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## Morpho-Semantic Structure of Complex Words in Persian: Perceptual Approach

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### Abstract

This article analyzes complex words, morphologically and semantically, within the Perceptual approach introduced by Safavi (2020). The authors aim to examine the possibilities of word formation of complex words in Persian as their first objective. To achieve this goal, they examined 2850 complex words selected randomly from the *Sokhan Dictionary* (Anvari, 2004). Following the mentioned approach, word-formation patterns are determined based on whether the morphemes belong to closed or open classes. According to a predetermined agreement, A stands for closed class units and B stands for open class units. This study reveals 57 patterns of word formation, with 'B + B' appearing to be the most common among all the patterns examined. Next, the authors investigated how much closed-class units help Persian speakers interpret the semantic head of complex words examined. To reach this aim, 20 Persian speakers not having any knowledge of linguistics were given a questionnaire of 120 words made up of eight affixes selected by the authors and questioned about interpreting each word. Finally, data analysis related to the questionnaire revealed that the meaning interpretation of the words appeared to be significantly impacted by the morphemes belonging to the closed class.

**Keywords:** word-formation, open & closed classes, Persian complex word, perceptual approach, meaning interpretation

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## 1. Introduction<sup>1</sup>

There has been a notable boost in the amount of research that concentrates on the relationship between different fields of linguistics in the past few decades since the discoveries of such research can significantly enlarge practitioners' insightfulness. In this regard, the interaction between morphology and semantics is essential in the current study.

Due to the difficulty of defining 'word' comprehensively, "structural linguists attempted to explain a smaller unit known as 'morpheme' in the first part of the twentieth century" (Shaghghi, 2014, p.58). Accordingly, the study of the internal structure of words and the identification of morphemes has been a focus of language experts for several years. Because of the wide variety of viewpoints on this issue, recognizing morphemes in complex words is becoming an increasingly important argument among linguists. Morphologists categorize morphemes as 'free' or 'dependent' based on their presence in linguistic structures and as 'lexical' or 'grammatical' depending on the role they play in these structures; Lexical morphemes typically carry meaning, whereas grammatical morphemes do not. In contrast to dependent morphemes, free morphemes can stand alone as words (Shaghghi, 2014, P. 66).

When morphemes are categorized as grammatical or lexical, several issues arise. To begin with, the notion that grammatical morphemes lack meaning cannot include pronouns (such as 'you' and 'it') as grammatical morphemes (Safavi, 2020, p. 27). Moreover, from the viewpoint of semantics experts, no word has a fixed meaning. In other words, although each word has a meaning, it is considered meaningful when used in a context. Therefore, assuming a morpheme is inherently lexical or grammatical leaves us uncertain. The current study examines the word-formation of complex words within the framework of the Perceptual approach developed by Safavi (2017). This approach no longer uses meaning as the basis for categorizing morphemes due to the ambiguities in categorizing morphemes based on the meaning. In one of his publications, *Word*, Safavi (2020) concentrated on word formation in Persian based on the previously mentioned approach.

Investigating the former sources and looking into the history of research on word formation in Persian, such as (Sadeghi, 1991a, 1991b, 1991c, 1992a, 1992b, 1992c, 1992d, 1993a, 1993b, 1993c, 1993d; Same'i, 1996; Parvizi, 2013; Tabataba'i, 2016) which will be explained further in Section Two, it is clear that no one has established patterns for word-formation in Persian based on the Perceptual approach. Thus, the current study employed complex words taken from the *Sokhan Dictionary* (fa.rhanj-e.ruz-e.soxan) (Anvari, 2004) and analyzed the data in a descriptive-analytical manner.

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<sup>1</sup> In this article, the phonemic transcription in Persian is based on Modarresi Ghavami's work (2017, pp. 55-56). The following list presents the Persian phonemes that have distinct transcriptions:

**Vowels:** /i/: front, close, unrounded; /e/: front, close-mid, unrounded; /a/: front, open, unrounded; /u/: back, close, rounded; /o/: back, close-mid, rounded; /ɑ/: back, open, unrounded

**Consonants:** /c/: palatal, plosive, voiceless; /j/: palatal, plosive, voiced; /ʃ/: alveolar, approximant, voiced; /g/: uvular, plosive, voiced; /x/: uvular, fricative, voiceless

Multiple researchers have extensively examined the semantic head of Persian compound words in several studies (e.g., Zargham, 1999; Khabbaz, 2005; Sabzevari, 2013; Karimidoustan & Vahidi, 2013; Afrashi & Rezaei, 2015; Ghonchepour & Raghibdost, 2021). Only a few studies, including one from Iran (Aghasharif, 2012), have addressed whether inflectional and derivational morphemes can also be referred to as semantic heads. However, numerous academics have investigated the semantic head in compound words. Thus, paying extra attention to the semantic head of complex words is necessary. Because of this, in the second part of the present study, the researchers are going to take a new look at the semantic head within the framework of the Perceptual approach to answer the question ‘To what degree does the element of /-jah/ belonging to a closed class have a significant impact on the semantic interpretation of words such as /sobhjah/ and /gatljah/ ‘Shambles’? To reach this goal, the authors provided a questionnaire to the Persian speakers. They finally analyzed the respondents’ answers in a descriptive-analytical manner. It is worth noting that in the Perceptual approach, the semantic head of the interpretation is the interpretation that corresponds to the purpose of the message sender in generating context A<sup>1</sup>. As Persian speakers, the authors claim that the suffix /-jah/ predominates in the interpretation of semantic heads in complex words such as /sobhjah/ ‘In the morning’ since the whole word refers to a time during the day. Thus, the morpheme /-jah/ in the mentioned word serves as the semantic head. In contrast, this morpheme is traditionally regarded as a grammatical morpheme with no meaning and merely serves grammatical purposes. According to the authors’ findings, none of the previous investigations have focused on the morpho-semantic structure of complex words in Persian within the framework of the approach mentioned above.

