Fluctuations in allomorphy domains: Applying Stump 2010 to Armenian ordinal numerals

HOSSEP DOLATIAN (ORCID)

Stony Brook University, United States

Numerals and ordinals occupy a special place in the typology of suppletion. In generative work, one basic cross-linguistic parameter is whether ordinal allomorphy displays internal vs. external marking. Internal marking is when irregular forms propagate from lower ordinals to higher ones (English 'first'→'twenty-first'), whereas external marking is the lack of propagation. We catalog ordinal formation in Armenian dialects through both formal-generative and functional-typological perspectives. We find that Eastern Armenian and Early Western Armenian are uniformly external-marking systems for the ordinals of '1–4'. However, Modern Western Armenian is a mixed system: '1' displays external-marking while '2–4' display internal-marking. Simultaneously, the ordinal of '1' uses a suppletive portmanteau, while the ordinals of '2–4' use agglutinative allomorphs. We formalize these differences in a derivational approach to morphology (Distributed Morphology). We argue that mixed systems arise from allomorphy rules that are sensitive to either constituency or linearity. The Western mixed system seems typologically rare and novel. Given our formal analysis, we then uncover other asymmetries in the propagation of irregular ordinals and the retention of portmanteau morphology across 35 Armenian varieties. The end result is a strong functional correlation between suppletion, external marking, and lower numerals.

KEYWORDS: suppletion, allomorphy, ordinal, irregular morphology, Distributed Morphology, numeral, inheritance, diachronic change

1. INTRODUCTION

Within morphology, numeral systems often show restricted types of morphosyntactic relationships. There is a wealth of work on the formation of cardinal numbers from each other (Hurford 1975; Ionin & Matushansky 2013; Veselinova 2020; Sudo & Nevins 2022) and the syntax-semantics of ordinals (Ionin & Matushansky 2018; Tatsumi 2021). This paper focuses on a small corner of ordinal typology: the derivation of ordinals from cardinals (Stump 2010). We catalog this phenomenon across a sample of 35 Armenian varieties with both a generative and typological goal.[1]

---

[1] For their help, I thank Ronald Kim and Agnes Ouzounian (for Classical data collection), Nikita Bezrukov and Hrach Martirosyan (for dialectal data collection), and Gregory Stump and Ljuba

1

Within ordinal morphology, a common cross-linguistic tendency is for the lower cardinal numbers to have suppletive ordinal forms, e.g., English 'one' and 'first' (Veselinova 1997; Stolz & Veselinova 2013; Stolz & Robbers 2016). Although the suppletion of low numbers is common, languages vary in whether these suppletive forms are propagated to higher forms (Hurford 2003; van Drie 2015).[2] For example, alongside 'twenty-one', English does not use a form *twenty-one-th; instead 'twenty-first' is used, showing inheritance from 'first'. French, however, blocks this inheritance in higher forms, e.g., 1 and 21 are *un* and *vingt-et-un* respectively, but their ordinals are *premier* and *vingt-et-unième* instead of *vingt-et-premier.* Based on this difference in inheritance patterns of suppletion, Stump (2010) categorizes ordinal formation as externally marked in French, while it is internally marked in English.

In this paper, we apply these typological and generative findings to Armenian. Armenian is an independent branch within the Indo-European family with two standard lects: Western and Eastern Armenian.[3] In both standard dialects (Table 1), the suppletive ordinal of 1 is a portmanteau that is not propagated to higher numbers like 21. In contrast, the ordinals of 2–4 are agglutinative and use special root and suffix allomorphs. These allomorphs are propagated to higher numbers like 24 in Modern Western Armenian but not in Eastern Armenian. We thus find dialectal variation in that Eastern Armenian blocks propagation for all ordinals, regardless of whether the ordinal is a portmanteau or agglutinative. We underline these irregular forms throughout this paper.

The Western Armenian data demonstrate an unexpected mixed system of external marking for '1' but internal marking for '2–4'. In terms of our generative analysis, we develop an analysis based on Stump's 2010 foundational work on

	Standard Eastern		Standard Western	
	Cardinal	Ordinal	Cardinal	Ordinal
'1'	mek	a͡ratʃʰin	meg	a͡ratʃʰin
'21'	kʰəsan-mek	kʰəsan-mek-eɾortʰ	kʰəsan-meg	kʰəsan-meg-eɾortʰ
'4'	t͡ʃʰoɾs	t͡ʃʰoɾ-ɾortʰ	t͡ʃʰoɾs	t͡ʃʰoɾ-ɾortʰ
'24'	kʰəsan-t͡ʃʰoɾs	kʰəsan-t͡ʃʰoɾs-eɾortʰ	kʰəsan-t͡ʃʰoɾs	kʰəsan-t͡ʃʰoɾ-ɾortʰ

Table 1
Overview of ordinals in Standard Armenian.

[2] From a different angle, Stolz (2002) looks at the propagation of syntactic requirements for complex numerals.

[3] Data are from my native Western judgments, elicitations, and the sources in the bibliography. Data are transcribed in the International Phonetic Alphabet (IPA). Note that affricate aspiration is quite variable in Western Armenian, but we mark it for easier illustration. Our glosses are CARD (cardinal), CON (connecting element), DEC (decade), DEF (definite), ORD (ordinal), and K (case).

ordinals. We translate his Paradigm Function Morphology (PFM)-based analysis to a piece-based realizational model of morphology like Distributed Morphology (DM) (Halle & Marantz 1993; Arregi & Nevins 2012), but our generalizations can easily extend to other models. We adapt these generalizations on propagation and internal/external marking to DM-based work on allomorphy domains (Embick 2010, 2015; Bobaljik 2012; Moskal 2015). Briefly, external marking requires that the sequence $\sqrt{}$-ORD forms a morphosyntactic constituent, while internal marking weakens this restriction to just requiring linearity.

Typologically, the ordinal data from the two standard dialects suggests multiple asymmetries between '1' and '2–4'. The ordinal of '1' is a suppletive portmanteau and never propagates, while the ordinals of '2–4' are numerically higher, agglutinative, and variably propagate. To foreground these asymmetries, we go through a sample of non-standard Armenian dialects that we had access to. The end result is a typological application on ordinal allomorphy across 35 Armenian varieties. The application demonstrates the utility of Stump's original typology and foregrounds functional correlations for suppletion in lower numbers.

This paper is organized as follows. In Section 2, we first explain Stump's 2010 groundbreaking generative typology of ordinal allomorphy. We then catalog ordinal formation in Modern Standard Armenian (Section 3). We formalize the Armenian data in Section 4 and develop our generative analysis. We then go through a wider typology of Armenian varieties in Section 5. We discuss and summarize our findings in Section 6. We conclude in Section 7.

2. STUMP 2010'S TYPOLOGY OF ORDINAL FORMATION

Stump (2010) is a large cross-linguistic study of ordinal formation. That paper sets up both typological and generative benchmarks for studying suppletion and allomorphy in ordinal formation. He sets up a basic parameter for ordinal formation: whether there is percolation of irregular forms (internal marking) or not (external marking).

Informally, a language has an internal-marking ordinal system if complex numerals inherit the ordinal allomorphs of their simple forms, while a language has external marking if there is no such inheritance. To illustrate, consider the numbers '1' and '21' in English and French in Table 2.

	English (internal)		French (external)	
	Cardinal	Ordinal	Cardinal	Ordinal
1	'one'	'first'	'un'	'premier'
21	'twenty-one'	'twenty-first'	'vingt-et-un'	*vingt-et-premier
		*twenty-oneth		'vingt-et-unième'

Table 2
Internal vs. external marking in English and French.

3

In English, the ordinal form of 'one' is a suppletive 'first', and not an agglutinative *one-th*. This suppletive form is inherited by higher numbers such as 'twenty-first'. Informally, such an allomorphy pattern is called internal marking because the ordinal form of the entire number '21' is based on the ordinal form of the internal unit '1'.

In contrast, French has external marking. The suppletive ordinal of *un* '1' is *premier*. But this suppletive form is not propagated to higher numbers. We thus get *vingt-et-unième* and not *vingt-et-premier*, even though *un-ième* is not a free-standing form. Such a system is called external marking because the ordinal form is determined based on examining the entire number '21', and not just the internal 'one' unit.

Structurally, for [[20-1]-ORD], the allomorphy pattern resembles a bracketing paradox in English but not in French (Pesetsky 1985; Stump 1991; 1996; Newell 2019).

Stump (2010) further elaborates this typology by introducing other parameters of variation, such as extended marking and conjunct marking. We set these aside for now and return to them later (Sections 4.4 and 5.2). The next section discusses how the Armenian data fit into this basic parameter system.

3. NUMERALS OF MODERN STANDARD ARMENIAN

Armenian is a pluricentric language made up of two standard dialects (Standard Western and Standard Eastern) and a host of non-standard dialects. We first focus on the two standard varieties. The two standard forms share largely the same morphology but with some systematic phonological differences. We go through the cardinal (Section 3.1) and ordinal systems (Section 3.2) and then patterns of ordinal inheritance (Section 3.3).

3.1. *Cardinal numerals of the two standards*

Numerals can be categorized as either cardinals (CARD) or ordinals (ORD). There is variation in the morphological structure of the cardinal (Table 3). Numbers 1–6 are monomorphemic from a simple root ($\sqrt{}$), while 7–10 can variably take the definite suffix *-ə* (DEF). The decade 20 is a single root, while the decades 30 and higher are

	Eastern	Western		Eastern	Western	
'5'	hiŋg	hiŋkʰ	'6'	veʦʰ	veʦʰ	$\sqrt{}$
'7'	jotʰ(-ə)	jotʰ(-ə)	'10'	tas(-ə)	das(-ə)	$\sqrt{}$-DEF
'20'	kʰəsan	kʰəsan	'50'	hi-sun	hi-sun	$\sqrt{}$ (-DEC)
'100'	haɾjuɾ	haɾɣɾ	'1000'	hazaɾ	hazaɾ	$\sqrt{}$

Table 3
Simple cardinal numbers in Standard Armenian.

4

made up of a bound root plus the decade suffix *-sun* (DEC). The higher numbers '100, 1000' are also single roots.

As for combining numbers to form complex numerals (Table 4), the teens are formed by combining the number '10' + the definite suffix *-n* + a connective schwa (CON) + the ones unit.[4] The higher numbers (25, 35, …) are formed by simple concatenation of the larger numeral and then the smaller numeral.

This completes cardinal numerals. We next discuss ordinals.

3.2. *Ordinal numerals in the two standards*

For most cardinal numbers, their ordinal form is transparently created by adding the ordinal suffix *-eroɾtʰ* after the cardinal. There is limited allomorphy, which we discuss in Section 3.3.

For simple numbers 5–10, decades, and their complex numeral combinations, the ordinal is formed by adding the suffix *-eroɾtʰ* in both dialects (Table 5). Numbers 7–10 and the teens can variably include the definite suffix *-n-* before the ordinal suffix.

	Eastern	Western	
'15'	tɑs-n-ə-hiŋ	dɑs-n-ə-hiŋkʰ	10-DEF-CON-5
'25'	kʰəsɑn-hiŋ	kʰəsɑn-hiŋkʰ	20-5
'56'	hi-sun-vetsʰ	hi-sun-vetsʰ	50-DEC-6
'1005'	hɑzɑɾ-hiŋ	hɑzɑɾ-hiŋkʰ	1000-5

Table 4
Complex cardinal numbers in Standard Armenian.

	Eastern	Western	
'5'	hiŋ	hiŋkʰ	5
'5th'	hiŋ-eroɾtʰ	hiŋkʰ-eroɾtʰ	5-ORD
'10'	tɑs(-ə)	dɑs(-ə)	10(-DEF)
'10th'	tɑs(-n)-eroɾtʰ	dɑs(-n)-eroɾtʰ	10(-DEF)-ORD
'20'	kʰəsɑn	kʰəsɑn	20
'20th'	kʰəsɑn-eroɾtʰ	kʰəsɑn-eroɾtʰ	20-ORD
'25'	kʰəsɑn-hiŋ	kʰəsɑn-hiŋkʰ	20-5
'25th'	kʰəsɑn-hiŋ-eroɾtʰ	kʰəsɑn-hiŋkʰ-eroɾtʰ	20-5-ORD
'1000'	hɑzɑɾ	hɑzɑɾ	1000
'1000th'	hɑzɑɾ-eroɾtʰ	hɑzɑɾ-eroɾtʰ	1000-ORD

Table 5
Regular ordinals for most numerals in Standard Armenian.

