Alanbari (1886), Bahloul (1993), and Mohammad (1998), for example, addressed morphological structures, while Hindawi (1992), Shaalan (2005), and Fasha (2017) considered Kana words from a syntactic perspective. Salem (2009), AlShihry (2017), and Alsaeedi (2015) looked at the aspectual components of Kana words. Various researchers have examined the lexical features of Kana words claimed to be carriers of tense, being connective verbs, copula verbs, and particles (Eifan, 2017; Chatar-Moumni, 2011; Smirkou and Smirkou, 2018; Abd Almawgood, 2019). However, Kana words were not investigated thoroughly, taking into consideration their variants. When considering each of the Kana words individually, the root segments were found to be interwoven with the inflectional and derivational segments. For example, the root [ʔamsa], which consists of the root segments [ʔ,m,a] becomes [sanumsi:] to derive the first-person dual and plural future tense version of the word. This makes it evident that Kana words are structured according to the nonconcatenative morphology of MSA.

Transfixation, which according to Kaye (2003), is a morphological process associated with Arabic, was found to be used with Kana words – compare [ʔamsa] with [sanumsi:]. Nevertheless, transfixation was not the only process that the first-person Kana words underwent; prefixation was also evident, though with very limited application. The prefixation identified in the present study was the prefix [sa-], which indicates the future tense. This conclusion is based on there being no variation between the variants affecting the future tense prefix – in other words, all the future variants began with the exact same prefix: [sa-].

Based on a strict and thorough morphological analysis, Kana words were found to be structured as verbs, which matches the findings of previous research (Alanbari, 1886; Bahloul, 1993; Mohammad, 1998). Table 24 compares each Kana word with an equivalent verb in MSA.

The morphology of Kana words is very similar to the morphology of verbs in MSA. Notice how each of the Kana words matches the corresponding verb in all phonemes except for the root phonemes, which indicate the root meaning. This is the case with all the numbers and tenses considered. For example, the first-person dual/plural past tense Kana word أصبح [ʔaSbaħa] "is/become/remain" and the normal verb أصلح [ʔaSlaħa] "fix" are minimal pairs containing the phonemes [b] and [l], respectively. This minimal pair was found with these phoneme patterns across all the first-person derivations – see Table (24). Another minimal pair example is [Sara] and [Tara], which also show the same minimal pair patterns across all derivations, as seen in Table (24). As with some Kana word/verb pairs, the correspondence relation is of a near-minimal pair, since there are no examples of pairs with one phoneme difference. Such a gap is expected to be found in languages. For example, [bata] and [xaTa] are different in the consonants [b, t] compared to [x, T], respectively. Nevertheless, the derivational structures of those pairs were found to be matching.

Table 24. Summary of the morphology of Kana words juxtaposed with their equivalent verbs in Arabic

Person	Number	Tense														Arabic	Meaning
first-person	Singular	Past			ʔ	a	S	b	a	ħ				t	u		أصبحت	is/become/remain
					ʔ	a	S	l	a	ħ				t	u		أصلحت	fix
					ʔ	a	D	ħ	a	j				t	u		أضحيت	become (in the forenoon)
					ʔ	a	ʕ	T	a	j				t	u		أعطيت	give
					ʔ	a	m	s	a	j				t	u		أمسيت	become (in the evening)
					ʔ	a	f	n	a	j				t	u		أفنيت	devour/consume
							b	i	t					:	u		بتُّ	become (at night)
							x	i	T					t	u		خطتُ	sew
							S	i	r					t	u		صرت	become
							T	i	r					t	u		طرت	fly
							k	u	n					t	u		كنت	Is/become
							q	u	l					t	u		قلت	say
							Z	a			l	a	l	t	u		ظللت	Remain
							m	a			l	a	l	t	u		مللت	get bored
first-person	Singular	present			ʔ	u	S	b	i					ħ	u		أصبح	is/become/remain
					ʔ	u	S	l	i					ħ	u		أصلح	fix
					ʔ	u	D							ħ	i	:	أضحي	become (in the forenoon)
					ʔ	u	ʕ							T	i	:	أعطي	give
					ʔ	u	m							s	i	:	أمسي	become (in the evening)
					ʔ	u	f							n	i	:	أفني	devour/consume
					ʔ	a	b	i	:					t	u		أبيت	become (at night)
					ʔ	a	x	i	:					T	u		أخيط	sew
					ʔ	a	S	i	:					r	u		أصير	become
					ʔ	a	T	i	:					r	u		أطير	fly
					ʔ	a	k	u	:					n	u		أكون	Is/become
					ʔ	a	q	u	:					l	u		أقول	say
					ʔ	a	m	a	l					:	u		أظل	Remain
					ʔ	a	ħ	a	l					:	u		أمل	get bored
first-person	Singular	future	s	a	ʔ	u	S	b	i					ħ	u		ساصبح	is/become/remain
			s	a	ʔ	u	S	l	i					ħ	u		ساصلح	fix
			s	a	ʔ	u	D							ħ	i	:	سأضحي	become (in the forenoon)
			s	a	ʔ	u	ʕ							T	i	:	ساعطي	give
			s	a	ʔ	u	m							s	i	:	سأمسي	become (in the evening)
			s	a	ʔ	u	f							n	i	:	سأفني	devour/consume
			s	a	ʔ	a	b	i	:					t	u		سأبيت	become (at night)
			s	a	ʔ	a	x	i	:					T	u		ساخيط	sew
			s	a	ʔ	a	S	i	:					r	u		ساصير	become
			s	a	ʔ	a	T	i	:					r	u		ساطير	fly
			s	a	ʔ	a	k	u	:					n	u		ساكون	Is/become
			s	a	ʔ	a	q	u	:					l	u		ساقول	say
			s	a	ʔ	a	Z	a	l					:	u		سأظل	Remain
			s	a	ʔ	a	m	a	l					:	u		سأمل	get bored