The subsequent research questions are the focus of this article:

1. What are the possible word-formation patterns of complex words in Persian?
2. To what extent do units belonging to a closed class play a significant role in interpreting the semantic head of complex words?

The rest of the paper is organized as follows: Section Two explores the literature review. Section Three describes the theoretical framework. Section Four is devoted to the methodology. Section Five interprets the results. The discussion and conclusion are mentioned in the last Section.

## 2. Literature Review

### 2.1. *Word Structure and word-formation Patterns*

A considerable amount of literature published on the internal structure of the word in both Persian and other languages (e.g., Parvizi, 2013; Zarghamiparast, 2016; Kalbasi & Sadeghi Soure, 2019; Sulistyawati & Bram, 2021). This Subsection will concentrate on the studies that have attempted to discuss Persian word-formation patterns.

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<sup>1</sup> The Third Section of this article, which deals with the theoretical framework, will explain what context A is and other details associated with the Perceptual approach.

According to Sadeghi (1991–1993), research on word-formation in Persian was insufficient. Hence, he presented his ideas in several articles by focusing on the different suffixes. He considered the grammatical points and the meaning of each suffix in various examples in these studies. For instance, Sadeghi (1991–1993) has suggested that the morpheme /-caɪ/ exists in words in two different forms: It is grammatically accepted as a ‘noun’ when it conveys the concept of ‘action’ (e.g., /vaɪzeʃcaɪ/), but as a suffix when it gets the concept of ‘doer’ (e.g., /talabcaɪ/). Furthermore, he provided /setamcaɪ/ and /dʒenajtaɪ/ as specific examples, asserting that both of them can be grouped into the two categories that were mentioned before.

In Same’i’s Ph.D. dissertation (1996), he introduced word-formation patterns in Persian. His goal was to depict the word formation descriptively. Same’i stated that three general methods could be used to produce complex words in Persian, considering that they are not loanwords, are not the consequence of syntactic processes, and have not undergone a significant change in their form. His study differs from the others since it discusses word-formation processes using the concept of the ‘fixed element’ rather than ‘affix.’ Because of their productivity, both units like /xane/ that are used alone and suffixes like /-mand/ and /-jaɪ/ that are not used alone are classified as ‘fixed elements.’ According to the findings of his study, ‘fixed element + stem’ was the most common mechanism for word formation. Additionally, the second primary process was ‘stem 1 + stem 2: [x,y],’ which only had four rules. ‘stem + stem: [x, x]’, which had three alternative forms, represented the third and final primary process. In sum, under the three main categories of the fundamental processes, 78 word-formation rules have been introduced.

Tabataba’i (2016) examined around 20,000 compound words to determine the possibilities of Persian word formation. He initially divided compound words into three general categories concerning their components’ structure, category, and syntax-semantic relations. He has regarded all compound words as a structurally twofold constituent due to the hierarchical nature of word-formation processes. Finally, he introduced 38 types of various word-formation rules for compound words. One of the most frequent word-formation rules in this research was ‘noun + present stem’ (e.g., /daɪʃenas/). He noted at the beginning of his book that in the compound words which follow the ‘noun + noun’ pattern (e.g., /zuɪxane/, /daneʃsaɪ/, /paɪhizcaɪ/), some nouns, such as /xane/, /saɪa/ and /caɪ/, are called ‘pasajand’ (Tabataba’i, 2016, pp. 17-25). Moreover, in his research, compound nouns such as /ʃahzade/ were formed based on the pattern ‘Noun + Passive Adjective.’ The classifications proposed by Tabataba’i (2016) did not include some adjectives created by combining two nouns, such as /ʃirfahm/, /delɪahm/, /bedehcaɪ/, /poʃtaɪ/. Thus, further research is required in the future on these kinds of words.

As mentioned in Section One, Safavi (2020) has analyzed several words focusing on their word-formation patterns in Persian within the framework of the Perceptual approach in a part of his book titled Word. Eventually, he presented 34 word-formation patterns for both simple and complex words. As mentioned earlier, the source is the most relevant research to the present study. Therefore, we will discuss it in the Third Section.

## ***2.2. Morpho-semantic Research/Semantic Head***

A growing body of literature has been devoted to morpho-semantic studies in linguistics. Accordingly, many attempts have been made toward the semantic head of compound words (e.g., Zargham, 1999; Khabbaz, 2005; Sabzevari, 2013; KarimiDoustan & Vahidi, 2013; Afrashi & Rezaei, 2015; Ghonchepour & Raghibdost, 2021). The following paragraphs will deal with the most relevant research to the current study (e.g., Aghasharif, 2012; Gandomkar & Ma'arefvand, 2022; Safavi, 2020).

To our knowledge, Aghasharif (2012) has previously researched whether inflectional and derivational affixes may likewise be regarded as semantic heads in Persian. To achieve this goal, she has examined several words with a synchronic point of view. Her research results were as follows:

1. If an affix changes the meaning of its base, then it is considered the semantic head (e.g., suffix /-tʃe/ in /mahitʃe/).
2. In words such as /javafaci/, in which the base carries the semantic load of the whole word, the semantic head is the base of the derivative.
3. The semantic head, which was described as an element that limits its dependent, is the derivational affix in some words, such as /alafzaʔ/, since the derivational affix (/ -zaʔ/) has constrained its base (/alaf/) and making the meaning of the affix predictable.
4. Aghasharif (2012) suggested that derivational affixes are not always the semantic head. Thus, she recommended a continuum that illustrates the power of affixes to be the semantic head. Finally, she maintained that inflectional affixes could not be the head semantic, as they do not alter the meaning of the base.

