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Semantic Fragmentation and Conventionalization in Persian Compound Nouns Ending in Verbal Stems: A Usage-based Perspective

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Abstract

In the present study, we analyze the semantic fragmentation and conventionalization in Persian compound nouns ending in the verbal stems *–andāz* 'throw', *-band* 'fasten/close,' *-foruš* 'sell', *-gir* 'catch', *-keš* 'pull', *-paz* 'cook', *-yāb* 'find', and *-zan* 'hit' from the usage-based perspective. The analysis is based on a 800 data set extracted from diachronic and synchronic corpora. The words produced from the general compounding pattern $[XV_{PRS}]_N$ can be categorized in a range of semantic categories, including agent, instrument, location, and object. In describing the semantic fragmentation of $[XV_{PRS}]_N$, we propose the human agent as the starting meaning, from which the instrument sub-pattern is derived by the mechanism of metaphorical extension. However, to justify the object and location meanings, we consider the metonymic extension mechanism to be involved. The sense extension mechanisms do not only apply to the individual words but can happen on the pattern level. It is also argued that these mechanisms are not mechanically applied to all the patterns ending in the verbal stems, instead, it is the usage and the communicative needs of the speakers that determine the semantic fragmentation of any patterns. To illustrate this point, as a case study, we focus on the development of instrument meaning in the pattern $[X\text{-}paz_{PRS}]_N$. We show that the instrument sub-pattern is a recent linguistic phenomenon that coincides with the introduction of modern

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cooking equipment with mostly English names to Iranian society. The increasing use of these types of equipment has led to a new communicative need for naming such instruments. This extra-linguistic factor has motivated the pattern [X-*paz* $_{PRS}]_N$ to be extended through analogy with English compound instrument nouns. The findings of this study may contribute to the understanding of word-formation patterns in general and compounding patterns in particular.

Keywords: Persian compounding, semantic fragmentation, metaphorical extension, metonymic extension, polysemy

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1. Introduction

One of the productive types of compounding in Persian is compound words ending in present verbal stems. In these compounds, a non-verbal element (a noun, adjective, or adverb) is combined with the present stem of a verb to form nouns or adjectives.[1] Data from the Farhangyar corpus[2] indicates that such compounds have existed in the first sentences in the corpus dating back to the beginning of the 9th century.

Extensive research has been conducted on these compound nouns in Persian (e.g., Anvari & Ahmadi Givi, 1999; Kalbasi, 1992; Khanlari, 1973; Khayyampour, 1993; Khorma'i, 2008; Lazard, 2005; Mashkur, 1989; Meshkatoddini, 2005; Nobahar, 1993; Sadeghi, 2004; Shariat, 1970; Soltanigard Faramarzi, 1997; Tabataba'i, 2003, 2014; Vahidian Kamyar & Omrani, 2006). However, most of this literature focussed on the formal structure of the mentioned compounds and neglected their semantic fragmentation and conventionalization. The present study attempts to fill this gap. The products of word-formation processes can often be grouped into some semantic categories. The Persian compound words ending in the verbal stems can be grouped into two major syntactic categories of nouns and adjectives. Depending on the verbal stem, the adjectives may have an agent meaning (e.g., *nāxon-gir*, lit. nail-catch, 'nail clipper'), a patient meaning (e.g., *kam-yāb*, lit. rare-find, 'rare'), or both (e.g., *dast-yāb*, lit. hand-find, 'a person who finds someone or something (agent meaning)', and 'accessible (patient meaning)').[3] The nouns can be categorized into at least four groups: human agents (*bāzār-yāb,* lit. market-find, 'marketer'), instruments (*felez-yāb*, lit. metal-find, 'metal detector''), objects (*dast-band*, lit. hand-fasten/close, 'bracelet'), and locations (*bār-band*, lit. load-fasten, 'carrier').

The semantic fragmentation is not limited to Persian word-formation patterns. Similar cases, even with a broader range of meanings, have been reported in

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1. It is worth mentioning that Persian verbs have two stems, namely the present stem and the past stem.
2. The only offline comprehensive diachronic corpus in Persian containing texts from the 9th century to the present.
3. Based on the context in which a word ending in a present stem appears, it can have agentive or patientive readings. AbolGhasemi (1991) states that "meaning and function" (p. 22) of the adjective designate the agentive or patientive readings such as the word *dast-yāb*, lit. hand-find which has agentive meaning as 'a person who finds someone or something' and patientive meaning as 'accessible', too.

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different languages (e.g., Booij, 1986, 2018; Booij & Audring, 2015; Francesco & Basciano, 2018; Francez & Koontz-Garboden, 2017; Jackendoff & Audring, 2016, 2018, 2019; Meibauer et al., 2004; Pankratova, 2018; Rainer, 2005a; Sánchez Fajardo, 2017).

Semantic variation in word-formation processes has always been one of the most challenging topics for morphologists. In this study, we addressed these questions:

a. What semantic variation does the Persian pattern $[XV_{PRS}]_N$ have?

b. What is the role of the semantic extension mechanisms in the development of sub-patterns?

c. How may extra-linguistic factors motivate semantic fragmentation?

The empirical basis for the present study is a collection of the compounds ending in *–andāz* 'throw', *-band* 'fasten/close', *-foruš* 'sell', *-gir* 'catch', *-keš* 'pull', *-paz* 'cook', *–yāb* 'find', and *-zan* 'hit' in the diachronic corpus of Farhangyar, the synchronic corpora of Persian Linguistic Database,[1] Bijankhan corpus,[2] Noormags corpus,[3] and the Persian Wikipedia website.[4] More words were collected from *Zansou Reverse Dictionary* (Keshani, 1993). Potential neologisms were explored with the help of a Google search. The findings of this research may contribute to understanding word-formation patterns in general and compounding patterns in particular.[5]

2. Literature Review

There are three approaches to the polysemy in morphological patterns: the separationist morphologist approach; the monosemy approach; and the polysemy approach (Booij, 2010, 2018). Theseparationist morphologists state that there is no systematic correspondence between form and meaning; therefore, semantic variations are investigated under different modules of the grammar (Beard, 1995; Booij, 2010, 2018). Such an extremist approach lacks the necessary efficiency required in the analysis of polysemy in morphological patterns since it completely ignores the systematicity present in polysemy in cross-linguistic studies.