(*continued*)

Table 24. Continued

Person	Number	Tense														Arabic	Meaning
first-person	Dual/plural	Past			ʔ	a	S	b	a	ħ			n	a	:	أصبحنا	is/become/remain
					ʔ	a	S	l	a	ħ			n	a	:	أصلحنا	fix
					ʔ	a	D	ħ	a	j			n	a	:	أضحينا	become (in the forenoon)
					ʔ	a	ʕ	T	a	j			n	a	:	أعطينا	give
					ʔ	a	m	s	a	j			n	a	:	أمسينا	become (in the evening)
					ʔ	a	f	n	a	j			n	a	:	أفنينا	devour/consume
							b	i	t				n	a	:	بتنا	become (at night)
							x	i	T				n	a	:	خطنا	sew
							S	i	r				n	a	:	صرنا	become
							T	i	r				n	a	:	طرنا	fly
							k	u	n				:	a	:	كنّا	Is/become
							q	u	l				n	a	:	قلنا	say
							Z	a		l	a	l	n	a	:	ظللنا	Remain
							m	a		l	a	l	n	a	:	مللنا	get bored
first-person	Dual/plural	Present			n	u	S	b	i				ħ	u		نصبح	is/become/remain
					n	u	S	l	i				ħ	u		نصلح	fix
					n	u	D						ħ	i	:	نضحي	become (in the forenoon)
					n	u	ʕ						T	i	:	نعطي	give
					n	u	m						s	i	:	نمسي	become (in the evening)
					n	u	f						n	i	:	نفني	devour/consume
					n	a	b	i	:				t	u		نبيت	become (at night)
					n	a	x	i	:				T	u		نخيط	sew
					n	a	S	i	:				r	u		نصير	become
					n	a	T	i	:				r	u		نطير	fly
					n	a	k	u	:				n	u		نكونُ	Is/become
					n	a	q	u	:				l	u		نقولُ	say
					n	a	Z	a	l				:	u		نظل	Remain
					n	a	m	a	l				:	u		نمل	get bored
first-person	Dual/plural	future	s	a	n	u	S	b	i				ħ	u		سنصبح	is/become/remain
			s	a	n	u	S	l	i				ħ	u		سنصلح	fix
			s	a	n	u	D						ħ	i	:	سنضحي	become (in the forenoon)
			s	a	n	u	ʕ						T	i	:	سنعطي	give
			s	a	n	u	m						s	i	:	سنمسي	become (in the evening)
			s	a	n	u	f						n	i	:	سنفني	devour/consume
			s	a	n	a	b	i	:				t	u		سنبيتُ	become (at night)
			s	a	n	a	x	i	:				T	u		سنخيط	sew
			s	a	n	a	S	i	:				r	u		سنصير	become
			s	a	n	a	T	i	:				r	u		سنطير	fly
			s	a	n	a	k	u	:				n	u		سنكون	Is/become
			s	a	n	a	q	u	:				l	u		سنقول	say
			s	a	n	a	Z	a	l				:	u		سنظل	Remain
			s	a	n	a	m	a	l				:	u		سنمل	get bored