Gandomkar & Ma'arefvand (2022) studied the semantic behavior of homonym morphemes in Persian within the framework of the Perceptual approach. Their research aimed to answer the question: Is the meaning interpretation of words in Persian done as 'part-whole' or 'whole-part'? Fundamentally, they tried to determine if people perceive the meaning of the whole word and then the meaning of its parts is revealed to them, or they perceive the meaning of the entire word by assembling the meaning of the word constituents. Eventually, their questionnaire-based study concluded that Persian speakers first interpret the meaning of the whole word and then the morphemes. According to the authors' findings, none of the previous investigations have focused on the morpho-semantic structure of complex words in Persian within the framework of the approach mentioned above. Therefore, this has prompted them to conduct further research in this area.

## **3. Theoretical Framework**

### ***3.1. Key Concepts in the Perceptual Approach***

As noted earlier, the current research intends to investigate the morpho-semantic structure of complex words in Persian using the Perceptual approach proposed by Safavi (2017), who first

presented it as a plan, not a theory. It is essential to recognize that the initial foundation for developing this approach was established in 2010. A complete source introducing the Perceptual approach, *Text Interpretation*, was eventually released in 2017. After 2010, in the years 2014, 2017, 2020, and 2021 respectively, Safavi introduced and examined the efficiency of this approach from different aspects such as text interpretation, semiotics in literature, words, and stylistics. In all of them, its efficiency has been proven. The primary vital concepts in the Perceptual approach are discussed in the following paragraphs.

The perceptual approach is distinguished by the words ‘perception’ and ‘interpretation.’ Hence, how people perceive their environment, or how they utilize one phenomenon to sense another, is closely related to this approach. Additionally, it is required to introduce a strategy for introducing the concept of perception in humans that is approved by philosophers from a variety of scientific fields, including linguistics, biology, and the philosophy of the nervous system (Safavi, 2017, P. 69). Accordingly, the previously mentioned approach defines perception as “any information received by a person from the world of realities around him using his five senses.” In the Perceptual approach, the human perception process occurs as a unit, similar to what grammarians call a ‘sentence.’ Thus, human beings understand the meaning of words in the form of meaningful sentences. As a result, interpreting begins with perception through the use of our five senses, which allows us to make rational ‘deductions’ based on our understanding, resulting in an interpretation. Thus, the difference between perception and interpretation is that by perceiving a sentence such as ‘This is hot’ and ‘This burns,’ one can select and combine these understood sentences to reach an interpretation such as ‘What is hot, burns’ (Safavi, 2021, p. 97). It is necessary to briefly explain two ‘selection’ and ‘combination’ processes that are particularly important to the perceptual approach. Biologists believe that the processes of selection and combination occur in all living creatures in a pre-programmed manner. Consequently, all human creations (including architecture, painting, cooking, and music) are the products of these processes (Safavi, 2017, pp. 58-59).

Another critical concept in the perceptual approach is the word ‘context,’ which is a collection of sentences that may be divided into three subcategories: ‘Context A,’ ‘Context B,’ and ‘Context C.’ The sender of a message communicates with the receiver using one or more sentences. Context A contains the sentences typically written or spoken with a specific purpose by the speaker, writer, or anyone else conveying the message. Context B is the interpretation of the sender’s message by the recipient/ addressee of the message, based upon the dominant position of context A. Context C refers to a set of sentences registered in the memory of a language speaker. Such information forms the background knowledge of every language speaker (Gandomkar, 2020, p. 84). Based on the definition provided in Section One, the semantic head interpretation is the interpretation that corresponds to the purpose of the sender of the message to provide context A.

### ***3.2. Perceptual Approach's View on Word Formation***

As noted earlier in Section One, classifying morphemes based on their meaning presents several problems. Consequently, within the framework of the Perceptual approach, morphemes are organized not by meaning but by the number of class members. The categorization is 'closed class' and 'open class' morphemes. Accordingly, the morphemes belonging to the closed class are few but widely used, and the passage of time has no specific effect on increasing their number. Pronouns, adpositions, and affixes belong to the closed class. Besides, open-class morphemes contain nouns, adjectives, adverbs, and verbs. The open class morphemes have an infinite number of members, and their numbers are increasing every day (Safavi, 2020, p. 27).

In language, one of the points that needs to be considered is the distinction between the terms 'construction' and 'system.' Two essential characteristics identify the 'system': First, it is a set of units arranged together for a particular reason and are in the same class; and second, each has a unique value due to its contrast with other units in the set. There is a contradiction between the belief that language is a system and the assumption that it has some phonemes, syllables, and morphemes; because, in this case, the units of the language system do not belong to the same class. In this regard, it can be considered that there are sub-systems in the language system, including the 'phoneme system' and 'morphological system'. In each of these sub-systems, there are units that are of the same class as each other (Safavi, 2020, pp. 24-25). It is worth noting that we select units from the paradigmatic axis and combine them on the syntagmatic axis to create constructions. "For instance, the phonemes /n/, /a/, /ɪ/, /d/, and /e/ from the phonetic system of the Persian are combined to create the two constructions /naɪ/ and /de/ in the Persian's syllable system, constructing the unit /naɪde/ in the Persian's morpheme system". The mentioned example exemplifies how new constructions can be built by selecting units from a system and combining them (Safavi, 2020, p. 25-26).

The traditional belief that grammatical morphemes do not have semantic functions creates a problem when we observe the semantic differences between the morphemes /honaɪ/ and /-mand/ in the word /honaɪmand/ because the first morpheme refers to a skill and at the same time, the second one refers to a person who possesses it. Consequently, the morpheme /-mand/ cannot be considered meaningless since it has changed meaning by adding it to the morpheme /honaɪ/. Affixes such as /-mand/, which are related to Persian's morpheme system, are combined with other units of Persian's morpheme system and finally include one of the units of the word system of Persian. Subsequently, as morphemes are selected and combined together or with a zero morpheme, a structure called a 'word' is created. Therefore, a simple word is formed when a morpheme is combined with a zero morpheme (e.g., /medad/ or /ma/). Besides, complex words are also created by combining two or more morphemes (e.g., /tʃubi/ or /paccon/).