---

[4] The definite suffix has two allomorphs *-n,-ə*. The nasal is conditioned when next to a vowel, while the schwa is elsewhere (Dolatian 2022a).

5

	Eastern		Western		
'1'	mek		meg		1
'1st'	$\widehat{\mathrm{arat\int}}^h$in	*mek-erorth	$\widehat{\mathrm{arat\int}}^h$in	*meg-erorth	1.ORD
'2'	jerku		jergu		2
'2nd'	jerk-rorth	*jerku-erorth	jerg-rorth	*jergu-erorth	2-ORD
'3'	jerekh		jerekh		3
'3rd'	jer-rorth	*jerekh-erorth	jer-rorth	*jerekh-erorth	3-ord
'4'	$\widehat{\mathrm{t\int}}^h$ors		$\widehat{\mathrm{t\int}}^h$ors		4
'4th'	$\widehat{\mathrm{t\int}}^h$or-rorth	*$\widehat{\mathrm{t\int}}^h$ors-erorth	$\widehat{\mathrm{t\int}}^h$or-rorth	*$\widehat{\mathrm{t\int}}^h$ors-erorth	4-ORD

Table 6
Irregular ordinals for numbers '1–4' in Standard Armenian.

We see suppletion and allomorphy, however, for the smaller numbers (Table 6). Number '1' has a fused suppletive form: 'one' *mek/meg* vs. 'first' *$\widehat{arat\int}^h$in/ $\widehat{arat\int}^h$in*.[5] In contrast, numbers 2–4 use different allomorphs for both the root and ordinal suffix: 'four' $\widehat{t\int}^h$ors vs. 'fourth' $\widehat{t\int}^h$or-rorth.

For the number '1' and its ordinal form, Standard Eastern and Western Armenian follow the common typological pattern of using a separate lexeme for the ordinal, such as in English (Veselinova 1997). The form *$\widehat{arat\int}^h$in* can be considered a portmanteau form.

For numbers 2–4, the ordinal is an irregular reduced form of the regular forms. There is a separate allomorph for the root and the suffix. Such reductions are allomorphic because they are unique to these numerals.[6] There is no general phonological rule that deletes obstruents like /s, kʰ, k, g/ before a vowel or rhotic. Such alternations are restricted to these three roots.[7]

3.3 Propagation or inheritance of irregular ordinals

The previous section established the basic patterns of regular ordinals and irregular ordinals. This section shows how the standard dialects vary in the inheritance of these irregular forms in complex numerals. Briefly, Standard Eastern and Early Standard Western are uniformly external marking languages, while Modern Standard Western is a mixed system.

For the numeral 'one' *mek*, its ordinal is a suppletive portmanteau *$\widehat{arat\int}^h$ in*, like English 'first'. This suppletive form, however, is not inherited by complex numerals

---

[5] The portmanteau [$\widehat{arat\int}^h$in] 'first' is morphologically related to the word [$\widehat{arat\int}^h$] which means 'forward, before' in the modern language. In Classical Armenian, the portmanteau also had other meanings like 'previous', while the root had other meanings like 'front' (Vidal-Gorène et al. 2021). The etymological connection between these words is cross-linguistically common (Veselinova 1997: 441).

[6] Such reductions can go further in colloquial speech. Compare prescriptive 'second' *jerk-rorth, jerg-rorth* vs. colloquial *jek-rorth, jeg-rorth*.

[7] One has to treat these morpheme alternation patterns as either highly morpheme-specific readjustment rules or as simple allomorphy. We go for allomorphy (Haugen 2016).

	Eastern	Western	
'1'	mek	meg	1
'1st'	aratʃʰin	aratʃʰin	1.ORD
	*mek-erortʰ	*meg-erortʰ	*1-ORD
'21'	kʰəsan-mek	kʰəsan-meg	20-1
'21st'	*kʰəsan-aratʃʰin	*kʰəsan-aratʃʰin	*20-1.ORD
	kʰəsan-mek-erortʰ	kʰəsan-meg-erortʰ	20-1-ORD

Table 7
Blocked suppletion for derivatives of 'one' in Standard Armenian.

(Table 7). Like French, complex numerals instead attach the regular ordinal suffix to create a sequence of morphemes, which is not attested as a separate word: *-mek-erortʰ*. Such external marking is found in both dialects. We underline the irregular forms.

For the numeral 'one', the two dialects show external marking. However, the dialects diverge for numbers '2–4'. First, consider Standard Eastern Armenian (Table 8). The ordinal forms of '2–4' involve special allomorphs for both the root and suffix. Such irregular allomorphs are *not* propagated to complex numbers. We underline the irregular forms.[8]

For Eastern Armenian, the irregular portmanteau of '1' and the irregulars allomorphs of '2–4' are not propagated to higher numbers. Thus, Eastern Armenian is uniformly external marking, like French.[9]

	'2'	'3'	'4'	
CARD:	jerku	jerekʰ	tʃʰors	√
ORD:	jerk-rortʰ	jer-rortʰ	tʃʰor-rortʰ	√-ORD
	*jerku-erortʰ	*jerekʰ-erortʰ	*tʃʰors-erortʰ	*√-ORD
	'22'	'23'	'24'	
CARD:	kʰəsan-erku	kʰəsan-erekʰ	kʰəsan-tʃʰors	20-√
ORD:	*kʰəsan-erk-rortʰ	*kʰəsan-er-rortʰ	*kʰəsan-tʃʰor-rortʰ	*20-√-ORD
	kʰəsan-erku-erortʰ	kʰəsan-erekʰ-erortʰ	kʰəsan-tʃʰors-erortʰ	20-√-ORD

Table 8
Blocked suppletion for derivatives of '2–4' in Standard Eastern Armenian.

[8] For the ordinals of 'X2', a glide is inserted in pronunciation to avoid vowel hiatus: Eastern '22nd' *kʰəsan-jerku[j]-erortʰ*. We do not mark this glide in our data for illustration.

[9] As an independent morphophonological process (Dum-Tragut 2009: 15), root-initial [je] substrings can alternate with [e] when word-medial: *tʃʰə-jerkʰem ~ tʃʰ-erkʰem* 'NEG-SING' ('I do not sing'). We see this variable alternation also in complex numerals for '2' and '3': '22' *kʰəsan-jergu ~ kʰəsan-ergu* and '23' *kʰəsan-jerekʰ ~ kʰəsan-erekʰ*. Most Eastern speakers prefer the medial [-e] forms and think of the [-je] forms as either hyper-correct or normative, while most Western speakers prefer the medial [-je] forms and think the [-e] forms are hyper-correct or normative. We set this variation aside because it is tangential.

7

	'2'	'3'	'4'	
CARD:	jeɾgu	jeɾekʰ	t͡ʃʰoɾs	√
ORD:	jeɾg-ɾoɾtʰ	jeɾ-ɾoɾtʰ	t͡ʃʰoɾ-ɾoɾtʰ	√-ORD
	*jeɾgu-eɾoɾtʰ	*jeɾekʰ-eɾoɾtʰ	*t͡ʃʰoɾs-eɾoɾtʰ	*√-ORD
	'22'	'23'	'24'	
CARD:	kʰəsan-jeɾgu	kʰəsan-jeɾekʰ	kʰəsan-t͡ʃʰoɾs	20-√
ORD				
early:	kʰəsan-jeɾgu-eɾoɾtʰ	kʰəsan-jeɾekʰ-eɾoɾtʰ	kʰəsan-t͡ʃʰoɾs-eɾoɾtʰ	20-√-ORD
modern:	kʰəsan-jeɾg-ɾoɾtʰ	kʰəsan-jeɾ-ɾoɾtʰ	kʰəsan-t͡ʃʰoɾ-ɾoɾtʰ	20-√-ORD

Table 9
Variable propagation of irregular forms for derivatives of '2–4' in Standard Western Armenian.

For Standard Western Armenian, we see variation (Table 9). In early variants of Standard Western Armenian, we again find that the numbers '2–4' do not propagate their irregular allomorphs: '23rd' *kʰəsan-jeɾekʰ-eɾoɾtʰ*. Such forms are attested in older grammars and in some modern teaching grammars, which we later list. In contrast, contemporary or Modern Standard Western *does* propagate these irregular forms: '23rd' *kʰəsan-jeɾ-ɾoɾtʰ*. Such forms are attested marginally in some older grammars but often in more modern grammars.

Within Stump's typology, Early Standard Western is classified as always an external marking language, like Standard Eastern. In contrast, Modern Standard Western does not easily fit into either of these categories. The ordinals of '1' and its higher numbers are uniformly external marking (like French), while the ordinals of '2–4' and their higher numbers are internal marking (like English). We label this system as a mixed system.

Because such variation data is subtle, the list in (1) shows the few references that we found that explicitly provided data on the complex ordinals for Standard Eastern and Western.[10] A few sources explicitly contrast the uniformly external marking system of Eastern against the mixed system of Modern Western (Սարգսյան 1985: 209; Hagopian 2005: 308).

(1) Sources that explicitly provide data for treating…
  (a) Eastern Armenian as uniformly external marking: Abeghian (1936: 78–79); Minassian (1980: 129); Սարգսյան (1985: 209); Bardakjian & Vaux (1999: 94), Ասատրյան (2004: 158); Hagopian (2005: 308); Sakayan (2007: 131)
  (b) Western Armenian as uniformly external marking: Riggs (1856: 20); Այտընեան (1867: 24); Սönեlեան (1899: 87); Gulian (1902: 37); Abeghian (1936: 78–79), Kogian (1949: 55); Տասնապետեան

---

[10] We say 'explicitly' because many sources simply state that the low numbers 1–4 use irregular forms (and show them), while they state that other numbers use regular forms. But they do not explicitly show the formation of the relevant complex numbers, such as both 11/21 and 14/24 (Johnson 1954: 176; Եզեկյան 2007: 255; Dum-Tragut 2009: 120).

(1990: 73) (published posthumously after his death in 1974); Andonian (1999: 82) (first published 1966); Sakayan (2000: 120)

(c) Western Armenian as mixed (external for '1', internal for '2–4'): Քիրէննեան (1864: 55); Սարգսյան (1985: 209); Samuelian (1989: ch.24); Hagopian (2005: 280)

For Western Armenian, some sources prescribe uniform external marking for the derivatives of '1–4', but they also report that internal marking for the derivatives of '2–4' is attested (Bardakjian & Thomson 1977: 85; Bardakjian & Vaux 2001: 108) although discouraged (Չոլաքեան 2018: 45; Եղիայեան 2022: 159). In contrast, some sources report that mixed marking is the norm for Western and that some speakers are using uniform external marking due to contact with Eastern Armenian (Եղիայեան 2017: 173). Some sources report that both uniform and mixed marking are attested, without giving a prescriptive or descriptive preference (Ամէնհիսյան 2007: 96).

The modern internal-marking forms are quite pervasive across Western Armenian communities. I am a speaker of Standard Western from the Lebanese community. I confirmed my judgments against other people from Lebanon, Turkey, and the US (all under 40 years old). In my own anecdotal experiences, I had never heard of external-marking forms like $k^h\partial san$-$je\varepsilon ek^h$-$e\varepsilon o\varepsilon t^h$ outside of a) Standard Eastern, b) Early Standard Western grammars, and c) some modern pedagogical grammars.

Given this empirical landscape, the next section formalizes the various ordinal forms.

4. Formalizing ordinal formation

This section formalizes the concepts of external, internal, and mixed marking systems. We first explain Stump's 2010 original analysis, couched in PFM (Section 4.1). We adapt his analysis to an alternative framework, DM (Section 4.2). We then apply it to Armenian (Section 4.3) and briefly discuss alternatives (Section 4.4).

4.1. *Stump's formalization of internal vs. external marking*

Stump (2010) is a benchmark for exploring the morphological structure of ordinal allomorphy. Before we formalize the Armenian data, we show how the basic parameter of internal vs. external marking is modeled in Stump's framework: PFM (Stump 2001).