1. *Persian Linguistic Database* (PLDB) is the first on-line database containing the Contemporary (Modern) Persian data (http://pldb.ihcs.ac.ir).
2. *Bijankhan corpus* has a collection of daily news and common texts. In this collection, there are documents of different subjects such as political, cultural and so on (http:// dbrg.ut.ac.ir/Bijankhan).
3. http://noormags.ir
4. http://fa.wikipedia.org
5. The examples are given in traditional Iranological transcription throughout this article.

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Leaving this approach aside, Booij (2010) believes that "if we do assume the systematicity in the relation between form and meaning, there are two options that do not exclude each other: monosemy and polysemy" (p. 77). Booij (2010) states that "in the monosemy approach we assign a very general and vague meaning […] to a certain morphological pattern" (pp. 77-78), so the pattern is considered to be multifunctional. For instance, while explaining the semantic variation of the derivational suffix *-er* in Dutch, Booij states that at least a number of the existing semantic categories – precisely the meanings of the animate agent, the inanimate agent, and the instrument – can be explained given the general sense of 'agent'. However, this approach cannot explain other meanings, such as objects or events. Considering this point, Booij (2010) assumes that "we need a 'regular polysemy' approach in which a prototypical meaning forms the starting point for deriving other meanings through the semantic extension mechanisms of metaphor and metonymy" (p. 78). That is to say, the various meanings should be systematically relatable (Evans & Green, 2006; Lopukhina et al., 2018; Lyons, 1977; Recanati, 2017; Wiese, 2016)

The two mechanisms of metaphor and metonymy can be involved in the formation of various meanings. For example, Booij (2010, 2018) mentions that the agentive meaning is prototypically referred to human beings; however, it can also refer to an inanimate entity through metaphor. Therefore, it is possible to refer to a film that scares people as a 'thriller' or to an inanimate object which is used to contain things as a 'container'. On the other hand, in the semantic development of the objects or events for which the mechanism of metaphor cannot be applied, the metonymy mechanism is involved.[1] The basic generalization in explaining this mechanism is that the word derived from the suffix *-er* can refer to any of the participants involved in the event. The emergence of such meanings in a morphological pattern – if used and embedded in the language community and sufficient examples of them are produced – can over time lead to the branching of sub-patterns which independently can produce words.

Most of the works that have dealt with the semantic fragmentation in word-formation patterns have focused on the agent-instrument polysemy. Among them, Meyer-Lübke (1890) is the first who claims that the general mechanism behind the

1. The role of metonymy in the formation of such concepts is proposed by the following scholars: Booij (1986);
Booij and Lieber (2004); Heyvaert (2003); Panther and Thornburg (2003).

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polysemy is personification (Luschützky & Rainer, 2011). Also, Rissman and Majid (2019) and Rissman and Rawlins (2017) mentioned that the instruments are linked to the agency meaning through the extension of an agent. During the many years following Meyer-Lübke, this claim seems to have little objections. Later researchers who followed this idea are Booij (1986, 2005, 2018), Lüdtke (2005), Luján (2010), Menéndez-Pidal (1968), and Recanati (2017), among others. Some scholars, however, have a critical approach to the metaphorical extension hypothesis. Panagl (1975, 1978) is the first who has questioned the assumption. By analyzing some German data, Panagl (1975) deduces that the hypothesis of metaphorical extension does not hold for this language because for each instrument noun, there needs to be a counterpart agent noun from which it is derived, while there exist no counterpart agent nouns for most instrument nouns. Beard (1990) challenges the personification hypothesis by rejecting the unilateral relation of an agent into an instrument in a diachronic context, referring to some instances of the Serbo-Croat language. By investigating the Romance languages, Rainer (2004a, 2004b, 2005b, 2011) reveals that some other considerations, namely sound change, ellipsis, borrowing, and analogy, might contribute to the formation of the concept of the instrument. Azimdokht (2019), Azimdokht and Rafiei (2019), Luschützky (2011), Luschützky and Rainer (2011), Rafiei and Rezaei (2019), and Rainer (2011) reveal how a new instrumental word-formation pattern can be formed under analogy with borrowed words.

Booij (2010, 2018) studied the polysemous meaning of the Dutch agentive suffix *-er* from a constructionist perspective. After classifying the derived words in some semantic categories, Booij defines 'human agent' as the prototypical meaning of *-er* construction. Instead of relying on the hypothesis of metaphorical extension at the word level, Booij put forward the hypothesis at the level of morphological constructions through a mechanism called reanalysis. According to Booij, before the metaphorical extension happened at the level of word-formation schemas, the speakers had metaphorically used a considerable number of agent nouns in the instrumental meaning. With the metaphorical extension of more and more words in this way, an independent construction for the production of instrument nouns has gradually emerged.[1]

The idea of pattern change due to the shift of some words of that pattern dates

1. Rainer (2005a) calls this mechanism *reinterpretation*. It is also called *neo-analysis* by Traugott and Trousdale (2013).

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back to Jaberg (1905). Jaberg discussed this hypothesis in derivation. According to Jaberg, the semantic change in individual words derived from an affix can result in a semantic change in the word-formation pattern of that affix by applying a mechanism that he calls reanalysis.