According to Safavi (2020), every language has a set of fundamental principles and procedures for word formation (p. 40). Therefore, it is possible to hypothesize some rules for it in

Persian. Thus, in the framework of the Perceptual approach, he introduced 34 patterns of word - formation by examining several words. Among these, 32 patterns are related to the word formation of complex words. Safavi (2020) presented the possibilities of two-morpheme to four-morpheme word-formation patterns in his book [*Word*]. It is worth noting that word-formation patterns are presented as follows: Conventionally, the morphemes belonging to the open class are represented by B, while the morphemes belonging to the closed class are indicated by A.

Safavi (2020) noted that more patterns might be added to the word-formation patterns that have been outlined, and the mere presence of rules does not necessarily demonstrate that they are stable (pp. 165-169). Table 1 contains words whose beginning morpheme belongs to the closed class morphemes, and Table 2 includes words whose beginning morpheme belongs to the open class morphemes. The first row of Table 1 indicates that /az/, as a unit selected from the Persian morpheme system, combined with zero, can create a structure that is a unit of the Persian word system. Thus, the first essential step in the construction of a word in Persian is to choose the initial constituent from either class A or B morphemes.

**Table 1**

*Introduced Patterns for Simple and Complex Words Beginning with Closed-Class Morphemes (Safavi, 2020)*

Rules	Examples	Morpheme separation
A + $\emptyset$	/az/	/az + $\emptyset$ /
A + A	/azi/	az + i//
A + A + A	/iaji/	/ia + j + i/
A + A + B	/nahamjun/	/na + ham + jun/
A + A + A + A	-	-
A + A + A + B	/azmabixaba/	/az + ma + bi + xaba/
A + A + B + A	/suemodirjat/	/su + e + modir + jat/
A + A + B + B	/nabesamanjara/	/na + be + saman + jara/
A + A + B + A + A	//azmabehtarun	/az + ma + beh + tar + un/
A + B	/hamsen/	/ham + sen/
A + B + A	/vaconef/	/va + con + ef/
A + B + B	/nadzavanmard/	/na + dzavan + mard/
A + B + A + A	/bazdzuji/	/baz + dzu + j + i/
A + B + A + B	/bisarosedar/	/bi + sar + o + seda/
A + B + B + A	/xodbozorbini/	/xod + bozor + bin + i/
A + B + B + B	/babadxofecon/	/ba + bad + xofc + con/
A + B + A + A + A	varfecasteji//	/var + fecast + e + j + i/
A + B + A + A + B	/bedehobestan/	/be + deh + o + be + setan/
A + B + B + A + A + A	/nadzavanmardaneji/	/na + dzavan + mard + ane + j + i/



**Table 2***Introduced Patterns for Simple and Complex Words, Beginning With Open-Class Morphemes (Safavi, 2020)*

Rules	Examples	Morpheme separation
B + Ø	/faɪda/	/faɪda + Ø/
B + B	/lacpoʃt/	/lac + poʃt/
B + A	/dana/	/dan + a/
B + B + B	/saɪɑʃpaz/	/saɪ + ɑʃ + paz/
B + B + A	/ɪusaɪi/	/ɪu + saɪ + i/
B + A + B	/toxmemoɪG/	/toxm + e + moɪG/
B + A + A	/daneʃmand/	/dan + eʃ + mand/
B + B + B + B	/caseboʃgabbandzan/	/case + boʃgab + band + zan/
B + B + B + A	/ʃabzendedaɪi/	/ʃab + zende + daɪ + i/
B + B + A + B	/badabohava/	/bad + ab + o + hava/
B + B + A + A	/jecdandəji/	/jec + dandə + j + i/
B + A + B + B	/moɪdeʃuɪxane/	/moɪd + e + ʃuɪ + xane/
B + A + B + A	/daneʃjaɪi/	/dan + eʃ + jaɪ + i/
B + A + A + B	/amɪcajɪtabaɪ/	/amɪca + j + i + tabaɪ/
B + A + A + A	/xandani/	/xan + d + an + i/

According to Safavi (2020), the rules mentioned in Tables 1 and 2 lead us to important conclusions, such as the fact that word formation in Persian can be accomplished step by step. As an example, in the word /az piʔ taʔjin ʃode/, it can be assumed that first, the pattern B + B + A + A is used to form /taʔjin ʃode/, and then /az/ and /piʃ/ are added. However, in some words, such as /xodcoʃi/, rules may have been applied simultaneously to create the word (Safavi, 2020, p. 167).

## 4. Methodology

This study's methodology is based on the Perceptual perspective in a descriptive-analytical manner, using tools such as books, articles, theses, and dissertations. In the following two paragraphs, we will provide a brief overview of the research data collected and analyzed and the number of subjects.

To achieve the first goal of the current study, in the beginning, 2850 words from the *Sokhan Dictionary* (Anvari, 2004) were randomly selected and analyzed as research data. We selected alternate pages randomly and extracted all complex words from each page. After studying and identifying words' constituents, we placed each word under the corresponding word-formation pattern. Then, the word-formation rules for these words are determined to present a complete classification of the possibilities of word formation in Persian. It is worth noting that the data are analyzed synchronically in the current research.