Source(s): The author

Conclusion

This study has provided an in-depth analysis of the morphological structure of first-person Kana words in Modern Standard Arabic (MSA). It emphasizes their relationship to verb forms through the process of transfixation. While previous research has explored various aspects of Kana words, such as their syntactic and semantic roles or their classification as pseudo-verbs, the focus on their morphological integration has been limited. Earlier works, including those by Koskenniemi (1983) and Ratcliffe (1990), have highlighted the nonconcatenative nature of

Arabic morphology; however, they have typically focused on infixation and prefixation/ suffixation processes, leaving transfixation underexplored.

The significance of this research lies in addressing this gap by demonstrating that transfixation is the predominant process shaping Kana words. Unlike infixation, which simply inserts morphemes into a root, transfixation involves the interweaving of morphemes with the root structure, creating more complex morphological patterns. This study builds upon Kaye's (2003) distinction between infixation and transfixation, applying it specifically to the morphological analysis of Kana words.

In MSA, the morphology of Kana words aligns closely with that of verbs, as previously noted by scholars including Alanbari (1886), Bahloul (1993), and Mohammad (1998). These researchers presented samples of Kana words to illustrate their linguistic behavior in comparison to MSA verbs, indicating that they share notable structural similarities. By analyzing naturally written data from Arabic books and utilizing methodologies such as McCarthy's (1981) autosegmental approach, this research further establishes the linguistic properties of Kana words. It demonstrates that these words exhibit the derivational and inflectional characteristics typical of Arabic verbs. In this respect, it challenges traditional classifications that have often labeled them as pseudo-verbs or incomplete verbs.

However, the current study has also revealed that some specific structures of Kana words behave differently from established patterns. For instance, the first-person dual and plural present and future tense endings are typically marked by [-*u*], consistent with the rules governing verbs in MSA. An exception arises when the root of a word ends with a vowel, in which case the ending is modified to [-*i:*]. Such exceptions may not be readily apparent without a thorough investigation of the morphological structure of individual words, which was undertaken in the present study. This finding indicates that each attested morphological pattern needs to be meticulously analyzed to draw well-founded conclusions.

Only the first-person forms are included due to space constraints imposed by the journal's article length. These limitations prevent a comprehensive analysis of all three grammatical persons and the indicative and imperative moods. A thorough examination of all forms would require a series of journal articles, highlighting both a limitation of this study and a potential direction for future research.

Overall, this study enhances the theoretical understanding of nonconcatenative morphology in Arabic. It offers new insights into the intricate relationships between bound morphemes and the roots of Kana words. This also lays the groundwork for continued exploration of other linguistic aspects of these words including their syntax and semantics.

Notes

1. All the sound symbols in this study follow the transcription conventions outlined in Appendix.

2. Indicating that the root سأل sʔl "asked" has only three sounds follows McCarthy's (1981) approach that highlights the essential sounds of the roots. As those sounds are indicated as letters in the Arabic orthography, spoken Arabic includes vowels occurring between these root elements.

3. These inflections include tense, person, and gender.

4. This platform helps comparing Kana words with other Kana words and with Arabic verbs.

5. The grammatical numbers in Arabic are: singular, dual, and plural.

6. External morphological changes are those affected by adding prefixes and suffixes, while the internal changes are affected by infixes.

7. The parts are the phonemes existent in the roots of the words when written in Arabic.

8. As the glottal stop is part of the root for all the quadripartite Kana words when it is in the onset position of the first syllable and the syllable following the question prefix, it may also indicate the singular. This is evident in the singular examples of the tripartite Kana words, as in ʔa.ku:.nu أكون is/become (first person, singular, present).

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Appendix
Symbols used in the present study for representing Arabic sounds

Table A1. Consonants

Arabic letter	Sound symbol	Arabic letter	Sound symbol
ء	ʔ	ض	D
ب	b	ط	T
ت	t	ظ	Z
ث	θ	ع	ʕ
ج	ʒ	غ	ʁ
ح	ħ	ف	f
خ	x	ق	q
د	d	ك	k
ذ	ð	ل	l
ر	r	م	m
ز	z	ن	n
س	s	ه	h
ش	ʃ	و	w
ص	S	ي	j

Source(s): The author

Table A2. Vowels

i		u
e	ə	o
a		

Source(s): The author

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