Rainer (2005a) endorsed the reanalysis mechanism. Besides, he introduced another mechanism called approximation. As a semantic change mechanism in word-formation patterns, in approximation, a mismatch is allowed between a pattern and the new words that it produces, as long as "the distance is bridged by metaphor or metonymy" (p. 130). In approximation, there is no need for several individual words to undergo a semantic change first to allow for a pattern change. In this mechanism, at the moment of producing a new word, the speakers decide to use a word-formation pattern that is not consistent with the meaning of the produced word. This way, the speakers use an existing word-formation pattern in a new way.

Among a few works in Persian, Bamshadi and Ghatreh (2018), and Torabi (2014) studied the Persian agentive suffixes. Following Booij (2010), Torabi claimed that the instrumental meaning of this suffix is the result of the metaphorical extension at the construction level, rather than individual words. Rafiei and Rezaei (2019), Azimdokht (2019), and Azimdokht and Rafiei (2019) also questioned the metaphorical extension hypothesis at the word level. They pointed to the possible influence of loan translation of English instrument nouns in developing the new instrument pattern in Persian agentive word-formation patterns.

The present study is based on the usage-based approach to language. The usage-based approach dates back to Paul (1920), although the emergence of generative grammar has pushed it to the sidelines (Traugott & Trousdale, 2013). In this approach, the basic idea is that language use determines linguistic representation. Language emerges as a result of the interaction between cognition and use, not 'a language-specific instinct,' as is claimed in generative models (Ibbotson, 2013). From this perspective, linguistic knowledge is dynamic because what language users are doing affects mental representations. According to Bybee (2010), for understanding language, both synchronically or diachronically, two critical factors of language use and knowledge must be considered.

The principles of the usage-based model have been shaped generally within the region of morphology (e.g., Bybee, 1985, 1995, 2001, 2010). Bybee (1985)

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points to type and token frequencies in language use as two fundamental factors in shaping language representations. She argues that the higher the token frequency of a linguistic form, the more entrenched it is in a speaker's mind. As for the type frequency, she points out that it determines the degree of the productivity of a pattern. The higher the number of words made by a pattern, the more productive the pattern is. The consequence of accepting this hypothesis is that the patterns are of varying degrees of entrenchment and productivity.

Usage-based approaches (Booij, 2010, 2018; Bybee, 1985, 1995, 2001, 2010; Goldberg, 1995) assume word-formation patterns to be acquired "bottom-up from complex words […] encountered in the input and retained in lexical memory" (Masini & Audring, 2019, p. 370). Again, one can expect the role of frequency, both type, and token, in building linguistic knowledge from a usage-based perspective to language.

By accepting that language use determines linguistic knowledge, it is also assumed that language change is a function of change in language use. From a usage-based perspective to language change, "change never needs to occur" (Traugott & Trousdale, 2013, p. 21). Every language change is rooted in how people use language and evaluate existing expressions. According to Traugott and Trousdale (2013), to understand language change, in addition to knowledge, you need to consider language use. In a usage-based approach to language, knowledge is not fixed and permanent, but 'nevertheless the ground out of which innovation emerges' under the influence of use. In other words, the speakers may use the existing knowledge to develop new expressions.

Milroy (1992) describes the linguistic change as "located in speaker-*interaction* [...] between speakers in the course of interaction" (p. 36). Change in a word-formation pattern may begin with changes in particular words. As this process continues, it can lead to a change in the pattern of making the words through the reanalysis mechanism. Reanalysis is gradual by nature. Changes can also happen instantaneously. The approximation is the mechanism that results in an instantaneous change.

Bybee (2010) identifies analogy as one of the cognitive processes that influence language use, and accordingly, it may lead to the development of the new linguistic structure. She defines analogy as the "mapping of an existing structural pattern onto a novel instance" (Ibbotson, 2013, p. 10). Analogy may act as a driving force

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behind reanalysis and approximation.

3. Methodology

The present study provides a qualitatively detailed semantic analysis of 800 gathered samples of Persian compound nouns ending in the verbal stems. The analysis is based on a usage-based approach presenting deep views into the semantic fragmentation and the conventionalization of the mentioned compounds.

Firstly, according to the aims of the present study, eight stems were selected randomly from Keshani (1992): *-andāz* 'throw', *-band* 'fasten/close', *-foruš* 'sell', *-gir* 'catch', *-keš* 'pull', *-paz* 'cook', *-yāb* 'find' and *-zan 'hit'.* Secondly, 800 Persian compound nouns ending in these verbal stems were collected from the diachronic corpus of Farhangyar, the synchronic corpora of Persian Linguistic Database, Bijankhan corpus, Noormags corpus, and the Persian Wikipedia website. More words were collected from *Zansou Reverse Dictionary* (Keshani, 1993). Potential neologisms were explored with the help of a Google search.

We first describe the semantic variation in the collected compound nouns. Then, we discuss the roles of metaphor and metonymy in developing new meanings in this pattern. Finally, from a usage-based perspective, we investigate the role of extra-linguistic motivations behind the semantic fragmentation. For this purpose, as a case study, we focus on developing instrument meaning in the pattern of [X- *paz* PRS]N.

4. Results

The compound words ending in the verbal stems are categorized into at least four groups: human agents, instruments, objects, and locations. The range of interpretations of the compound nouns - by some examples- are given in Table 1:

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Table 1

Range of Interpretations of the Compound Nouns Ending in the Verbal Stems

Stem	Human Agent	Instrument	Object	Location
-andāz 'throw'	*tir – andāz* (lit. arrow-throw, 'archer')	*xompāre-andāz* (lit. mortar shell-throw, 'mortar')	*pā-andāz* (lit. foot-throw, 'doormat')	*bār-andāz* (lit. load-throw, 'dock')
band 'fasten/close'	*safhe-band* (lit. page-fasten/close, 'typographer')	-	*dast-band* (lit. hand-fasten/close, 'bracelet')	*bār-band* (lit. load-fasten/close, 'carrier')
-foruš 'sell'	*mive-foruš* (lit. fruit-sell, 'greengrocer')	-	-	
-gir 'catch'	*āmār-gir* (lit. statistics-catch, 'statistician')	*nāxun-gir* (lit. nail-catch, 'nail clipper')	-	*āb-gir* (lit. water-catch, 'lake')
-keš 'pull'	*bār-keš* (lit. load-pull, 'porter')	*dud-keš* (lit. smoke-pull, 'chimney')	*xat-keš* (lit. line-pull, 'ruler')	*sine-keš* (lit. chest-pull, 'slope')
-paz 'cook'	*āš-paz* (lit. pottage-cook, 'chef')	*boxār-paz* (lit. stream-cook, 'food steamer')	-	-
-yāb 'find'	*bāzār-yāb* (lit. market-find, 'marketer')	*min-yāb* (lit. mine-find, 'mine detector')	-	-
-zan 'hit'	*dohol-zan* (lit. drum-hit, 'drummer')	*morvārid-zan* (lit. pearl-hit, 'a device which attaches pearls to women's dress')	-	-

In describing the semantic fragmentation of the pattern $[XV_{PRS}]_N$, we first use the monosemy approach. Like Booij's analysis (2010, 218) of deverbal nouns ending in Dutch *–er* suffix, by assigning a general notion to the pattern of Persian compound nouns ending in the verbal stems, we can derive at least a sub-set of meanings from the general notion. Taking the instruments as inanimate agents, one may propose the notion 'agent' as the general notion of the pattern from which two meanings of 'human agent' and 'non-human agent' are derived. For example, the word *kabāb-paz* (lit. kebab- cook, 'person who cooks kebab'), which initially referred to 'human agent', is now also used to name an instrument that plays a similar role. The same explanation can be assumed for a couple of other words with both meanings such as *āmār-gir* (lit. statistics-catch, 'statistician; an application

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calculating statistics'), *rag-gir* (lit. vein-catch, 'person who takes veins; an instrument taking veins'), and *nobat-zan* (lit. turn- hit, 'a person who drums; a device assigning turns to people in a doctor office, restaurant, etc.') However, as previous research shows (Booij, 2010, 2018, 2019a, 2019b; Kooij & Booij, 2018), the monosemy approach cannot do justice to all the meanings of the pattern. The non-agentive meanings of 'object' and 'location', in words such as *xat-keš* (lit. line-pull, 'ruler') and b*ār-band* (lit. load-fasten, 'carrier') cannot be derived from the general notion 'agent' by applying sense extension mechanisms.

In line with previous research (Booij, 2010, 2018, 2019a, 2019b; Kooij & Booij, 2018), the monosemy approach cannot account for the whole range of interpretations, we move on to the regular polysemy approach. As mentioned in section two, in the polysemy approach, a prototypical meaning is regarded as the starting point for deriving the other meanings by applying the semantic extension mechanisms of metaphor and metonymy. Given that the human agent meaning is the most common in the words produced from this pattern, we may propose the human agent as the starting meaning from which other meanings are derived. We can then assume that human agent nouns can metaphorically be extended to refer to non-human agents.

Although the metaphorical extension can justify the instrument meaning, the object and location meanings cannot be derived from the human agent meaning by the same mechanism. So, the rise of non-agentive meanings (i.e., object and location) might be sought in another mechanism: metonymy. This is the explanation that has previously been used to analyze non-agentive types of meanings of deverbal *–er* nouns in English and Dutch (Booij, 1986, 2010, 2018; Booij & Lieber, 2004; Heyvaert, 2003; Panther & Thornburg, 2003).

The metonymic extension can be explained so that a compound noun ending in a verbal stem can denote another participant in the event than the agent (Bauer, 2017; Brdar, 2017; Janda, 2014). Accordingly, nouns with the object meaning refer to the patient of the event, and those with the locative meaning refer to the place where the event has taken place. For example, b*ār-band* (lit. load-fasten/close, 'carrier') with locative meaning refers to the place for fastening some loads at the roof of a car.

The production of sufficient examples of words with new meanings over time can lead to the branching of sub-patterns in the main general pattern through the reanalysis of the pattern (Booij, 2010, 2017, 2018, 2019c; Booij & Audring, 2018;

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Booij & Masini, 2015). Accordingly, the sub-patterns can independently produce new words. However, the sense extension mechanisms do not only apply on the individual words. If that were the case, each produced word would have to have at least two meanings: a source meaning from which the sense extension had begun and a target meaning. However, there are many words such as *paše-band* (lit: mosquito-fasten/close, 'mosquito net') that have been used in only one meaning from the beginning. As we will see in section five, the semantic-conceptual mechanisms can even happen on the pattern level through a mechanism called approximation (Rainer, 2005b).

5. Discussion

5.1. Conventionalization in Semantic Fragmentation

As shown in Table 1, the produced words belong to some specific categories. This proposes that there is a kind of conventionalization in assigning a word to a semantic category. For example, while *havā-paz* (lit. air-cook, 'air fryer') is an instrument, *āš-paz* (lit. pottage-cook, 'chef') is a human agent. As Booij (2010, 2018) states about Dutch deverbal nominals in *–er*, we need to specify the conventional interpretation(s) for each compound noun. It should also be noted that some words belong to more than one category at a time. For example, *keik-paz* (lit. cake-cook 'cake cooker') can refer to a human agent or an instrument. This can be due to either the independent word-formation pattern under two different sub-patterns or applying a sense extension mechanism on the individual word.