To achieve the following purpose of this research, the second part entails the analysis of the interpretation of 120 complex words constructed based on the 'B + A' pattern (with the second morpheme belonging to the closed class). The eight suffixes (such as /-ande/, /-ban/, /-dan/, /-zaɪ/, /-setan/, /-jah/, /-jaɪ/ & /-mand/) were examined in these words to determine the extent to which each

unit is involved in the interpretation of the semantic head of the words. It is not possible to review all the words made using the B + A pattern in this research. Therefore, we will limit ourselves to reviewing 15 examples for each listed suffix. For this purpose, the researchers will examine the alignment between the researchers' interpretation and that of 20 monolingual Persian speakers aged 20 to 50 years, including 10 women and 10 men, with non-linguistic education, for interpretations of each of these examples. The semantic interpretation of Persian language speakers was gathered using a questionnaire consisting of 120 words with the conditions mentioned above. Participants were asked to write down the first meaning that came to mind when they saw each word.

## ***4.1. Data Analysis***

### ***4.1.1. First Part***

Notably, the word-formation patterns introduced in Subsection 3.2 were previously presented in models presented by Safavi (2020). He discussed word-formation patterns of complex words with two to four morphemes. Safavi (2020) also introduced three patterns related to words with five morphemes and one pattern related to words with six morphemes. Therefore, in the present Subsection, the researchers will confine their analysis to give examples of new word-formation patterns. Ultimately, they will express all the word-formation patterns arising from evaluating complex words with five to eight morphemes and reveal the research findings.

In the word /tazebedo.ɾan.ɾeside/, the morphemes /be/, /an/, /id/, and /-e/ are respectively adposition, suffix, past formative morpheme, and suffix, which all belong to the closed class. Moreover, /taze/, /doɾ/, and /ɾes/ are, respectively, the adjective, noun, and present stem of the verb /ɾesidan/ that all belong to the open class. Therefore, this complex word is constructed based on the B + A + B + A + B + A + A pattern.

In the word /azca.ɾoftadeji/, the morphemes /caɾ/ and /oft/ both belong to the open class; because the first one is a noun and the other one is the present stem of the verb /oftadan/. In addition, /az/, /ad/, /-e/, /j/, and /-i/ are, respectively, adposition, causative morpheme, suffix, empty morph, and suffix that all belong to the closed class. Thus, this complex word is constructed based on the A + B + B + A + A + A + A pattern.

### ***4.1.2. Second Part***

The current Subsection aims to introduce the semantic analysis of the data described in the Second Section using some examples. As mentioned at the beginning of the questionnaire, some affixes, such as /-jah/, /-jaɾ/, and /-ban/, have multiple meanings. For instance, the suffix /-jah/ may refer to 'place' in some cases and 'time' in others. To illustrate, when a speaker of Persian hears the word /ecɾmatjah/, it immediately invokes the idea of 'A place where one can stay.' Given that the

whole concept of the word refers to a particular 'place,' it appears that the morpheme /-jah/ possesses a more significant role than the morpheme /egamat/ in determining the concept of the word.

Put another way, a Persian speaker first hears a word as a whole unit and then interprets it analogously based on the meaning already pre-stored in his mental lexicon by linguistics convention (Gandemkar & Ma'arefvand, 2022). Based on the whole concept gained from the word, the language speaker can determine if a morpheme plays a more significant part in determining the semantic head of a word. In this regard, the word /egamatjah/, which refers to 'A place where one can stay,' places a significant portion of the semantic load on the morpheme /-jah/, which is a member of the closed class and stands for the concept of 'place.' Therefore, the suffix /-jah/ is more significant than the word /egamat/ when it comes to interpreting the word /egamatjah/.

The Persian speaker's first impression of the word /asjah/ was 'It is the time between afternoon and evening'. This definition suggests that /-jah/ plays a more critical role in determining the meaning of the word than /as/; because the concept of the whole word refers to a specific time of the day.