Recall that English and French are our canonical examples for internal vs. external marking. In a model like PFM, morphological operations are informally conceived as item-and-process operations (Hockett 1942). By default, a process of ordinal formation adds a suffix to the input (2a) (cf. Stump 2010: 214). For suppletive forms like 'one', a special ordinal operation is defined for this numeral

9

(2b). The two rules are in competition with each other, and the latter wins for 'one' by being more narrowly defined.

(2) PFM operations for English and French ordinals
    (a) Default suffixation
        (i) English: **Ord**(X) = X-*th*
        (ii) French: **Ord**(X) = X-*ième*
    (b) Portmanteau allomorphy for ordinal 'one'
        (i) English: **Ord**(*one*) = *first*
        (ii) French: **Ord**(*un*) = *premier*
    (c) Internal marking for English (recursive decomposition)
        Ord([X Y])=[X **Ord**(Y)]

For higher numbers like '21', the languages vary. French is external marking: French merely adds the ordinal suffix *-ième* (2a-ii). The suppletion rule (2b-ii) is defined only for '1' *un* and not '21' *vingt-et-un*. But English is internal-marking. A rule of decomposition (2c) defines the ordinal form of a large number '21' in terms of a concatenation of '20' and the ordinal of '1'. Such a rule exists for English but not French; and this rule applies for all ordinals in English.

Stump's PFM account is elegant and captures the data. For this paper, however, we translate Stump's system into an entirely separate formalization of morphology: DM (Halle & Marantz 1993). The reasons are the following.

The first reason is scientific replicability. It is a strength for Stump's generalizations and analyses that his system can be translated to a separate framework. By converting his analysis to DM, we reinforce the cross-linguistic and cross-theoretic utility of his typology. They are not tied down to any one specific formalism but can be generalized across frameworks.

The second reason is operational ease. PFM is an inferential-realizational framework (essentially item-and-process) whereby morphology is defined in terms of operations/processes and not morphemes/morphs. The formalism allows restricted uses of word-internal hierarchical structure (mostly for compounds and syntax-like complex numerals). DM in contrast is lexical-realizational (essentially item-and-arrangement), where morphology works over morphemes/morphs, and there is hierarchical structure for everything. We use DM to highlight the role of hierarchical constituency in ordinal allomorphy and to more visibly distinguish suppletive portmanteaus (a single morph) from agglutinative allomorphy (two morphs).

The third reason is theoretical refinements. Stump's original PFM account made certain assumptions on the syntactic structure of complex ordinals like '21st', which would differ in external vs. internal marking systems (footnote 12) and in languages with extended marking (Section 5.2). In contrast, DM assumes that the input to the morphology is directly motivated by the semantics or abstract syntax. This means that at an abstract level, we would expect that the syntactic structure of '21' should be essentially the same in different languages, or at least for different dialects of the same language. The morphology can then apply operations that would change this structure

10

and thus create mismatches between the (universal) semantics and the (language-specific) morphology. By using a DM-based syntactic structure, we discover points of ambiguity and possible controversy in Stump's typology. These points do not negate Stump's work, but they set up paths for future refinements of the typology and discovering possible connections between the typology of ordinal morphology and the typology of ordinal syntax/semantics.

The fourth reason is theory-internal benefits. The Armenian data provide theory-internal evidence on how different allomorphy domains can be defined in DM. In fact, Stump's dichotomy between internal vs. external marking ends up analogous to linearity vs. constituency (spans) in the DM toolkit.

Fifth, the diachronic change from Early to Modern Western Armenian is formalized as rule simplification for DM but as a rule addition for PFM (Section 4.2). This paper cannot answer the typological question of whether the change from external-to-internal marking is cross-linguistically common. But such a change is subjectively more obvious to analyze and interpret in DM than in PFM.

Finally, computationally speaking, PFM and DM are inter-translatable. Within formal language theory, both models computationally define regular languages and thus have the same weak generative capacity or expressivity (Karttunen 2003; Roark & Sproat 2007; Ermolaeva & Edmiston 2018). Thus, any linguistic process that can be defined in one model is a priori definable in another. The mathematical equivalency between the two models should encourage the dialogue between the two formal camps (Kramer 2016; Siddiqi & Harley 2016).

4.2. *Linearity vs. constituency in allomorphy*

Having shown how PFM formalizes internal vs. external marking, this section sets up a formal system for DM. Briefly, internal marking references locality domains, while external marking references constituency domains.

For clarity, we describe some basic assumptions in DM that are relevant for ordinal allomorphy. More information can be found in more dedicated surveys (Harley & Noyer 1999; Embick & Noyer 2007; Bobaljik 2017). We focus on a handful of tools from DM.

DM works over lexical items (pieces), often called morphemes or morphs. The input to the morphological derivation is a sequence or structure of feature bundles. These bundles are then realized by specific morphs. For English and French, there is no ordinal process but an abstract ordinal morpheme ORD that is realized in a multitude of ways, one of which is a default form (3a). Such realization rules are called Vocabulary Insertion (VI) rules. For number morphs, we assume that the roots are indexed items (Harley 2014), such that a root for 'one' is underlyingly $\sqrt{1}$ (3b).[11]

---

[11] For illustration, we treat numeral roots as having meaningful/mnemonic indexes like '1' or '2'. Further, the tree structures in this paper are much too simple to capture the full cross-linguistic range of numeral formation and semantics. These simple grammars, however, are sufficient for

(3)   DM analysis for English and French ordinals
    (a)   Default suffixation
        (i)   English: ORD ↔ *-th*
        (ii)   French: ORD ↔ *-ième*
    (b)   Default forms for numerals
        (i)   English: $\sqrt{1}$ ↔ *one*
        (ii)   French: $\sqrt{1}$ ↔ *un*

DM assumes that the input to the morphological derivation is a structured sequence of morphemes. This structure by default matches syntactic-semantic scope, but it can be modified during the course of the morphological derivation. We illustrate the structure of cardinal and ordinal for '1' and '21' in Figure 1.[12]

Given such elaborated structures, VI can target an individual item (terminal node) such as the ORD morpheme (3a), but it can also be sensitive to a larger cluster of units. This sensitivity allows refined allomorphy domains that distinguish internal vs. external marking. For portmanteaus like 'first' and 'premier', they simultaneously expone the root $\sqrt{1}$ and the ORD suffix. For English (4a), the portmanteau expones the linear sequence $\sqrt{1}$-ORD regardless of internal structure. In contrast, the French portmanteau (4b) requires that $\sqrt{1}$-ORD form a morphosemantic constituent, and VI targets the non-terminal node '21'.[13]

(4)   DM analysis for English and French ordinals
    Portmanteau allomorphy for ordinal 'one'
    (a)   English: $\sqrt{1}$-ORD ↔ *first*
    (b)   French: [$\sqrt{1}$-ORD] ↔ *premier*
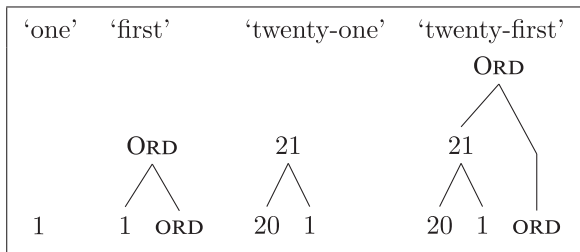
Figure 1
Structure of cardinals and ordinals for '1' and '21'.

our purposes in describing ordinal allomorphy. More complete grammars can be found elsewhere (Hurford 1975; Gorman & Sproat 2016; Boyé 2018).

[12] Stump (2010: 226) assumes that the tree structure for '21st' differs for internal vs. external systems: English, [[20][1-ORD]] vs. [[20-1]-ORD]. We instead assume that they have the same semantically motivated structure and that the morphology then treats these structures differently.

[13] For illustration, we use a simple dash or space to mark linear locality, instead of specialized concatenation symbols like * or ⌢ (Embick & Noyer 2001; Embick 2010).

12

Figure 2
Deriving ordinals for '1' and '21' in English (internal) and French (external).

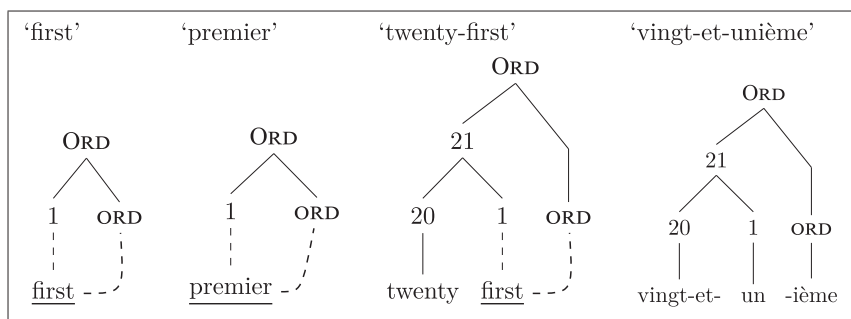We illustrate a derivation for the two systems in Figure 2. The dashed lines indicate portmanteau forms. We underline the irregular forms.

For English, the allomorphy rules derive internal marking because the portmanteau 'first' is sensitive only to the linear sequence of '1' and ORD (4a). This allows the propagation of the suppletive form. Internal marking is thus reduced to LINEARITY-CONDITIONED allomorphy in DM.

In contrast, the French *premier* is only allowed when the '1' and ORD form a semantic constituent (4b). This means that the allomorphy cannot be propagated to higher numbers. The ordinal of '21' instead resorts to using an otherwise unattested sequence *-un-ième* made up of the default forms for the root and ordinal suffix (3). External marking is thus reduced to CONSTITUENCY-CONDITIONED allomorphy.

This division between external vs. internal marking can be easily modeled in DM in terms of different allomorphy domains, as shown above. Specifically, it is common for the participating morphemes in a suppletive or allomorphic process to be both linearly local to each other and to form a structural constituent (Bobaljik 2012); some argue that the portmanteau form can then target insertion at a non-terminal node (Caha 2009; Radkevich 2010; Embick 2017). This creates external marking as in French. However, there are patterns of allomorphy where the component morphemes are linearly adjacent but do not form a constituent. In this case, some phenomena treat the component morphemes as structurally adjacent, i.e., a span (Svenonius 2012; Merchant 2015; Middleton 2021). Other phenomena treat the morphemes as structurally non-adjacent with intervening but linearly non-adjacent material, i.e., stretches (Ostrove 2018), post-linearization fusion (Embick 2015: 215; Felice 2021; Banerjee 2021), or post-linearization spanning (Haugen & Siddiqi 2016). Internal marking in English ordinals can be considered either a span or stretch depending on one's analysis of the internal structure of ordinals, i.e., whether '1' and ORD form a contiguous sequence of nodes in an extended projection.

Thus, the ordinal of 'one' is suppletive in both English and French. This suppletive form is inherited by higher numbers in English but not French. To block

13

the propagation (external marking), the relevant rules define allomorphy as delimited by constituency (targeting a non-terminal node), while to allow propagation (internal marking), the rules are delimited by just locality (a span or stretch). Within DM, there have been various camps of practitioners who argued for using one of the above two modes for portmanteau formation (linearity and constituency), and often exclusively only one mode. The basic typology of ordinals is, however, evidence that both modes of allomorphy are attested and required.

Before we move on to formalizing the Armenian data, notice the subtle difference between the two DM rules in (4), repeated below. The internal marking rule (English: 5a) targets a string $\sqrt{1}$-ORD which is representationally simpler than the string $[\sqrt{1}$-ORD$]$ of the external marking rule (French: 5b). Thus for the DM analysis, internal marking is representationally simpler than external marking. In contrast, the PFM analysis (2) required *adding* a rule for internal marking (5c). Thus, PFM treats external marking as derivationally simpler than internal marking.

(5)   Contrasting PFM and DM for external vs. internal marking
   (a)   DM English: $\sqrt{1}$-ORD $\leftrightarrow$ *first* (repeated from 4a)
   (b)   DM French: $[\sqrt{1}$-ORD$] \leftrightarrow$ *premier* (repeated from 4b)
   (c)   PFM for English (repeated from 2c)
         Ord$([X\ Y])=[X\ ***Ord***(Y)]$

The above distinction of simplicity is quite formal: an analysis is simpler if it uses fewer symbols or rules. Given this formal distinction, one question is whether such a formal distinction has any empirical significance. For the Armenian case, it seems that the language has a tendency to gain internal marking for numerals '2–4'; this suggests that internal marking is simpler (= more default) than external marking.