Table 1 shows another important point: Not all patterns necessarily produce words in all the categories. Simply put, some slots are often empty. For example, while the pattern [X-*andāz* $_{PRS}]_N$ produces words under all four categories of the human agent, instrument, object, and location, the words produced by the pattern [X-*paz* $_{PRS}]_N$ belong to only two categories of human agent and instrument. This is further evidence showing the role of convention in the development of the sub-patterns. The sense extension mechanisms are not mechanically applied to all the patterns ending in the verbal stems, instead, it is the usage and the communicative needs of the speakers that determine which sub-patterns be developed. From this perspective, one can claim that in Persian speaking society, there has existed needs for the pattern [X-*andāz* $_{PRS}]_N$ to produce nouns in all four meanings to label things. No such need existed for the pattern [X-*paz* $_{PRS}]_N$ as there have not been things

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meaning object or location to be labeled by words produced by this pattern. In other words, the speakers have not extended the pattern [X-*paz* $_{PRS}]_N$ to the sub-patterns of 'object' and 'location', for labeling 'a place where a specific kind of food is cooked', or 'an object related with the cooking of some specific food'.[1]

From a usage-based perspective (e.g., Bybee, 2010; Ibbotson, 2013; Paul, 1920), all word-formation patterns are subject to change to fulfill specific communicative needs. From this perspective, the development and change of word-formation patterns, including the patterns under study, are rooted in language usage. Therefore, the reason behind the development of a special sub-pattern (e.g., instrument or location) is to meet a particular communicative need. In the next section, as a case study, we will look at a change that has taken place in the pattern [X-*paz* $_{PRS}]_N$ and change in language usage due to some extra-linguistic factors.

5.2. Development of New Sub-patterns: The Case of Instrument Meaning in [X-paz $_{PRS}]_N$

In the present section, we investigate how the instrument sub-pattern has emerged in the pattern [X-*paz* $_{PRS}]_N$.[2] To this end, we first address the metaphorical extension at the word level. We will argue that the analysis of Persian data does not support this assumption. As a remedy, we will examine the hypothesis of reanalysis. Arguing against this hypothesis, too, we will proceed to justify the idea of approximation. We will argue that under the influence of technological advancement in Iranian society and the introduction of English instrument nouns, the pattern of *–paz* compound nouns, rather than individual words, has changed to develop a new sub-pattern to produce agentive instrument nouns through analogy.

5.2.1. Metaphorical Extension at the Word Level and the Reanalysis of the Pattern

Among 92 compound nouns ending in the present stem *-paz* extracted from the

1. This could be due to the presence of rival patterns, too. For example, the compound patterns of [X-*xāne* 'home'] (*ketāb- xāne* , lit. book-home, 'library'), and [X-*sarā* 'home] (*farhang-sarā*, lit. culture-home, 'community center') both meaning 'a place where an event related to X is done', as well as the derivational patterns [X-*kade*] (*honar-kade*, 'art school') and [X-*i*] (*kabāb-i*, 'kebab store') are very productive patterns for producing place names.

2. It is necessary to mention Azimdokht and Rafiei (2019) as a related article here. There, in the framework of Construction Morphology, we briefly dealt with *-paz* construction, the polysemy of the words derived from it, and its development. Our analysis in the present section is based on much more data, both synchronic and diachronic including neologisms on the net, to examine the claim that we made in the previous article.

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synchronic and diachronic corpora, 28 nouns have only instrumental meaning (e.g., *boxār-paz*, lit. steam-cook, 'food steamer'), nine nouns have both instrumental and agentive meanings (e.g., *polo-paz*, lit. rice-cook, 'a device which cooks rice/ a person who cooks rice'), and the remaining 55 words have only agentive meaning (e.g., *āš-paz*, lit. pottage-cook, 'chef'). As mentioned in section two, most studies on agent-instrument polysemy consider the instrumental meaning as a result of the metaphorical extension of the agentive meaning (e.g., Meyer-Lübke, 1890;

Rissman and Majid, 2019; Rissman and Rawlins, 2017). Accordingly, in those words with an agentive meaning, the target domain instrument is conceptualized via the source domain human agent through a gradual metaphorical projection. At first sight, this traditional hypothesis seems plausible for the Persian *–paz* compounds due to the existence of the words with both agentive and instrumental meanings. As an example, the word *kabāb-paz* (lit. kebab-cook), which initially referred to 'someone who cooks kebab', now, is used to name an instrument which cooks kebab. The same explanation can be assumed for most words with both meanings (e.g., nān-*paz*, lit. bread-cook, 'bread cooker/ baker', and *polo-paz*, lit. rice-cook, 'a device which cooks rice/ a person who cooks rice'). The agentive and instrumental meanings of *kabāb-paz, nān-paz*, and *polo-paz* are illustrated in the following example sentences:

(1)

a.	*felfor*	*kabāb-paz*	*mi-goft*	*berešte*	*bar*	*ātaš*
	quickly	kebab-cook	PROG-say.PST.3rd SG	roasted	on	fire

'The person who cooks kebab quickly asked to put roasted beef on the fire.'

(18th century)

b.	*jāyeze-ye*	*šomā*	*yek*	*dastgāh-e*	*kabāb-paz*	*ast*
	prize-EZ	you	a	device-EZ	kebab- cook	is

'Your prize is a roaster'

(1958)

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(2)

a. *nān-paz-e* *Čālāk*
bread-cook-EZ Nimble
'A nimble baker'
(12th century)

b. *nān-paz-e* *barqi-ye* *Morphy Richards*
bread-cook-EZ electric-EZ Morphy Richards
'Morphy Richards electric bread cooker.'
(1994)

(3)

a. *āšpaz-hā* *do* *daste* *hastand* *yeki* *az* *ānhā* *polo-paz-hā* *hast-and*
chef-PL two group Are One of them rice-cook-PL are
'The chefs are of two groups: one group are those who cook rice.'
(19th century)

b. *māst* *rā* *dar* *polo-paz* *be-riz-id*
yogurt OBJ marker in rice-cook SUBJ-pour-PRS.2nd SG
'Pour yogurt in the rice cooker.'
(2001)

Table 2 contains all the words with both agentive and instrumental meanings extracted from the corpora:

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Table 2
Persian Compound Nouns Ending in -Paz with Both Agentive and Instrumental Meaning

Persian Transcription	Meaning	English Translation
kabāb-paz	'kebab-cook'	roaster/ person who cooks kebab
nān-paz	'bread-cook'	bread cooker/ baker
polo-paz	'rice-cook'	rice cooker/ person who cooks rice
keik-paz	'cake-cook'	cake cooker/ person who cooks cake
pitzā-paz	'pizza-cook'	pizza maker/ person who cooks pizza
halim-paz	'porridge-cook'	porridge cooker/ person who cooks porridge
šir-paz	'milk-cook'	milk cooker/ person who makes cheese, cream, and so forth from milk
širini-paz	'confectionery-cook'	confectionery cooker/ person who cooks confectioneries
čelo-paz	'rice-cook'	rice cooker/ person who cooks rice

While the hypothesis of metaphorical extension of the agent to instrument seems plausible at first glance, it encounters some problems:

1) There is a considerable number of *-paz* compounds that only denote instrumental, not agentive meaning. Among 37 nouns with instrumental meanings, 28 words are of this type, so their meaning cannot be attributed to the result of the metaphorical extension, e.g., *zud-paz* (lit. soon-cook, 'pressure cooker'), *ārām-paz* (lit. slow-cook, 'slow cooker'), and *toxmemorq-paz* (lit. egg-cook, 'egg cooker'). This finding is consistent with some previous observations (e.g., Azimdokht, 2019; Azimdokht & Rafiei, 2019; Beard, 1990; Luschützky, 2011; Luschützky and Rainer, 2011, 2013; Panagl, 1975; Rafiei & Rezaei, 2019; Rainer, 2004a, 2004b 2005b, 2011, 2014, 2015).

2) In many cases, it is impossible to consider the personification metaphor to be relevant at all. Consider two examples of *havā-paz* (lit. air-cook, 'air cooker'), and *boxār-paz* (lit. steam-cook, 'food steamer'). In these cases, it is not plausible to assume that the speaker conceptualizes the instruments through metaphorical mapping from a person who cooks food by hot air or steam. Such an extension is not diachronically verified either.

To justify the current situation, one may resort to the Jabergian scenario. As mentioned in section two, according to Jaberg (1905), the semantic change in individual words, plus the application of the reanalysis of the pattern would lead to a semantic change in a word-formation pattern. This process may lead to the

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development of a new pattern alongside the older one.

Regarding the Persian data, one may assume that, as Booij (2010, 2018) claims about the Dutch *-er* suffix, at first, some words with agentive meanings have metaphorically extended to refer to new instruments, then, as these types of words grow, a new pattern in charge of producing instrument nouns has been developed. The development of the new independent instrumental pattern has led to the production of instrument nouns without the need for the metaphorical extension of counterpart agent nouns.

As mentioned in the research literature, if this assumption were valid, one would have to see a considerable number of nouns having both agentive and instrumental meanings. From our data, out of 92 words, only nine are used in both meanings. More importantly, as predicted by the reanalysis hypothesis, since the development of a pattern through the reanalysis mechanism is gradual by nature, the words with only instrumental meanings should have been produced later than the words with both meanings. Examples such as *xorāk-paz* (lit. food-cook, 'food cooker'), and *zud-paz* (lit. soon-cook, 'steam cooker') as the oldest instrument nouns with only instrumental meanings refute this claim. According to the data, the first example sentences for these words belong to 1950 and 1964, respectively.

By considering these observations and following Rainer (2004a, 2004b, 2005a, 2011, 2014, 2015, 2018) and Lushützky and Rainer (2011, 2013), it can be argued that the hypothesis of the metaphorical extension of the agent to the instrument at word level resulting in the reanalysis of the pattern of *-paz* compounds is not confirmed with the Persian data.

5.2.2. Approximation and Development of the Instrumental Pattern

Although the reanalysis hypothesis cannot do justice to the development of the instrumental pattern, this does not exclude the development of an independent pattern for the production of instrument nouns. Evidence confirms the existence of a separate and productive pattern for compound instrument nouns ending in *-paz*:

1) As mentioned above, there are some words with only instrumental meanings (e.g., *boxār-paz,* lit. steam-cook, 'food steamer'). 28 words out of 92 extracted words belong to this category. These words have no corresponding agent nouns; therefore, it is plausible to consider an independent pattern for them.

2) There are words such as *tahčin-paz* (lit. tahchin-cook) that have no corresponding agent nouns and do not have English equivalents. *Tahčin* is an Iranian food made from rice, meat, yogurt, eggs and saffron. The existence of such

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words indicates that the production of the instrument nouns cannot be reduced to loan translation.

The existence of *–paz* words with only instrumental meanings and the instrument nouns with no English equivalents make it inevitable to consider an independent and specific pattern for the production of instrument nouns. The question now is how this pattern was formed. To answer this question, we will consider the history of the formation of these words, and their type frequencies in the corpus, respectively.

The *-paz* compound words with agentive meaning have a long history in Persian, dating back at least to the 9th century. It is noteworthy that the Farhangyar corpus covers evidence from the 9th century onwards. Given that the words with agentive meaning exist in the earliest texts in the corpus, these kinds of words were most likely common even before the 9th century.

Despite the long history of the *-paz* compound nouns with the agentive meaning, using the nouns in instrumental meaning is quite a recent phenomenon. According to Farhangyar and Noormags corpora, the first instances of instrument nouns belong to the second half of the twentieth century. Table 3 shows the instrument nouns with their first approximate occurrence dates in the corpora.