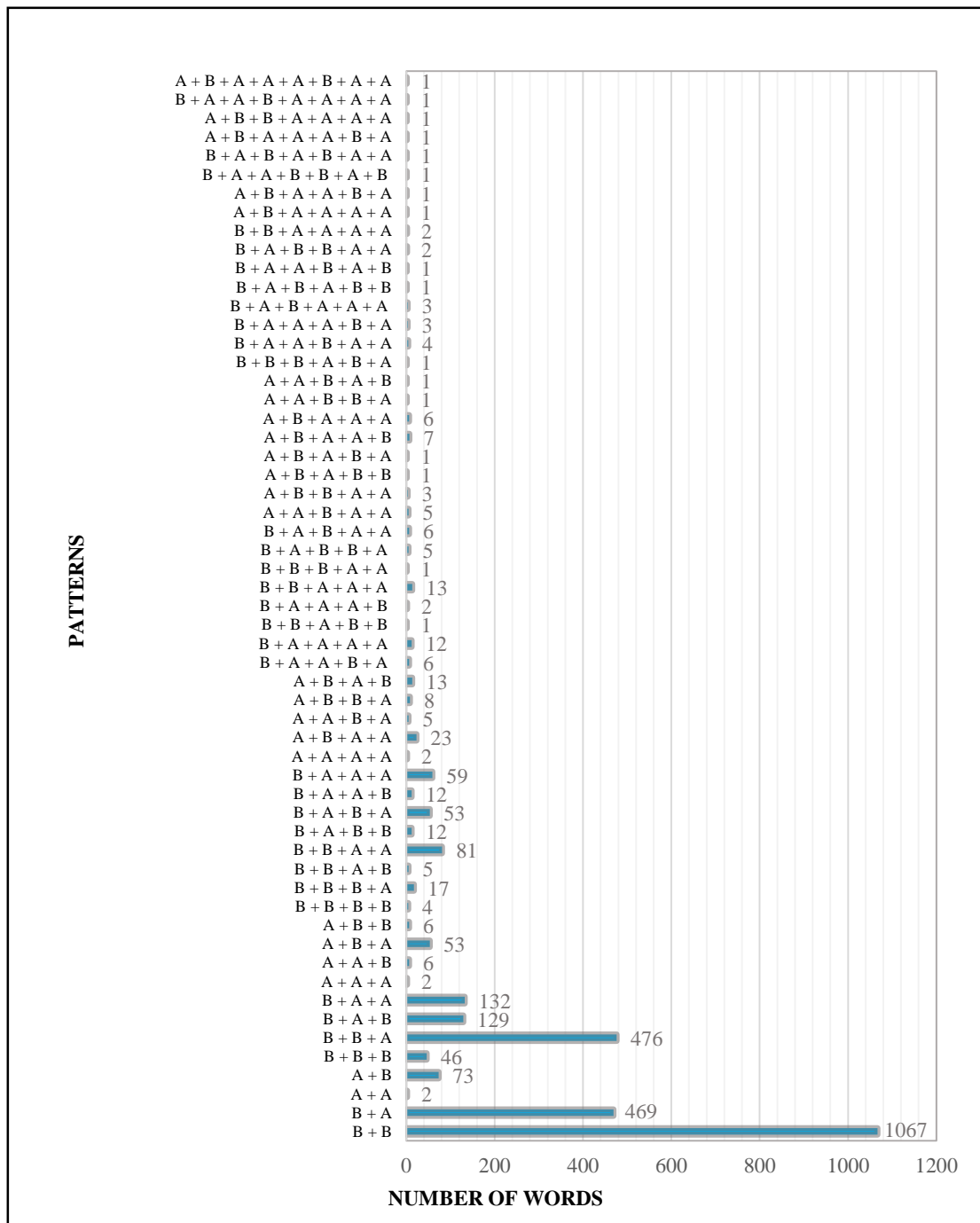
## 5. Results

### *5.1. First Research Question*

As the first objective, the researchers used the Perceptual approach to analyze randomly selected complex words that are part of the current research to introduce the possibilities of word-formation patterns in Persian. By analyzing the construction of 2850 words based on whether their constituents fall into closed or open class, researchers discovered 57 word-formation patterns. In Figure 1, the authors provide a statistical analysis of all these patterns.

Figure 1

*Frequency of All the Word-Formation Patterns*



Other side results can be obtained by carefully reviewing Figure 1, which is evident in Figure 2 and Figure 3. Figure 2 illustrates that among all introduced patterns, the frequency of words that begin with morphemes belonging to the open class is significantly higher than that of the closed class (i.e., 90 to 10%).

**Figure 2**

*Comparison of the Frequency of Complex Words, Beginning With Open and Closed Class Morphemes*

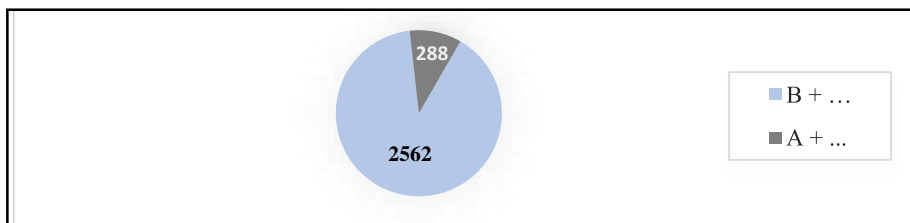
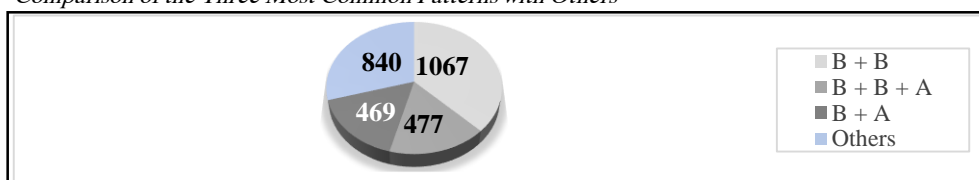


Figure 3 shows the comparison of the frequency of three of the most abundant patterns of word-formation in the considered approach. Accordingly, all the patterns presented in the present study showed that words constructed following the ‘B + B’ pattern (i.e., words composed of two open-class morphemes) were the most frequent, with a frequency of 37%.

**Figure 3**

*Comparison of the Three Most Common Patterns with Others*



### 5.2. Second Research Question

Figure 4 and Figure 5 display the findings based on the analysis of the questionnaire that the individuals answered. As shown in Figure 4, all words with suffixes /-ande/, /-ban/, /-dan/, /-zaɪ/, /-setan/, /-jaɪ/ & /-mand/), except /-jah/, were interpreted in the same manner as the researchers and the respondents gave an interpretation for each of the mentioned words that were related to the word in these cases.

Additionally, Figure 5 demonstrates that certain speakers’ interpretations of the words /aʒazjah/, /ʒo.rubjah/, and /veladatjah/ differed from the researchers’ view. The following part will go over the specifics of the individual’s responses.