Having set up how the basic typology of ordinal marking can be modeled in DM, the next section applies the formalization to Armenian.

4.3. *Formalizing the mixed system of Armenian*

Recall from Section 3.3 that Eastern Armenian and Early Western Armenian are uniformly external-marking systems (like French). Modern Western is instead a mixed system. This section formalizes the two systems, and shows how the systems differ in subtle rule reformulations. For brevity, we do not formalize Eastern Armenian but just the two Western registers.[14]

Consider the forms of 'one' in Western Armenian. Both Early and Modern Western Armenian use the same rules for this number (6). The ordinal suffix is by default -*eɾortʰ* and the root 1 is by default *meg*. Because the system is external marking like French, then the ordinal '1st' is a portmanteau *araɾt͡ʃʰin* that is defined in terms of constituency.

---

[14] The Eastern system is essentially the same as the Early Western system. The only difference is in the phonological form of certain morphs: 'one' is /meg/ in Western but /mek/ in Eastern.
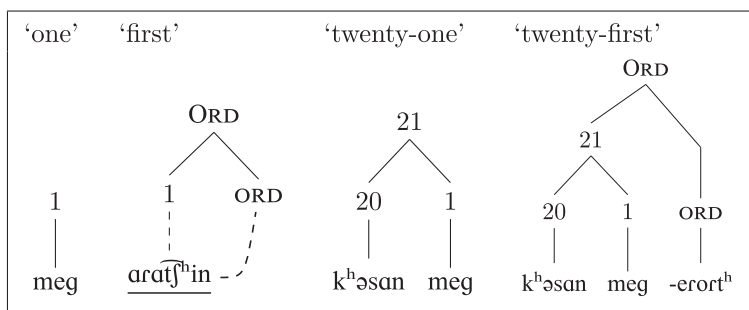
Figure 3
Deriving external marking for '1' and '21' in Western Armenian.

(6) DM rules for the cardinal and ordinal of '1' in Western Armenian (early and modern)
   (a) ORD $\leftrightarrow$ -erort^h
   (b) $\sqrt{1}$ $\leftrightarrow$ meg
   (c) [$\sqrt{1}$-ORD] $\leftrightarrow$ aɾatʃ^{h}in

Figure 3 illustrates how these rules derive external marking for '1' and '21' in essentially the same way as French (Figure 2). Portmanteaus are underlined.

In contrast, for the numerals '2–4', we see agglutinative allomorphy instead of portmanteaus. The ordinal suffix uses a special allomorph *-rort^h* instead of the default *-erort^h* (7a). The numeral roots differ in the cardinal and ordinal forms for '2–4' (7b).

(7) DM rules for the cardinal and ordinal of '2–4' in Western Armenian (early)
   (a) ORD $\leftrightarrow$ -rort^h / [{2,3,4} _]
                      -erort^h
   (b) $\sqrt{2}$ $\leftrightarrow$ jeɾg   / [_ ORD]
                      jeɾgu /
         $\sqrt{3}$ $\leftrightarrow$ jeɾ   / [_ ORD]
                      jeɾek^h /
         $\sqrt{4}$ $\leftrightarrow$ tʃ^{h}oɾ   / [_ ORD]
                      tʃ^{h}oɾs

For Early Western Armenian, these special allomorphs for '2–4' are restricted to numbers '2–4' and do not percolate to higher numbers. This system of external marking is represented in the above rules via referencing constituency brackets in the rules for both the ordinal suffix (7a) and numeral roots (7b).

Figure 4 illustrates the cardinal and ordinal forms for '4' and '24' for Early Western. We underline irregular forms. The use of constituency brackets in our rules (7) blocks the percolation of irregular forms.

15
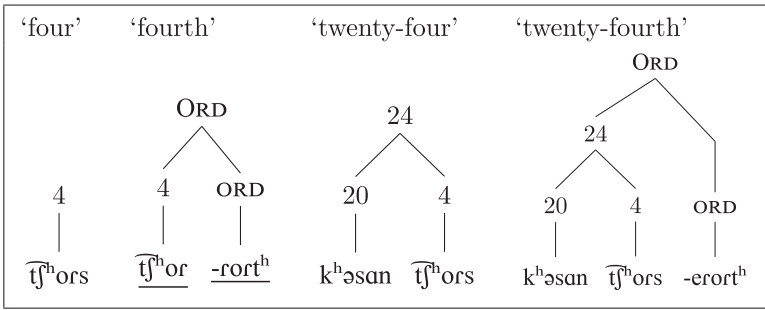
Figure 4
Deriving external marking for '4' and '24' in Early Western Armenian.

The above is for Early Western Armenian. Modern Western Armenian, however, does propagate the irregular forms of '2–4'. Within our rule system, this means that Modern Western abandons the use of constituency brackets for the irregular forms of '2–4' and the ordinal suffix (8).

(8) DM rules for the cardinal and ordinal of '2–4' in Western Armenian (modern)

(a) ORD ↔ -rorth / {2,3,4} _
             -erorth

(b) $\sqrt{2}$ ↔ jerg   / _ ORD
               jergu   /
     $\sqrt{3}$ ↔ jer   / _ ORD
               jerekh   /
     $\sqrt{4}$ ↔ t͡ʃʰor   / _ ORD
               t͡ʃʰors

The system in (8) references linearity instead of constituency. This allows the propagation of irregular forms, creating internal marking instead of external marking, as Figure 5 illustrates.

Figure 5
Deriving internal marking for '4' and '24' in Modern Western Armenian.

16

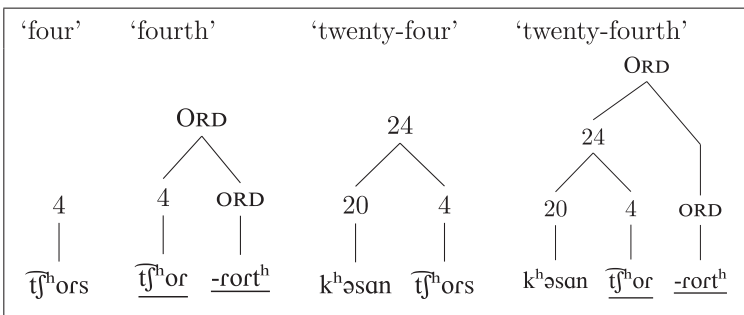|	Ordinal of '1'	Ordinal of '2–4'
Early:	$[\sqrt{1}\text{-ORD}] \leftrightarrow \alpha \text{ra}\widehat{t\!\int}^{h}\text{in}$	ORD $\leftrightarrow$ -rorth^{h} / [{2,3,4} _]
		$\sqrt{4} \leftrightarrow \widehat{t\!\int}^{h}$or / [_ ORD]
Modern	$[\sqrt{1}\text{-ORD}] \leftrightarrow \alpha \text{ra}\widehat{t\!\int}^{h}\text{in}$	ORD $\leftrightarrow$ -rorth^{h} / {2,3,4} _
		$\sqrt{4} \leftrightarrow \widehat{t\!\int}^{h}$or / _ ORD

Table 10
Diachronic change in rule formulation for Western Armenian.

For easier illustration, Table 10 shows how the relevant rules for '1–4' changed from Early to Modern Western. The rules for '1' stayed the same (external marking) because the modern form references constituency. The rules for '2–4' abandoned constituency, creating internal marking.

In this way, the above formalization straightforwardly captures the mixed system of ordinal marking in Modern Western Armenian. Modern Western Armenian is a mixed system in terms of ordinal formation because it references structure and linearity in different parts of the grammar (cf. Lee & Amato 2018). The data are evidence that multiple types of allomorphy domains (linearity and constituency) can coexist within the same grammatical system. The data and formalization likewise suggest that internal marking is 'representationally simpler' because Western Armenian went through a diachronic change of removing constituency conditions, thereby moving from external marking to internal marking.

4.4. *Ambiguity of mixed vs. conjunct systems in Western Armenian*

The previous sections presented our DM analysis of internal marking (English), of uniform external marking (French, Eastern Armenian, Early Western), and of mixed marking (Modern Western). This section discusses an alternative analysis in terms of conjunct morphology.

French is categorized as an external marking system because the ordinal for $\sqrt{1}$ is different for the simple number '1' vs. complex numbers like '21'. However, Stump (2010: 228) notes that suffixal external systems like French can be alternatively analyzed as using conjunct morphology.[15] Conjunct morphology is when a morpheme uses one allomorph when used in isolation (the absolute form: 9a) vs. another allomorph when used as part of a complex phrase (the conjunct form: 9b). Example (9) shows a hypothetical PFM analysis, adapted from Stump (2010: 222).

(9) PFM analysis for French ordinals as conjunct morphology
    (a) ***Ord**(un)=un*
    (b) ***Ord**conjunct(un)=premier*

---

[15] Coincidentally, Stump (2010: 228) lists the early register of Western Armenian as an ambiguously external system (like French).

17

The above PFM analysis incorporates the concept of conjunct morphology into the process ***Ord***conjunct(X). A hypothetical DM version would decompose this process into an allomorphy domain that references a word-initial boundary.

(10) DM analysis for French ordinals as conjunct morphology
  $\sqrt{1}$-ORD $\leftrightarrow$ *premier* / # _

In DM, a conjunct analysis essentially just replaces references to constituency boundaries (7, 8) with references to word-initialness (11). For Early Western, the numbers '1' (11a) and '2–4' (11b) have separate absolute and conjunct forms. Both sets of numbers reference the word-initial boundary. But in the modern form, the ordinal of '1' has separate allomorphs (11a) that reference the # boundary, while the ordinals of '2–4' (11c) have identical absolute-conjunct forms that do not reference the # boundary.

(11) DM analysis for Western Armenian ordinals as conjunct morphology
  (a) Ordinals of '1' for both early and modern
    $\sqrt{1}$-ORD $\leftrightarrow$ $\mathrm{ara\widehat{t\int}^h in}$ / # _
    $\sqrt{1}$ $\leftrightarrow$ meg
  (b) Ordinals of '4' for Early Western
    ORD $\leftrightarrow$ -ɾoɾtʰ / # {2,3,4} _
      -eɾoɾtʰ
    $\sqrt{4}$ $\leftrightarrow$ $\widehat{\mathrm{t\int}}^h$oɾ / # _ ORD
      $\widehat{\mathrm{t\int}}^h$oɾs
  (c) Ordinals of '4' for Modern Western
    ORD $\leftrightarrow$ -ɾoɾtʰ / {2,3,4} _
      -eɾoɾtʰ
    $\sqrt{4}$ $\leftrightarrow$ $\widehat{\mathrm{t\int}}^h$oɾ / _ ORD
      $\widehat{\mathrm{t\int}}^h$oɾs

Thus, if we assume Armenian has conjunct morphology, then both early and Modern Western Armenian can be categorized as external marking systems. The difference between the early and modern registers is just the leveling of the absolute-conjunct forms /$\widehat{\mathrm{t\int}}^h$oɾ-ɾoɾtʰ, $\widehat{\mathrm{t\int}}^h$oɾs-eɾoɾtʰ/ to identical absolute-conjunct forms /$\widehat{\mathrm{t\int}}^h$oɾ-ɾoɾtʰ, $\widehat{\mathrm{t\int}}^h$oɾ-ɾoɾtʰ/.

This alternative analysis works but we do not consider it further for the following reasons.

First, it is a formal ambiguity that any suffixal external marking system (or a mixed marking system) can be analyzed as a conjunct system. This point is acknowledged by Stump (2010: 227). There is thus no empirical evidence that prefers one analysis over another. Any possible arguments for one of the two systems will ultimately be conceptual.

Second, once we decompose conjunct morphology into an item-and-arrangement system like DM, the differences between conjunct morphology (word-boundaries) vs. external-marking (constituencies) look notational.

18

Third, if we adopt a conjunct system for Armenian, then it seems difficult to separately classify the early and modern registers of Western Armenian. If we assume that there is no conjunct system in Armenian, then Early Western is labeled as uniformly external marking, while the modern system is mixed. But if we assume a conjunct system, then terms such as 'uniform' and 'mixed' are not obviously interpretable.