Table 3

Instrument Nouns and Their First Approximate Occurrence Date

Persian Transcription	Meaning	English Translation	Occurrence Date
esteik-paz	steak-cook	steak maker	2013
esnak-paz	snack-cook	snack cooker	2014
ārām-paz	slow-cook	slow cooker	1994
boxār-paz	steam-cook	steam cooker	2003
berenj-paz	rice-cook	rice cooker	2014
beryān-paz	grill-cook	grill cooker	2010
pāstā-paz	pasta-cook	pasta cooker	2012
polo-paz	polo-cook	rice cooker	1989
pitzā-paz	pizza-cook	pizza maker	2006
pirāški-paz	pierogi-cook	pierogi maker	2017
toxmemorq-paz	egg-cook	egg cooker	2003
tahčin-paz	tahchin-cook	-	2013
juje-paz	chicken-cook	chicken cooker	2009
čelo-paz	rice-cook	rice cooker	1955
halim-paz	porridge-cook	porridge cooker	1959
xorāk-paz	food-cook	food cooker	1950
xoreš-paz	stew-cook	-	2010
donāt-paz	doughnut-cook	doughnut maker	2011
zud-paz	soon-cook	pressure cooker	1964

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Persian Transcription	Meaning	English Translation	Occurrence Date
sālem-paz	healthy-cook	-	2017
sup-paz	soup-cook	soup cooker	2016
šir-paz	milk-cook	milk-cooker	2015
šīrini-paz	cookie-cook	cookie baker	1977
qazā-paz	food-cook	food cooker	1997
kabāb-paz	kebab-cook	kebab cooker	1958
kate-paz	kate-cook	-	2015
kerākof-paz	krakow-cook	krakow baker machine	2014
keik-paz	cake-cook	cake cooker	2001
garm-paz	warm-cook	food warmer	2017
morq-paz	chicken-cook	chicken cooker	2008
nān-paz	bread-cook	bread maker	1994
wāfel-paz	waffle-cook	waffle maker	2015
hātdāg-paz	hot dog-cook	hot dog maker	2011
hamberger-paz	hamburger-cook	hamburger cooker	2013
havā-paz	air-cook	air cooker	2013
fereni-paz	porridge-cook	porridge cooker	1955
nudel-paz	noodle-cook	noodle cooker	2016

Four words in the table have no English equivalents (i.e., *tahčin-paz*, *xoreš*-paz, *sālem-paz*, and *kate-paz*). As mentioned earlier, *tahčin* is an Iranian food made from rice, meat, yogurt, eggs, and saffron; *xoreš* refers to a group of Iranian foods that are juicy combinations of fried vegetables or boiled beans, usually served with boiled meat; *sālem-paz* is a device for cooking a variety of healthy and non-smoked foods, usable indoors and table-top; and *kate* is a unique method of cooking rice usually attributed to the northern provinces of Iran.

As shown in Table 3, the first use of *-paz* compounds in instrumental meaning is observed in 1950 in the word *xorāk-paz* (lit. food-cook, 'food cooker'). According to the data, around 70 % of all instrument nouns are much newer and have a maximum dating back to 2000.

The remarkable point is that the formation of the *-paz* compound nouns with instrumental meaning coincides with the arrival of the new cooking equipment to Iran. Since the second half of the twentieth century, the introduction of modern technology to Iranian society has led to a widespread import and use of modern agentive instruments, among them newly invented cooking equipment. The most important feature of these types of equipment, when compared with the traditional ones, is the automatic and more efficient way they accomplish tasks. For example, with the advent of the roaster, what traditionally used to be done by hands in roasting a piece of meat, now by the new device, is done automatically, more

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efficiently, not requiring continuous monitoring, and in large numbers, if needed.

Evidence suggests that the justification of the development of instrumental word-formation pattern from *-paz* compounding should be sought in the extra-linguistic factor of the borrowing of vast numbers of technological notions, including cooking terms from European languages, in particular from English over the last decades due to modernization processes in Iran. The introduction of the new cooking equipment into the community and their widespread use have brought about a new communicative need for a particular word-formation pattern to produce words referring to them. This need has been fulfilled by the expansion of *-paz* compounds to provide an instrumental pattern. Thus, a change in the use of a word-formation pattern has led to a change in linguistic knowledge. This is in line with claims made by Booij and Audring (2015), Francesco and Basciano (2018), Jackendoff and Audring (2016, 2018, 2019), Luschützky (2011), Luschützky and Rainer (2011, 2013), Rainer 2004a, 2004b, 2005b, 2011, 2014, 2015) in other languages.

A review of English equivalents of the instrument nouns reinforces the hypothesis that the pattern of *–paz* compounds in Persian has developed an instrumental pattern under the influence of English instrument words.

The structural and semantic parallelism between the Persian and English instrument nouns suggests that the English equivalents have analogically influenced the pattern of *–paz*.

The English names of instruments act as a motivating factor for developing the instrumental pattern from Persian *-paz* compounds. Today, this word-formation pattern is independent and is used as a model to coin new words that have not necessarily been introduced into Persian from English, nor do they have any English equivalents, e.g., *sālem-paz* (lit. healthy-cook, 2017), *kate-paz* (lit. piloff-cook, 2015), *tahčin - paz* (lit. tahchin-cook, 2013), and *xoreš – paz*, lit. stew-cook, 2010):

(4)

sālem-paz-e *Atrona*

healthy-cook-EZ Atrona

'Atrona healthy cooker.'