**Figure 4**

*Persian Speakers’ Interpretation of All Suffixes (Except the Suffix /-jah/)*

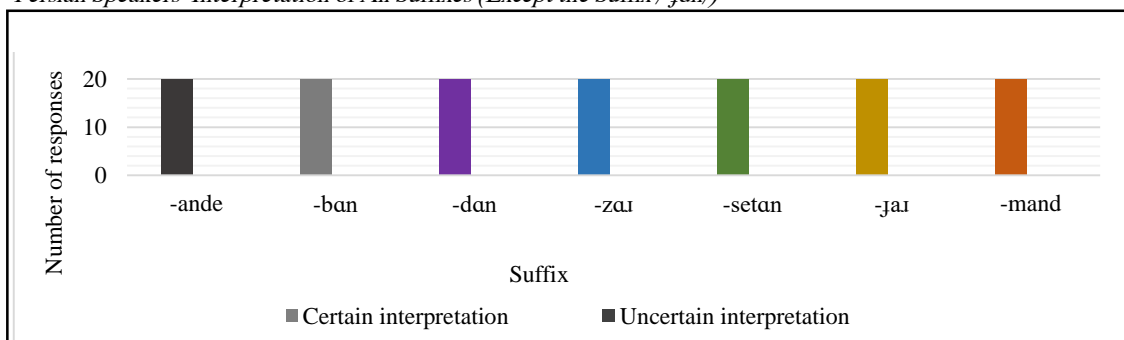
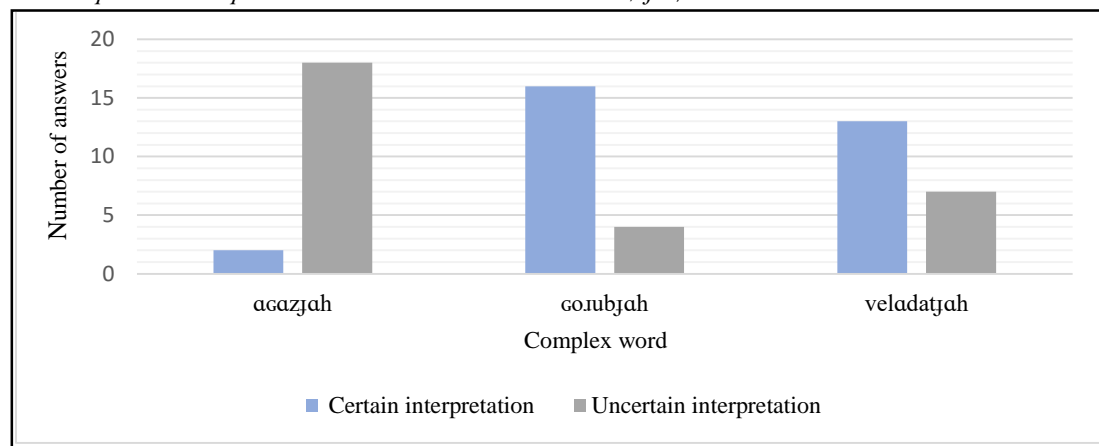


Figure 5

*Persian Speakers' Interpretation of Three Words with the Suffix /-jah/*



## 6. Discussion and Conclusion

The authors have accomplished the present research in two parts, one aimed at introducing the possibilities of word formation in Persian. The other sought to ascertain the extent to which some morphemes from the closed class might function as the semantic head when interpreted by Persian speakers.

According to the first research question, the results showed that within the framework of the Perceptual approach, 57 patterns of word formation in Persian could be identified based on the analysis of 2,850 complex words (see Figure 1). Moreover, the complex words constructed based on the 'B + B' pattern are among the most frequent words in Persian. To some extent, this confirms previous findings in the literature (Parvizi, 2013; Tabataba'i, 2016; Kalbasi & Sadeghi Soure, 2019) since all of these researchers have concluded that compound words are the most frequent complex words in Persian.

Besides, regarding Figure 1 in the previous Section (5), it was found that the rarest Persian complex words contain five to eight morphemes. These findings align with Kalbasi and Sadeghi Soure's (2019) research since they determined that compound-derivative words are the least frequent complex words in their studies.

Unlike preceding research, this study has the advantage of providing a more clear way to recognize the morphemes in a word. In this regard, identifying the type of morphemes in complex words will result in fewer disagreements. In terms of the words whose second part is /daɪ/, Sadeghi's point of view (1991-1993) suggests that only in words where /daɪ/ means 'protector and manager' we can treat it as the 'present stem' of the verb /daɪtan/ and in other words, when /daɪ/ means 'A person doing work or service,' we should treat it as a suffix. While, those complex words (such as /mehmandɑɪ/, /xanedɑɪ/, and those in which the morpheme /daɪ/ is the second component) are taken into consideration in the present stem, along with its grammatical category, rather than its meaning in the complex word. Thus, within the framework of the Perceptual approach, since

Persian speakers perceive /daɪ/ as the present stem of the verb /daftan/, they consider it in one way, which is a morpheme belonging to the open class.

According to Sadeghi (1991-1993) and Tabataba'i (2016), the morpheme /-jah/ has lost its meaning in words such as /dastjah/, /daɪjah/, /abjah/, and others, and such words should be considered simple words. Whereas in the current research, on the one hand, the Persian speaker places the morphemes of /dast/, /daɪ/, and /ab/ in the nouns category in such words. On the other hand, he may interpret the morpheme /-jah/ as a suffix. In light of this, he believed that the 'B + A' pattern served as the foundation for the creation of words like /gatɪjah/, /sahaɪjah/, and /da.manjah/.

According to Tabataba'i (2016), as was noted in Section 2.1, several adjectives like /fiɪfahm/, /delɪahm/, /bedehcaɪ/, /poftcaɪ/ are not included in any of the categories he offered for word-formation patterns. However, the framework of the approach used in the present research includes words like patterns mentioned in Table 3.

**Table 3**

*Analyzing a Few Words Based on the Perceptual Approach*

<b>B + B</b>	<b>A + B + B</b>
/fiɪ + fahm/	/be + deh + caɪ/
/poft + caɪ/	
/del + ɪahm/	

To sum up, the findings of the first part of the study suggest some general conclusions:

1. When comparing the number of complex words starting with a morpheme belonging to the closed class in Persian to those beginning with a morpheme from the open class, the former are much fewer.
2. The authors included that bimorphemic words beginning with morphemes belonging to the open class are more frequent than other complex words in Persian.
3. There are complex words in Persian with eight morphemes or even more. Nonetheless, the acquired results demonstrated that these words have a low rate of occurrence.
4. The pattern of word formation of several words had yet to be definitively established by previous researchers, as previously described. Accordingly, as seen in Table 3, examining such complex words in the Perceptual approach showed that it is possible to determine their word-formation pattern. Returning to the second question posed at the beginning of this study, it is now possible to state that dividing morphemes into open and closed classes and then examining the word-formation patterns within the perceptual framework enables us to develop a more coherent classification of word-formation possible patterns in Persian.