Fourth, outside of these four numerals '1–4' and their derivatives, we have not found evidence of conjunct morphology elsewhere in the language. There is ample work on Armenian compounds (Donabédian 2004; Dolatian 2021b, 2022b), but we cannot find any evidence of conjunct marking in compounds. This is in contrast to languages where conjunct morphology is argued to exist because of multiple phenomena (Stump 2010, citing Stump 1995:264–273, 2001:119–126).

Having acknowledged this formal ambiguity, the rest of this paper focuses on just using our external vs. mixed labels for illustrative ease.

5. ASYMMETRIES AND DIALECTAL VARIATION

The previous sections formalized the system of uniform external marking in Standard Eastern and Early Western Armenian vs. mixed marking in Modern Standard Western Armenian. This section explores diachronic and further dialectal variation. We uncover asymmetries in the difference between the portmanteau allomorphy for '1' vs. the agglutinative allomorphy for '2–4' when it comes to external vs. internal marking (12):

(12)   Asymmetries in ordinal formation across Armenian
   (a)   The irregular portmanteau ordinal of '1' never propagates, while the irregular agglutinative ordinals of '2–4' can propagate.
   (b)   For '1–4', a larger number like '4' can regularize without affecting the irregularity of lower numbers.
   (c)   The ordinal '1' is the most resistant to regularization or loss if the dialect loses, simplifies, or replaces ordinal morphology.

The above asymmetries cannot be easily captured in a formal generative analysis, but they make sense in terms of a functional account that emphasizes the importance of lower ordinals like 'first' over higher ordinals (Veselinova 1997; Barbiers 2007; Stolz & Robbers 2016).

5.1. *Asymmetries in Modern Standard Armenian*

The previous PFM and DM analyses both capture the relevant data from Early and Modern Western Armenian. However, our formal analysis does not capture a striking correlation in the data. The ordinal of '1' uses portmanteau allomorphy and it always uses external marking (= never propagates). In contrast, the ordinals of '2–4' use agglutinative allomorphy, variably show internal vs. external marking, but they always behave as a single set for Standard Armenian.

19

		'1'	'2–4'
Allomorphy:		portmanteau	agglutinative
Inheritance:	Eastern	external	external
	Early Western	external	external
	Modern Western	external	internal
	*unattested	external	internal for '2', external for '3–4'
	*unattested	internal	external/internal

Table 11
Asymmetries in portmanteau vs. agglutinative allomorphy.

In other words, the numerals '2–4' either all show external marking as in Early Western, or they all show internal marking as in Modern Western. Table 11 summarizes the range of variation. It is not the case that '2' acts differently from '3–4'. To illustrate, an unattested variety of Western Armenian is to make '2' have have internal marking in '22' /kʰəsɑn-jerɡ-rortʰ/, while '4' is external marking in '24' /kʰəsɑn-t͡ʃʰoɾs-erortʰ/. Similarly, we do not know of any register of Armenian where '1' propagates, while '2–4' do or do not.

Note that we later find that some non-standard dialects regularize a larger number like '4' while still maintaining the irregularity of '2–3'.

The above sample is obviously small with only three language varieties, but the data are suggestive. The next two subsections go through more Armenian varieties in order to establish these generalizations. We first discuss the diachrony of Armenian.

5.2. *Diachronic origins of the ordinal system*

The earliest known attested variety of Armenian is Classical Armenian (∼fifth century).[16] The cardinal and ordinal words are virtually the same across the ancient and modern languages but have subtle combinatorial differences (Աճառյան 1952a: 283–284; Thomson 1989: 94–97). These differences again indicate an asymmetry between '1' vs. '2–4'.

First, consider the numbers '1–5' and '20' (Table 12). The ordinal suffix -*(e)rord* is the ancestor of the modern form -*(e)rortʰ*. The suffix -*erord* is the default form. Like the modern language, the ordinal of '1' is a portmanteau, while '2–4' use agglutinative allomorphy. We underline the irregular forms.[17]

---

[16] Unfortunately, we do not know the exact pronunciation of this ancient language. For transparency, we provide the orthographic forms and an approximate pronunciation based on traditional pronunciation and IPA equivalents to the orthographic letters (Macak 2017). We do not mark hypothetical nasal place assimilation before velars. Data are taken from either the referenced sources or corpus data from the Classical Bible: https://arak29.org/bible/book/index.htm.

[17] Some numbers like '100' հարիւր /hɑriwɾ/ are attested with either the default suffix -*erord* or a novel suffix -*ord*; both can be found in Classical dictionaries (Vidal-Gorène et al. 2021): dictionary.calfa.fr/.

	Cardinal		Ordinal	
'1'	մի	mi	առաջին	$\widehat{\text{ara}d\text{3}}$in
'2'	երկու	erku	երկրորդ	erk-rord
'3'	երեք	erekʰ	երրորդ	eɾ-rord
'4'	չորք	$\widehat{\text{t}\int}^{h}$orkʰ	չորրորդ	$\widehat{\text{t}\int}^{h}$oɾ-rord
'5'	հինգ	hing	հինգերորդ	hing-eɾord
'20'	քսան	kʰəsan	քսաներորդ	kʰəsan-eɾord (from 1 Chronicles 24:17)

Table 12
Cardinals and ordinals for '1–5, 20' from Classical Armenian (Thomson 1989: 94–97).

	Cardinal	X-10	Ordinal	X-10-ORD	
'1'	մետասան	me-tasan	մետասաններորդ	me-tasan-eɾord	(Zechariah 1:7)
'2'	երկոտասան	erko-tasan	երկոտասաններորդ	erko-tasan-eɾord	(1 Chronicles 25:19)
'3'	երեքսասան	erekʰ-tasan	երեքսասաններորդ	erekʰ-tasan-eɾord	(1 Chronicles 25:20)
'4'	չորեքսասան	$\widehat{\text{t}\int}^{h}$orekʰ-tasan	չորեքսասաններորդ	$\widehat{\text{t}\int}^{h}$orekʰ-tasan-eɾord	(1 Chronicles 25:21)
'5'	հնգետասան	hənge-tasan	հնգետասաններորդ	hənge-tasan-eɾord	(1 Chronicles 25:22)

Table 13
Cardinals and ordinals for '11–15' from Classical Armenian.

		20	and	X	
'21'	քսան եւ մի	kʰəsan	ew	mi	(Jeremiah 52:1)
'22'	քսան եւ երկու	kʰəsan	ew	erku	(1 Chronicles 12:28)
'23'	քսան եւ երեք	kʰəsan	ew	erekʰ	(Jeremiah 25:3)
'24'	քսան եւ չորք	kʰəsan	ew	$\widehat{\text{t}\int}^{h}$orkʰ	(Revelation 4:4)
'25'	քսան եւ հինգ	kʰəsan	ew	hing	(Ezekiel 40:21)

Table 14
Cardinals '21–25' from the Classical Armenian Bible.

For the teens (Table 13), Classical Armenian places the morpheme for '10' on the right, and it takes the regular ordinal suffix -*erord*. Thus, the teens cannot inform us on whether the irregular allomorphs of '1–4' propagate. Note that cardinals were taken from Thomson (1989: 94), while the ordinals are from the Classical Armenian Bible.

Matters get complicated for higher numbers (Thomson 1989: 95–97). For a complex numeral like '25', Classical Armenian uses a more syntactic method. The larger number '20' and the smaller number '5' are separated by the conjunction եւ [ew] (Table 14).

For these complex numbers, the ordinal is formed by turning each cardinal numeral into an ordinal (13a). The conjunction [ew] can sometimes be dropped in some contexts, although it is unclear when (13b).[18]

---

[18] Because case and number inflections in Classical Armenian are not at issue here, we use the symbol κ in the glosses as a shortcut.

21

		20-ORD	X-ORD-DEF	
'22nd'	քսաներորդ երկրորդն	kʰəsan-eɾoɾd	eɾk-ɾoɾd-ən	1 Chronicles 24:17
'23rd'	քսաներորդ երրորդն	kʰəsan-eɾoɾd	eɾ-ɾoɾd-ən	1 Chronicles 24:18
'24th'	քսաներորդ չորրորդն	kʰəsan-eɾoɾd	t͡ʃʰoɾ-ɾoɾd-ən	1 Chronicles 24:18

Table 15
Cardinals and ordinals for '21–25' from Classical Armenian.

(13) Classical Armenian
  (a) kʰəsan-eɾoɾd-i   ew   hing-eɾoɾd-i   am-i
       20-ORD-K   and 5-ORD-K   year-K
       '… in the 25th year…' (from Ezekiel 40:1)
       քսաներորդի եւ հինգերորդի ամի
  (b) kʰəsan-eɾoɾd   hing-eɾoɾd   ams-ojn
       20-ORD   5-ORD   month-K
       '… the 25th month…' (from Nehemiah 6:15)
       քսաներորդ հինգերորդ ամսոյն

Based on the above data, Classical Armenian can be classified as using an extended ordinal system (Stump 2010: 214). Multiple constituents in the complex numeral receive ordinal marking.

We see this same extended pattern for numerals that use allomorphy. For derivatives of '2–4' like '22–24', the irregular form is used (Table 15).

Because complex ordinals like '24th' inherit the irregular ordinal of '4', Stump (2010: 223) would classify Classical Armenian as an extended *internal* system based on his PFM formalization. However, from the perspective of DM, such ordinals are ambiguously either internal or external. In a phrase like '20-ORD 4-ORD', this phrase would have the constituency structure of [[20-ORD] [4-ORD]]. The right member is a constituent and would use the irregular ordinal form regardless whether we think the system is internal or external (cf. the rules in Table 10).

As a brief caveat though, the Bible corpus did have a few cases where the left numeral does not get ordinal marking (14). Thus, it is possible that some complex ordinals have structures like [[20 and 4]-ORD] and would necessarily require an internal-marking formalization.

(14) kʰəsan   ew   t͡ʃʰoɾ-ɾoɾd
      20   and   4-ORD
      '… 24th…' (from 1 Chronicles 25:31)
      քսան եւ չորրորդ

Matters are more complicated for derivatives of '1' (15). In a complex ordinal like '21st', the '1' unit uses a portmanteau *and* the regular ordinal suffix. This

	Cardinal	Ordinal	
'1'	mek	ɒrɒt͡ʃʰin	1.ORD
'21'	kʰsɒn-mek	kʰsɒn-mek-eɹoɹtʰ	20-1-ORD
'2'	eɹku	jek-ɹoɹtʰ	2-ORD
'22'	kʰsɒn-eɹku	kʰsɒn-jek-ɹoɹtʰ	20-2-ORD

Table 16
Mixed marking from Tehrani Iranian Armenian.

inheritance system for '1' resembles multiple exponence. Ordinality is marked both in the portmanteau and in the default ordinal suffix.[19]

(15) (a) kʰəsɑn-eɾoɾd   ɑɾɑd͡ʒn-eɾoɾd-ən
           20-ORD   1.ORD-ORD-DEF
           '… the 21st…' (from 1 Chronicles 24:17)
           քսաներորդ առաջներորդն

     (b) kʰəsɑn   ew   ɑɾɑd͡ʒn-eɾoɾd
          20   and   1.ORD-ORD
          '… 21st…' (from 1 Chronicles 25:28)
          քսան եւ առաջներորդ

It is unclear to me what is the most elegant way to model the above multiple exponence of '21st' in either PFM or DM. We set that aside. But what matters for us is that even in Classical Armenian, where there is ambiguous distinction between internal vs. external marking, we still find an asymmetry between the inheritance of portmanteau allomorphy of '1' vs. agglutinative allomorphy of '2–4'.

5.3. *Decay of the ordinal system across Armenian dialects*

Besides the two standard lects, there are dozens of non-standard Armenian varieties with varying degrees of mutual (un-)intelligiblity (Աճառեան 1911). These dialects can be loosely categorized as being part of the Western branch (W) vs. the Eastern branch (E). The former branch developed in the Ottoman Empire and the latter in the Persian/Russian Empires. This section goes over the few Armenian dialects for which I could find grammars at hand.[20] What we find is that no dialect ever develops internal marking for '1', but it can lose irregular marking for '2–4'.