(http://atronaco.com, retrieved on January 25th, 2020)

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(5)

kate-paz	*jozv-e*	*tajhizāt-e*	*āšpazxāne-hā-ye*	*sanʔati*	*ast*
piloff-cook	part-EZ	utensil-EZ	kitchen-PL-EZ	industrial	is

'Piloff cooker is one of the industrial kitchen utensils'

(https://ashpazkhaneha.com/katepaz/, retrieved on January 26th,2020)

(6)

xarid-e	*interneti-ye*	*tahčin-paz-e*	*Toranj*
shopping-EZ	online-EZ	tahchin-cook-EZ	Toranj

'Online shopping of Toranj tahchin-cooker'

(http://digikala.com, Retrieved on January 27th,2020)

(7)

xoreš-paz-e	*sanʔati*	*barāy-e*	*resturān-hā-ye*	*bozorg*
stew-cook-EZ	industrial	for- EZ	restaurant- PL- EZ	large

'Industrial stew cooker for large restaurants'

(http://industrial-kitchen.com, Retrieved on January 26th, 2020)

When a new word-formation pattern is shaped, it usually starts to produce a limited number of words. As the speakers frequently use the produced words, the pattern gradually becomes established. The speakers can then use the established and accessible pattern to produce more and more words (McColm & Trousdale, 2019; Norde & Trousdale, 2016; Traugott & Trousdale, 2013; Trousdale, 2019). Coining of new *-paz* compounds with instrumental meaning, or using the existing agentive nouns in instrumental meaning, has been a growing phenomenon. Table 4 shows the type frequency distribution of the instrumental nouns since the 1950s:

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Table 4
Type Frequency Distribution of Instrument Nouns Since the 1950s

Decade	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2019
Type Frequency	5	1	1	1	3	6	20

By surfing the Web, one can find more evidence of the increasing usage of the instrument nouns ending in *-paz*. Two instances are *šir-paz* (lit. milk-cook, 'milk cooker', 2015) and *nudel-paz* (lit. noodle-cook, 'noodle cooker', 2016):

(8)

šir-paz	*yek*	*vasile-ye*	*Xub*	*barāye*	*tolid-e*	*šir*	*ast*
milk-cook	a	appliance-EZ	Good	for	production-EZ	milk	is

'milk cooker is a good appliance for boiling/cooking milk.'

(https://www.uryad.com/shop, Retrieved on January 27th, 2020)

(9)

noodel-paz-e	*Shamim*
noodle-cook-EZ	Shamim

'Shamim noodle cooker.'

(https://www.aparat.com/v/EVgmn, Retrieved on January 27th, 2020)

As Bybee (1985, 1995, 2001, 2010) argues, the productivity of a given word-formation pattern depends on that pattern's type frequency. The increasing frequency of the words produced by the newly developed instrumental pattern of *-paz* compounds indicates that this pattern is established and productive in modern Persian.

Although the metaphorical extension at the word level is not confirmed, it does not mean that metaphorical relations are not available to the speakers at all. According to the approximation mechanism, it is plausible to hypothesize that Persian speakers, thinking metaphorically in the pattern level and under the analogy

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with English instrument nouns, have decided to use the pattern of *–paz* in an approximate way to form instrument nouns in addition to human agent nouns. This process has led to developing an independent instrument pattern that can produce nouns with just instrumental meanings.

From a usage-based perspective to language change, new communicative needs may force speakers to use word-formation patterns in new ways. With any change in the communicative needs, the corresponding pattern undergoes some changes as well. This process may even lead to the development of new patterns. If for whatever reason, the communicative need is extended, reduced, or removed, the corresponding pattern will be extended, marginalized, or removed from the lexicon ((McColm & Trousdale, 2019; Norde & Trousdale, 2016; Traugott & Trousdale, 2013; Trousdale, 2019). As for the compound words ending in *–paz*, and probably other patterns in charge of agent nouns in Persian, the advancement of technology and the introduction of new English instrument nouns to the Iranian society have given rise to a communicative need for naming the new cooking equipment, and this applied need has finally led to the extension of instrument pattern.

6. Conclusion

In this study, we investigated the semantic fragmentation of Persian $[XV_{PRS}]_{N.}$ The compounds ending in present stems appear as human agents, instruments, objects, and locations. The produced words belong to some specific categories. At the same time, not all patterns necessarily produce words in all the categories. This proposes a kind of conventionalization in the semantic fragmentation and assigning a word to a semantic category.

Taking a usage-based account to language, it is claimed that the intriguing force behind the conventionalization is communicative needs. Taking both synchronic and diachronic stances to the change that occurred in the word-formation pattern $[X\text{-}paz_{\ PRS}]_N$ as a case study, we showed that the instrument extension in this pattern is due to some extra-linguistic motivations. By arguing against the hypothesis of metaphorical extension at the word level, and the mechanism called reanalysis, we showed that the instrumental meaning of the compound nouns in question is a recent linguistic phenomenon that coincides with the introduction of modern cooking equipment with mostly English names to the Iranian society. The increasing use of these equipment has led to a new communicative need for naming such instruments. This extra-linguistic factor has motivated the pattern of *–paz* to be extended through analogy with English compound instrument nouns. Now, Persian

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speakers use the instrument pattern of *-paz* to produce new instrument words or understand the meaning of words they face for the first time. Coinage of words with no English equivalents and increasing type frequency of the coined words indicate the establishment of this pattern as an independent and productive pattern in modern Persian. The development of new instrument meaning shows how new communicative needs may force speakers to use the word-formation patterns in new ways.

As a recent example, we may point to the ongoing change that the Covid-19 pandemic crisis makes in the *–paz* pattern. It seems that the tendency to cook foods at home rather than buying from outside has forced the speakers to use words with the meaning of 'food that is cooked by someone' (e.g., *keik-e xodam-paz*, lit. cake-of myself-cook, 'a cake cooked by me'). Although this usage is not entirely new in Persian, and there are a few words with this meaning in the corpus (e.g., *doxtar-paz*, lit. girl-cook 'food cooked by a girl'), one frequently encounters such words- both existing and newly coined (e.g., *refiq-paz*, lit. friend-cook, 'a food cooked by a friend')- since the beginning of the pandemic. In the long run, this can lead to the development of another established and productive sub-pattern.

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Appendix

Abbreviations

PROG	progressive	*PRS*	Present
EZ	Ezāfe	*PST*	Past
OBJ	Object	*SG*	Singular
PL	Plural	*SUBJ*	Subjunctive

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