The second goal of the current research was to identify the extent to which morphemes belonging to closed classes serve as semantic heads when interpreting the meaning. Thus, the researchers presented a questionnaire containing some selected words (see Appendix A) to 20

Persian speakers, and they were required to interpret each of the words in the questionnaire. The findings in the second part of the present study are consistent with the findings of some previous researchers. In the present study, the responses to the questionnaire indicated that in many cases (except for three cases), the suffixes, which are members of the closed class morphemes, had a significant role in interpreting the meaning of the words, acting as the semantic head. This observation is in line with Aghasharif's (2012), which found that derivational affixes have the potential to function as the semantic head.

As mentioned in the previous paragraph, according to the questionnaire results, among all the 120 words, respondents' interpretations of only three words with the suffix /-jah/ were not aligned with the researchers' interpretation. For instance, as can be seen in Table 4, 90% of the respondents expressed doubts concerning the meaning interpretation of the word /agazjah/. They were unsure if the word meant 'A place from which someone initiates an action' or 'The moment when someone initiates an action.' Another 10% of the respondents, however, interpreted this word as 'the place from which they begin an action,' which was consistent with the researchers' view. In this regard, the majority of respondents had difficulty distinguishing if the other two words (e.i., /go.rubjah/ & /go.rubjah/) were referring to a concept of time or 'place.'

**Table 4**

*Three Words with the Suffix /-jah/ Were Unclear to the Respondents When They Were Asked to Interpret Them*

Interpretation of the word /veladatjah/	Interpretation of the word /go.rubjah/	Interpretation of the word /agazjah/
doubt	doubt	doubt
doubt	Concept of time	doubt
Concept of place	doubt	Concept of place
doubt	Concept of time	doubt
doubt	Concept of time	doubt
doubt	doubt	doubt
doubt	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
doubt	Concept of time	doubt
Concept of place	Concept of time	Concept of place
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	Concept of time	doubt
Concept of place	doubt	doubt
Concept of place	Concept of time	doubt

The word /agazjah/ has caused the respondents to express a more incredible amount of uncertainty than the other two words, as shown in Table 4. One explanation for this outcome might



be as follows: The Persian speakers struggled to determine whether the morpheme /-jah/ in this word was used in the concept of place or time because they had not previously registered the general concept of such a word in their mental lexicon. Even after combining the meanings of the two morphemes, /agaz/ and /-jah/, they were still unable to conclude. Therefore, it is only conceivable for Persian speakers to interpret the word if they were already aware that it was used in the *Sokhan Dictionary* (Anvari, 2004) to refer to ‘starting place’ rather than ‘time to start.’ The results of the semantic interpretation of 120 complex words showed that the Persian speaker could not interpret the meaning of a word's constituents unless he was aware of the word's whole meaning. This research confirms the previous findings of Gandomkar & Ma'arefvand (2022). They concluded that Persian speakers interpret linguistic units from the total to the parts, meaning that they can determine the meaning of the individual pieces by understanding the meaning of the whole.

In the Perceptual approach, which we discussed before in the theoretical framework, human beings perceive words in terms of units, similar to what grammarians refer to as sentences (Safavi, 2020). Persian speakers have interpreted the words as sentences, according to interpretations provided by respondents and examples included in the research. These findings confirm the previous results reported by Safavi (2020).

Consequently, results suggest that the current research has some limitations. Although the first part of the research introduced more word-formation patterns of complex words in Persian in the framework of the Perceptual approach, our work could be a starting point for determining the other possible word-formation patterns of complex words in Persian. Hence, such research can be conducted on corpora to determine if there are more word-formation patterns of complex words in Persian. Furthermore, regarding the semantic analysis portion of the study, it appears that further studies are required to examine the amount to which morphemes belonging to closed class — including prefixes, pronouns, and the like— play a role in determining the meaning of a word by looking at a more significant number of these morphemes.

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## Appendices

### Appendix A:

*The questionnaire (related to the second part of the research)*

Dear friends, we have created this questionnaire to carry out a part of our research. The research objective requires your assistance in completing the questionnaire. We appreciate your time and attention in advance.

Thanks and regards

The current questionnaire has 120 words in it. You are kindly asked to write down your interpretation of the meaning of each word in front of it.

\* It is crucial to understand that the suffix /-jah/ can relate to 'time' in some nouns and 'place' in others. For instance, this suffix is used to represent the concept of 'time' in the word /ʃamʔjah/ and the concept of 'place' in the word /coʃtaɪjah/. Moreover, suffixes such as /-jaɪ/ are sometimes used to refer to a person who does something, creates something; or is the owner of something. Finally, The suffix /-ban/ is frequently used to denote a 'military rank' or 'protector and keeper.'

Words	Interpretation	Words	Interpretation	Words	Interpretation
/afainande/		/sanʔdan/		/naxlestan/	
/azande/		/ʃamʔdan/		/nejaestan/	
/bazande/		/ʃiɪdan/		/nejestan/	
/barande/		/atɪdan/		/hona:estan/	
/binande/		/ʒalamdan/		/hitʃestan/	
/parande/		/ʒandan/		/aʒaʒjah/	
/xazande/		/cahdan/		/eʒamatjah/	
/xohande/		/ʒoldan/		/bandaɪjah/	
/tapande/		/namacdan/		/tabʔidjah/	
/fe:restande/		/jaxdan/		/da:manjah/	
/jiɪande/		/banafʒeɪɪ/		/ʃabjah/	
/laʒzande/		/biʃeɪɪ/		/sobhjah/	
/neja:ande/		/ʃʔamanɪɪ/		/asɪjah/	