Standard Eastern is uniformly external marking and neither portmanteaus nor agglutinative allomorphy propagate. The Karin dialect (W) is reported to be the

---

[19] The portmanteau /ɑɾɑd͡ʒin/ loses its high vowel before inflectional suffixes due to an independent process of high vowel reduction (Thomson 1989: 16; Vaux 1998: 148; Dolatian 2021a).

[20] The bibliographic sources generally do not apply a morpheme segmentation, and they transcribe dialectal words using a modified phonemic form of the Armenian script. I provide a simplified segmentation: I only segment the numerals and the ordinal suffix. I converted their Armenian transcriptions to the IPA.

23

	Cardinal	Ordinal	
'1'	min	t͡sərkʰji or ɑɾɑd͡ʒin	1.ORD
'2'	jeɾku	jeɾg-ɾoɾtʰ	2-ORD
'3'	jiɾekʰ	je(ɾ)-ɾoɾtʰ	3-ORD
'4'	t͡ʃʰokʰ	t͡ʃʰokʰ-eɾoɾtʰ	4-ORD
'7'	oχtə	oχtj-eɾoɾtʰ	7-ORD

Table 17
Loss of irregular ordinal for '4' in the Kirzen dialect.

same (Մկրտչյան 1952: 56–57). The cardinal '1' is [meg], and its ordinal is a portmanteau [ɦɑɾd͡ʒi]. The grammarian reports that the irregular suffix [-ɾoɾtʰ] is used for ordinals of '2–4', while other ordinals take default [-eɾoɾtʰ].

Modern Standard Western is a mixed system such that portmanteaus do not propagate while agglutinative allomorphy does. Tehrani Iranian Armenian (E) is reportedly the same (Table 16: Dolatian et al. in review). The portmanteau of '1' does not propagate to higher numbers, while the irregular agglutinative forms of '2–4' do propagate.

The dialects so far still treat the numeral set '2–4' uniformly. The numerals all take irregular agglutinative allomorphy. And they either all propagate (Modern Standard Western), or none of them propagate (Standard Eastern). Some dialects show, however, that this set can be reduced in size. The dialect of Kirzen (E) maintains largely the same morphemes as Standard Eastern Armenian (Table 17: Բաղրամյան 1958: 80). The ordinal '1' is a portmanteau, while the numerals '2–3' use agglutinative allomorphy with an irregular *-ɾoɾtʰ* suffix.[21] But the numeral '4' uses the regular suffix *-eɾoɾtʰ* without any root allomorphy. Thus, it is possible for an irregular ordinal like '4' to be regularized without affecting the lower numbers '1–3'. Unfortunately, the source does not discuss higher ordinals.

Other Armenian dialects show more variation. Many dialects have simplified or levelled away ordinal allomorphy through various means. Some attested methods are a) losing the irregular ordinal suffix, b) replacing ordinal suffixes with other suffixes, and c) replacing Armenian ordinals with cardinals or Turkish/Azerbaijani ordinals (Martirosyan 2019: 195). But in some of these levelled dialects, we find an asymmetry between the ordinals of '1' vs. other numerals.

In some dialects like Malatya (W), the numeral '1' has a portmanteau ordinal that does not propagate to higher numbers (Table 18: Դանիելյան 1967: 95–98). But this dialect lost the irregular ordinal suffix *-ɾoɾtʰ* and irregular root allomorphs for

---

[21] For the Kirzen form of 'first' [t͡sərkʰji], the grammarian implies this is a cognate of the standard form [ɑɾɑt͡ʃʰin], but it is unclear to me how this form could have originated. It could instead be related for the word for 'hand': SEA [d͡zerkʰ].

	Cardinal	Ordinal	
'1'	meg	$\widehat{\text{art}\int}^{h}$in	1.ORD
'11'	dɑsnə-meg	dɑsnə-meg-errort^h	10-1-ORD
'2'	ergu	ergu-errort^h	2-ORD
'21'	dɑsv-ergu	dɑsv-ergu-errort^h	10-2-ORD

Table 18
Loss of irregular ordinal suffix in Malatya Armenian.

	Cardinal	Ordinal	
'1'	meg	er$\widehat{dʒ}$in	1.ORD
'2'	erguk^h	erguk^h-ən$\widehat{dʒ}$i	2-ORD
'2'	irik^h	irik^h-ən$\widehat{dʒ}$i	3-ORD
'4'	t$\int^h$urs	t$\int^h$urs-ən$\widehat{dʒ}$i	4-ORD
'5'	hing	hing-ən$\widehat{dʒ}$i	5-ORD

Table 19
Retention of portmanteaus but replacement of the ordinal suffix in Sasun Armenian.

'2–4'. There is only one ordinal suffix -*errort^h*, and this suffix is used for numerals '2' and above.[22]

The retention of the non-propagating portmanteau ordinal for '1' and the loss of other irregular ordinals is also found in some dialects that have replaced the Armenian -*(e)rort^h* suffix with other morphemes.

In the Sasun dialect (W), the cardinal '1' has a portmanteau ordinal (Table 19: Պետոյան 1954: 38–39). But all other ordinals are formed by borrowing the Turkish suffix -*inci*. The grammarian does not report any propagation of the ordinal of '1' to higher numbers. Other dialects that behave this way include Agulis (E: Աճառեան 1935: Section 293), Burdur (E: Մկրտչյան 1971: 105), Kesab (W: Չոլաքեան 2009: 87), Meghri (E: Աղայան 1954: 178), and Old Istanbul (W: Աճառյան 1941: 106). Some of these may have borrowed the suffix from Azerbaijani instead of Turkish.[23]

Some dialects replaced the ordinal suffixes -*(e)rort^h* with the suffix -*um* that is a reflex of a locative suffix from Classical Armenian. Adjarian (Աճառյան 1952a: 287) reports three such dialects: New Julfa (E), Suceava (W), and New Nakhiche-van (W: Table 20). The ordinal '1' is a portmanteau that does not propagate. The

---

[22] A similar state of affairs is reported for New Julfa Armenian (Աճառյան 1940; Vaux unpublished manuscript: Section 258). However, the ordinal 'first' in this dialect can be either the native *ar$\widehat{dʒ}$i* or a borrowing [ɑvvɑlin] from Persian <ɑvvɑlin>.

[23] Of this set, some dialects like Istanbul and Burdur are reported to also use the Turkish borrowing "birinci" for 'first' with some semantic distinctions from the native ordinal. Istanbul uses the borrowing "ikinci" for the ordinal 'second'.

	Card.	Ord.			Card.	Ord.	
'1'	meg	ar͡tʃʰi	1.ORD	'11'	dasnə-meg	dasnə-meg-um	10-1-ORD
'2'	ergu	ergus-um	2-ORD	'12'	dasn-ergu(s)	dasn-ergus-um	10-2-ORD
'3'	irekʰ	irekʰ-um	3-ORD	'13'	dasv-irekʰ	dasv-irekʰ-um	10-3-ORD
'4'	t͡ʃʰors	t͡ʃʰors-um	4-ORD	'14'	dasnə-t͡ʃʰors	dasnə-t͡ʃʰors-um	10-4-ORD
'5'	hing	hing-um	5-ORD	'15'	dasnə-hing	dasnə-hing-um	10-5-ORD
'10'	dasə	dasn-um	10-ORD	'20'	kʰsan	kʰsan-um	20-ORD

Table 20
Retention of portmanteaus but replacement of the ordinal suffix in New Nakhichevan Armenian.

other numerals (2 and beyond) do not show any allomorphy (Աճառեան 1925: 203).[24]

The pattern so far is that the portmanteau ordinal of '1' is perseverant and resistant to wide-scale morphological changes. For example, some dialects lost almost the entire ordinal system except for '1'. In the Bayazet dialect (E: Կատվալյան 2016: 331–335), the cardinal '1' [mek] has a portmanteau ordinal [ɦar͡tʃʰi]. But the other numerals do not have any ordinal form; instead, cardinals are used, often with some type of case suffix. Other such dialects include the general dialect area of Ararat (E: Մարկոսյան 1989: 126).[25] Middle Armenian (∼ twelfth century) had an ordinal for '1' but there is little attestation of other ordinal numbers (Karst 1901: 222).

However, some dialects are on the path to losing the special status of the '1' ordinal. In the general dialect area of Karabakh (E: Դավթյան 1966: 125), all ordinals are formed by adding the Turkic suffix -*inci* after the cardinal. But for the cardinal '1' [min], its ordinal is either the cardinal plus this suffix [min-in͡dʒi], or a reflex of the portmanteau plus the suffix [ara͡tʃʰ-in͡dʒi].[26]

Some dialects have finalized the loss of the native ordinal allomorphy. For example, the Goris dialect (E: Մարգարյան 1975: 154–157) replaced all the native ordinals with just the cardinal plus a Turkic suffix: '1' [min] vs. '1st' [min-in͡dʒi]. Other such dialects include Aresh (E: Բաղրամյան 1979: 82).

Some dialects removed all native ordinal morphology but did introduce some allomorphy for '1'. For example, the Maragha dialect (E: Աճառյան 1926: 182–183) replaced the native ordinal suffixes with a Turkic suffix (Table 21). They borrowed a special root allomorph for '1st' from Turkic/Persian <avval>, but this root does not propagate to higher numbers. This dialect thus still maintained an

[24] For New Nakhichevan, one grammar reports transcriptions /d, g/ (Աճառյան 1952a: 287), while another has difficult cursive writing with /t, kʰ/ (Աճառեան 1925: 203). I report the first grammar's transcription because it is more recent.

[25] The Cilicia dialect of Zeytun (W: Աճառյան 2003: 208) is reported to lack ordinals, though there is evidence of the portmanteau ordinal '1'. The Tigranakert dialect (W: Հանեյան 1978: 87) is reported to have the portmanteau ordinal for '1' but no other ordinals.

[26] Within Karabakh, some dialect areas also use a Turkic borrowing for 'first' (Մկրտչյան 1971: 105).

	Cardinal	Ordinal	
'1'	mekʲ	ævvæl-imd͡ʒi	1.ORD-ORD
'11'	tasnə-mekʲ	tasnə-mekʲ-imd͡ʒi	10-1-ORD
'3'	irikʲ	irikʲ-imd͡ʒi	3-ORD
'13'	tasn-irikʲ	tasn-irikʲ-imd͡ʒi	10-3-ORD
'5'	χinkʰʲ	χinkʰʲ-imd͡ʒi	5-ORD
'15'	tasnə-χinkʰʲ	tasnə-χinkʰʲ-imd͡ʒi	10-5-ORD

Table 21
External marking ordinals in Maragha via borrowings.

external-marking system despite changing all the ordinal morphemes. Cross-linguistically, borrowing is known to affect ordinal systems in this way (Stolz & Robbers 2016: Section 3.1.4).

Some dialects have replaced all native ordinals with Turkish or Azerbaijani ordinals (as borrowings). These include Arapgir (W: Դալիթ-Բէկ 1919: 215), Artvin (E: Ալավերդյան 1968: 234), and Kayseri (W: Անթոսյան 1961: 80).

And finally, some dialects have simply lost all ordinal morphology. For example, one variant of the Hamshen dialect (W: Աճառյան 1947: 109) uses cardinals instead of ordinals. Other dialects without ordinal morphology include Çatak or Šatax (W: Մուրադյան 1962: 115), Van (W: Աճառյան 1952b: 148), and Vozim (W: Արևիկյան 1967: 78). Some dialects like Urmia (E: Ասատրյան 1962: 86) and Lori (E: Ասատրյան 1968: 106) lost their ordinal morphology, but its speakers have started to adopt Standard Eastern ordinals because of education.

In sum, ordinal morphology is quite susceptible to diachronic change across Armenian dialects. However, even across such changes, we find that the ordinal of '1' never develops internal marking, not propogation (= no propagation) and that '1' resists regularization before '2–4'. These asymmetries fall out from a functional account that would emphasize the semantic significance, high frequency, and portmanteau morphology of the ordinal 'first' (Veselinova 1997). We emphasize this point next.

6. FORM AND FUNCTION: THE SPECIAL STATUS OF 'FIRST'

The bulk of this paper has looked at ordinal allomorphy in two modern standard Armenian varieties: Standard Eastern and Standard Western. Given a formalization based on the modern standard forms, we then examined a larger scale of variation in ordinal allomorphy across other varieties of Armenian: Classical Armenian and a host of non-standard dialects. Table 22 summarizes some of the key properties of some of these varieties.

As the earliest known Armenian variety, Classical Armenian already had suppletive allomorphy for '1' and agglutinative allomorphy for '2–4'. In this way, Classical Armenian already resembles modern Standard Armenian. But unlike all of its descendants, Classical Armenian had an extended marking for higher numerals, such that the ordinal form of '21' would have ordinal marking twice as

27

Variety	Inheritance type		Form of allomorphy		
	For '1'	For '2–4'	For '1'	For '2–4'	Ordinal suffix
Classical (Section 5.2)	ambiguous	ambiguous	suppletive	agglutinative	native -(e)rord
Standard Eastern (Section 3.3)	external	external	suppletive	agglutinative	native -(e)rortʰ
Early Standard Western (Section 3.3)	external	external	suppletive	agglutinative	native (-e)rortʰ
Modern Standard Western (Section 3.3)	external	internal	suppletive	agglutinative	native (-e)rortʰ
Kirzen (Table 17)	unstated	unstated	suppletive	agglutinative for '2–3'	native -(e)rortʰ
Malatya (Table 18)	external	N/A	suppletive	no allomorphy	native -errortʰ
Sasun (Table 19)	unstated	N/A	suppletive	no allomorphy	borrowed -ənd͡ʒi
New Nakhichevan (Table 20)	external	N/A	suppletive	no allomorphy	reanalyzed -um
Bayazet (Section 5.3)	unstated	N/A	suppletive	no ordinals	no ordinals
Karabakh (Section 5.3)	unstated	N/A	variably suppletive	no allomorphy	borrowed -ind͡ʒi
Goris (Section 5.3)	N/A	N/A	no allomorphy	no allomorphy	borrowed -ind͡ʒi
Maragha (Table 21)	external	N/A	borrowed	no allomorphy	borrowed -imd͡ʒi
Arapgir (Section 5.3)	N/A	N/A	borrowed	borrowed	borrowed
Hamshen (Section 5.3)	N/A	N/A	no ordinals	no ordinals	N/A

Table 22
Patterns of ordinal allomorphy across Armenian.

in '20th and 1st'. In Stump's PFM analysis, extended marking would be classified as internal marking; but in our DM-based analysis, the data are ambiguous between external vs. internal marking. Classical Armenian is, however, atypical. The modern dialects seem to have all lost extended marking.

Across our sample, we see that the numeral '1' is quite resistant to change. Many of the modern varieties retained a suppletive portmanteau morphology for its ordinal. They likewise developed external marking for it.[27] Some regularized the entire ordinal system and removed allomorphy, except for the numeral '1' (Malatya). Some lost all ordinal morphology except for '1' (Bayazet). Some even replaced their ordinal morphology with borrowings that still privileged the role of '1' (Maragha).

In contrast, as said, for the numerals '2–4', Classical Armenian had agglutinative allomorphy. But the behavior of this set is unstable across the descendants. Some dialects kept the allomorphy and developed either external or internal marking

---

[27] For some dialects like Sasun, the grammar does not provide data on higher numerals like '11', so we cannot know for sure if such dialects had external marking for '1'. But, given that these grammarians knew Standard Eastern Armenian (which is external marking), then the grammarians' omission implies that the dialect was also external marking.

28

(Standard Eastern vs. Standard Western). It seems that external marking developed first, and that internal marking arose as an innovation (Early vs. Modern Standard Western). However, most dialects simply lost these allomorphic forms, whether by regularizing these numerals (Malatya) or by losing most ordinals (Bayazet).

Despite the above fluctuations, we see the following strong correlations. The numeral '1' has suppletive allomorphy, prefers external marking, and it is resistant (but not immune) to regularization and morphological change. In contrast, numerals '2–4' have agglutinative allomorphy, have no consistent pattern with external vs. internal marking, and are susceptible to regularization and loss. We can see these correlations simultaneously in varieties like Early vs. Modern Standard Western Armenian. The numeral '1' stayed external marking, while '2–4' went from external marking to internal marking. For some dialects like New Nakhichevan, '1' retained its suppletive external-marking allomorphy, while '2–4' lost their allomorphy. As a rare case study, Kirzen kept suppletion for '1' and allomorphy for '2–3' but regularized '4'.

These correlations seem strong within our sample of 35 Armenian varieties. However, our formal generative analysis cannot directly capture them. On the one hand, our DM analysis provides us with explicit tools to formalize internal vs. external marking allomorphy in terms of linearity-sensitivity vs. constituency-sensitivity. But regardless of whether we use PFM or DM, our morphological rules do not create any obvious connections between suppletive allomorphy and external marking nor do they connect the patterns of allomorphy with individual numerical values. That is, a formal analysis cannot tell us why the Armenian numeral '1' should prefer suppletive external marking, while the Armenian '2' has no such preferences. Our formal analysis helps us to classify the range of variation, but it does not naturally explain it.

Furthermore, from a diachronic perspective, it is not obvious how a generative analysis can predict which of the above diachronic changes would have been possible, preferred, or neither. In terms of formal simplicity and learnability, we briefly entertained the idea that that PFM seems to treat external marking as simpler, while DM treats internal marking as simpler. It is unclear if this distinction between the two types of generative analyses can be connected to the fact that the numeral '1' prefers external marking, while the numeral '2' can change from external to internal marking. Future work can better refine a computational notion of simplicity with respect to language change.

Instead, it seems that the Armenian data underlie a set of asymmetries that cannot be transparently derived from any formal generative analysis. A synchronic generative analysis like DM or PFM does not obviously restrict or delimit the sets of possible suppletive patterns. Such frameworks can at most describe and contrast the patterns that exist. Instead, such asymmetries make more sense from a typological-functional orientation. The numeral 'one' has an important communicative function in human culture and language. Its importance then correlates with its frequency, its resistance to change, and its role in language contact (Veselinova 1997; Stolz & Robbers 2016).

7. CONCLUSION

This paper has discussed ordinal formation in Armenian. Cross-linguistically, a basic dimension for ordinal allomorphy is whether suppletive forms propagate to higher numbers (like in English) or not (like in French). For Standard Armenian, the low numerals '1–4' have portmanteau or agglutinative allomorphs. The portmanteau of '1st' never propagates (always external marking), while the agglutinative ordinals of '2–4' variably propagate (variably external marking). Based on this Armenian case study, this paper had two analytical goals: generative and typological.

For the generative goal, we modeled this behavior in DM by making our realization rules reference either structural constituency (Bobaljik 2012) or linear adjacency (Ostrove 2018). Structural constituency blocks the percolation of irregular allomorphy, while linear adjacency licenses the percolation. Within a single Armenian dialect, a realization rule is free to pick either type of condition. This creates the appearance of a mixed system like Modern Western Armenian. Such mixed systems are evidence that the same grammar can utilize both linearity-sensitive allomorphy and constituency-sensitive allomorphy.

For the typological goal, we catalogued the wide set of possible ordinal systems that are attested across Armenian registers or dialects ($n = 35$). We found further asymmetries that foregrounded the fact that the ordinal of '1' never propagates and that it is the most resistant to morphological changes in the language. Instead, this finding is functionally grounded (Veseliova 1997).

In sum, this paper acts as a single in-depth case study on the developments of ordinal allomorphy in a single language (and its dialectal varieties). We discovered a mixed system of ordinal marking. We interpreted the data from multiple generative perspectives (PFM and DM) in order to find ambiguities in the typology and analysis, while foregrounding similarities and other points of theoretical interest. With our generative analysis laying out the extremes of changes, we then argued for a functional asymmetry between low vs. high numerals and between suppletive vs. agglutinative allomorphy. The end result is that we better understand a narrow domain of morphological inquiry (ordinal allomorphy) by contrasting how multiple nuanced theories work on it. We encourage future research on similar developments of ordinal morphology. Given a wider set of such case studies, it is then a worthwhile question if the Armenian patterns of development are diachronically and synchronically rare or whether they reflect a general cross-linguistic tendency.

REFERENCES

Abeghian, Artasches. 1936. *Neuarmenische Grammatik: Ost- und westarmenisch mit Lesestücken und einem Wörterverzeichnis*. Berlin/Leipzig: Mouton De Gruyter. doi:10.1515/9783111631196.

Andonian, Hagop. 1999. *Beginner's Armenian*. New York: Hippocrene Books.

Arregi, Karlos & Andrew Nevins. 2012. *Morphotactics. Studies in natural language and linguistic theory*, vol. 86. Dordrecht: Springer Netherlands. doi:10.1007/978-94-007-3889-8.

Banerjee, Neil. 2021. Two ways to form a portmanteau: Evidence from ellipsis. *Proceedings of the Linguistic Society of America* 6(1), 39–52. doi:10.3765/plsa.v6i1.4934.

Barbiers, Sjef. 2007. Indefinite numerals one and many and the cause of ordinal suppletion. *Lingua* 117 (5), 859–880. doi:10.1016/j.lingua.2006.03.003.

Bardakjian, Kevork B. & Robert W Thomson. 1977. *A textbook of Modern Western Armenian*. Delmar, NY: Caravan Books.

Bardakjian, Kevork B. & Bert Vaux. 1999. *Eastern Armenian: A textbook*. Ann Arbor: Caravan Books.

Bardakjian, Kevork B. & Bert Vaux. 2001. *A textbook of Modern Western Armenian*. Delmar, NY: Caravan Books.

Bobaljik, Jonathan David. 2012. *Universals in comparative morphology: Suppletion, superlatives, and the structure of words*. Cambridge, MA: The MIT Press. doi:10.7551/mitpress/9069.001.0001.

Bobaljik, Jonathan David. 2017. Distributed morphology. In *Oxford research encyclopedia of linguistics*. Oxford: Oxford University Press. doi:10.1093/acrefore/9780199384655.013.131.

Boyé, Gilles. 2018. Lexemes, categories and paradigms: What about cardinals? In Olivier Bonami, Gilles Boyé, Georgette Dal, Hélène Giraudo & Fiammetta Namer (eds.), *The lexeme in descriptive and theoretical morphology*, 19–41. Berlin: Language Science Press. doi:10.5281/ZENODO.1406989.

Caha, Pavel. 2009. The nanosyntax of case. Dissertation, Universitetet i Tromsø.

Dolatian, Hossep. 2021a. Cyclicity and prosodic misalignment in Armenian stems: Interaction of morphological and prosodic cophonologies. *Natural Language & Linguistic Theory* 39(3), 843–886. doi:10.1007/s11049-020-09487-7.

Dolatian, Hossep. 2021b. The role of heads and cyclicity in bracketing paradoxes in Armenian compounds. *Morphology* 31(1), 1–43. doi:10.1007/s11525-020-09368-0.

Dolatian, Hossep. 2022a. An apparent case of outwardly-sensitive allomorphy in the Armenian definite. *Glossa: a journal of general linguistics* 7(1), doi:10.16995/glossa.6406.

Dolatian, Hossep. 2022b. Variation in a bracketing paradox: A case study in Armenian compounds. In Öner Özçelik & Amber Kennedy (eds.), *Proceedings of the 4th Conference on Central Asian Languages and Linguistics (ConCALL)*, 95–108.

Dolatian, Hossep, Afsheen Sharifzadeh & Bert Vaux. 2023. Grammar of Iranian Armenian: Parskahayeren or Iranahayeren. Unpublished manuscript.

Donabédian, Anaïd. 2004. Le nom composé en arménien. In Pierre J.L. Arnaud (ed.), *Le nom composé: Données sur seize langues*, 3–20. Lyon: Presses Universitaires de Lyon.

Dum-Tragut, Jasmine. 2009. *Armenian: Modern Eastern Armenian. London Oriental and African language library*, vol. 14. Amsterdam: John Benjamins Publishing Company. doi:10.1075/loall.14.

Embick, David. 2010. *Localism versus globalism in morphology and phonology*. Linguistic inquiry monographs 60. Cambridge, MA: The MIT Press. doi:10.7551/mitpress/9780262014229.001.0001.

Embick, David. 2015. *The morpheme: A theoretical introduction*. Boston/Berlin: Walter de Gruyter. doi:10.1515/9781501502569.

Embick, David. 2017. On the targets of phonological realization. In Vera Gribanova & Stephanie S. Shih (eds.), *The morphosyntax-phonology connection: Locality and directionality at the interface*, 255–284. Oxford: Oxford University Press. doi:10.1093/acprof:oso/9780190210304.003.0010.

Embick, David & Rolf Noyer. 2001. Movement operations after syntax. *Linguistic Inquiry* 32(4), 555–595. doi:10.1162/002438901753373005.

Embick, David & Rolf Noyer. 2007. Distributed Morphology and the syntax-morphology interface. In Gillian Ramchand & Charles Reiss (eds.), *The Oxford handbook of linguistic interfaces*, 289–324. Oxford: Oxford University Press. doi:10.1093/oxfordhb/9780199247455.013.0010.

Ermolaeva, Marina & Daniel Edmiston. 2018. Distributed Morphology as a regular relation. *Proceedings of the Society for Computation in Linguistics*, vol. 1, 178–181. University of Massachusetts Amherst. doi:10.7275/R51834PC.

Felice, Lydia. 2021. A novel argument for PF operations: STAMP morphs in Gã. *Proceedings of the Linguistic Society of America* 6(1), 844–854. doi:10.3765/plsa.v6i1.5023.

Gorman, Kyle & Richard Sproat. 2016. Minimally supervised number normalization. *Transactions of the Association for Computational Linguistics* 4, 507–519. doi:10.1162/tacl_a_00114.

Gulian, Kevork H. 1902. *Elementary modern Armenian grammar*. Heidelberg: Julius Groos.

Hagopian, Gayané. 2005. *Armenian for everyone: Western and Eastern Armenian in parallel lessons*. Ann Arbor, MI: Caravan Books.

Halle, Morris & Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In Kenneth Hale & Samuel J. Keyser (eds.), *The view from Building 20: Studies in linguistics in honor of Sylvaln Bromberger*, 111–176. Cambridge, MA: MIT Press.

Harley, Heidi. 2014. On the identity of roots. *Theoretical Linguistics* 40(3–4), 225–276. doi:10.1515/tl-2014-0010.

Harley, Heidi & Rolf Noyer. 1999. Distributed Morphology. *Glot international* 4(4), 3–9. doi: 10.1515/9783110890952.463.

Haugen, Jason D. 2016. Readjustment: Rejected? In Daniel Siddiqi & Heidi Harley (eds.), *Morphological metatheory*, 303–342. Amsterdam: John Benjamins Publishing Company. doi:10.1075/la.229.11hau.

Haugen, Jason D. & Daniel Siddiqi. 2016. Towards a restricted realization theory: Multimorphemic monolistemicity, portmanteaux, and post-linearization spanning. In Daniel Siddiqi & Heidi Harley (eds.), *Morphological metatheory*, 343–386. Amsterdam: John Benjamins Publishing Company. doi: 10.1075/la.229.12hau.

Hockett, Charles F. 1942. A system of descriptive phonology. *Language* 18(1), 3–21. doi:10.2307/409073.

Hurford, James R. 1975. *The linguistic theory of numerals*. Cambridge: Cambridge University Press.

Hurford, James R. 2003. The interaction between numerals and nouns. In Frans Plank (ed.), *Noun phrase structure in the languages of Europe*, 561–620. The Hague: De Gruyter Mouton. doi: 10.1515/9783110197075.4.561.

Ionin, Tania & Ora Matushansky. 2013. Numerals. https://www.oxfordbibliographies.com/display/document/obo-9780199772810/obo-9780199772810-0131.xml.

Ionin, Tania & Ora Matushansky. 2018. *Cardinals: The syntax and semantics of cardinalcontaining expressions*. Cambridge: MIT Press. doi:10.7551/mitpress/8703.001.0001.

Johnson, Emma Wintler. 1954. Studies in East Armenian grammar. Dissertation, University of California, Berkeley.

Karst, Josef. 1901. *Historische Grammatik des Kilikisch-Armenischen*. Strassburg: Verlag von Karl Trübner.

Karttunen, Lauri. 2003. Computing with Realizational Morphology. In Gerhard Goos, Juris Hartmanis, Jan van Leeuwen & Alexander Gelbukh (eds.), *computational linguistics and intelligent text processing*, vol. 2588, 203–214. Berlin, Heidelberg: Springer Berlin Heidelberg. doi:10.1007/3-540-36456-0_20.

Kogian, Sahak L. 1949. *Armenian grammar (West dialect)*. Vienna: Mechitharist Press.

Kramer, Ruth. 2016. Syncretism in paradigm function morphology and distributed morphology. In Daniel Siddiqi & Heidi Harley (eds.), *Morphological metatheory*, 95–120. Amsterdam: John Benjamins Publishing Company. doi:10.1075/la.229.04kra.

Lee, Hyunjung & Irene Amato. 2018. A hybrid locality constraint on allomorphy: Evidence from Korean. *Snippets* 34. 14–16. doi:10.7358/snip-2018-034-leam.

Macak, Martin. 2017. The phonology of Classical Armenian. In Jared Klein, Brian Joseph & Matthias Fritz (eds.), *Handbook of comparative and historical Indo-European linguistics*, 1037–1079. Berlin/Munich/Boston: Walter de Gruyter. doi:10.1515/9783110523874-016.

Martirosyan, Hrach. 2019. The Armenian dialects: Archaisms and innovations; description of individual dialects. *Bulletin of Armenian Studies / Армянский гуманитарный вестник* 5. 164–258.

Merchant, Jason. 2015. How much context is enough? Two cases of span-conditioned stem allomorphy. *Linguistic Inquiry* 46(2), 273–303. doi:10.1162/LING_a_00182.

Middleton, Jane. 2021. Pseudo-ABA patterns in pronominal morphology. *Morphology* 31(4), 329–354. doi:10.1007/s11525-021-09377-7.

Minassian, Martiros. 1980. *Grammaire d'arménien oriental*. Delmar, NY: Caravan Books.

Moskal, Beata. 2015. Domains on the border: Between morphology and phonology. Dissertation, University of Connecticut.

Newell, Heather. 2019. Bracketing paradoxes in morphology. In *Oxford research encyclopedia of linguistics*. Oxford: Oxford University Press. doi:10.1093/acrefore/9780199384655.013.589.

Ostrove, Jason. 2018. Stretching, spanning, and linear adjacency in Vocabulary Insertion. *Natural Language & Linguistic Theory* 36(4), 1263–1289. doi:10.1007/s11049-018-9399-y. http://link.springer.com/10.1007/s11049-018-9399-y.

Pesetsky, David. 1985. Morphology and logical form. *Linguistic Inquiry* 16(2), 193–246.

Radkevich, Nina V. 2010. On location: The structure of case and adpositions. Dissertation, University of Connecticut.

Riggs, Elias. 1856. *A grammar of the modern Armenian language as spoken in Constantinople and Asia Minor*. Constantinople: AB Churchill.

Roark, Brian & Richard Sproat. 2007. *Computational approaches to morphology and syntax*. Oxford: Oxford University Press.

32

Sakayan, Dora. 2000. *Modern Western Armenian for the English-speaking world: A constrastive approach*. Montreal: Arod Books.

Sakayan, Dora. 2007. *Eastern Armenian for the English-speaking world: A contrastive approach*. Yerevan: Yerevan State University Press.

Samuelian, Thomas. 1989. *A course in Modern Western Armenian: Dictionary and linguistic notes*, vol. 1. New York: Armenian Prelacy.

Siddiqi, Daniel & Heidi Harley (eds.). 2016. *Morphological metatheory*. Linguistik Aktuell/Linguistics Today, vol. 229. Amsterdam: John Benjamins Publishing Company. doi:10.1075/la.229.

Stolz, Thomas. 2002. Is 'one' still 'one' in 'twenty-one'? On agreement and government properties of cardinal numerals in the languages of Europe. *STUF - Language Typology and Universals* 55(4), 354–402. doi:10.1524/stuf.2002.55.4.354.

Stolz, Thomas & Maja Robbers. 2016. Unorderly ordinals. On suppletion and related issues of ordinals in Europe and Mesoamerica. *STUF - Language Typology and Universals* 69(4), 565–594. doi: 10.1515/stuf-2016-0024.

Stolz, Thomas & Ljuba N. Veselinova. 2013. Ordinal Numerals. In Matthew S. Dryer & Martin Haspelmath (eds.), *The world atlas of language structures online*. Leipzig: Max Planck Institute for Evolutionary Anthropology. https://wals.info/chapter/53.

Stump, Gregory. 2010. The derivation of compound ordinal numerals: Implications for morphological theory. *Word Structure* 3(2), 205–233. doi:10.3366/word.2010.0005.

Stump, Gregory T. 1991. A paradigm-based theory of morphosemantic mismatches. *Language* 67(4), 675–725. doi:10.2307/415074.

Stump, Gregory T. 1995. The uniformity of head marking in inflectional morphology. In Geert Booij & Jaap van Marle (eds.), *Yearbook of morphology* 1994, 245–296. Dordrecht: Kluwer. doi: 10.1007/978-94-017-3714-2_9.

Stump, Gregory T. 1996. Two types of mismatch between morphology and semantics. In Eric Schiller, Elisa Steinberg & Barbara Need (eds.), *Autolexical theory*, 291–318. Berlin/New York: Mouton De Gruyter. doi:10.1515/9783110889376.291.

Stump, Gregory T. 2001. *Inflectional morphology: A theory of paradigm structure*. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511486333.

Sudo, Yasutada & Andrew Nevins. 2022. No ABA patterns with fractionals. In Linnaea Stockall, Luisa Martí, David Adger, Isabelle Roy & Sarah Ouwayda (eds.), *For Hagit: A celebration*. London: QMUL Occasional Papers in Linguistics.

Svenonius, Peter. 2012. Spanning. Unpublished manuscript.

Tatsumi, Yuta. 2021. Linguistic realization of measuring and counting in the nominal domain: A cross-linguistic study of syntactic and semantic variations. Dissertation, University of Connecticut.

Thomson, Robert W. 1989. *An introduction to Classical Armenian*. Delmar, NY: Caravan Books.

van Drie, E. G. A. 2015. The morphological derivation of numerals. Bachelor's thesis, Universiteit Utrecht.

Vaux, Bert. 1998. *The phonology of Armenian*. Oxford: Clarendon Press.

Vaux, Bert. 2023. *The Armenian dialect of New Julfa, Isfahan*. Unpublished manuscript.

Veselinova, Ljuba. 1997. Suppletion in the derivation of ordinal numerals: A case study. In Benjamin Bruening (ed.), *Proceedings of the 8th Student Conference in Linguistics*, 429–44. Cambridge, MA: MIT.

Veselinova, Ljuba N. 2020. Numerals in morphology. In *Oxford Research Encyclopedia of Linguistics*. Oxford: Oxford University Press. doi:10.1093/acrefore/9780199384655.013.559.

Vidal-Gorène, Chahan, Aliénor Decours-Perez, Baptiste Queuche, Agnès Ouzounian & Thomas Riccioli. 2021. Digitalization and enrichment of the Նոր Բառգիրք Հայկազեան Լեզուի: Work in progress for Armenian lexicography. *Journal of the Society for Armenian Studies* 27(2), 224–244. doi:10.1163/26670038-12342714.

Ալավերդյան, Ս. Ա. 1968. Արդվինի Բարբառի Ձևաբանության Մի Քանի Առանձնահատկությունները [Some features of the morphology of the dialect of Artvin]. *Պատմա-բանասիրական հանդես* 3, 229–240.

Աղայան, Էդուարդ Բագրատի. 1954. *Մեղրու Բարբառը [The dialect of Meghri]*. Երևան: Հայկական ՍՍՀ Գիտությունների Ակադեմիա Հրատարակչություն.

Աճառեան, Հրաչեայ. 1911. *Հայ Բարբառագիտություն [Armenian dialectology]*. Մոսկուա-Նոր-Նախիջեւան): Լազարեան Ճեմարան Արեւելեան Լեզուաց.

Աճառեան, Հրաչեայ. 1925. *Քննութիւն Նոր-Նախիջեւանի (Խրիմի) Բարբառի [Examination of the New Nakhichevan (Crimea) dialect]*.

Աճառեան, Հրաչեայ. 1935. *Քննութիւն Ագուլիսի Բարբառի [Study of the dialect of Agulis]*. Երեւան: Պետական Հրատարակչութիւն.

Աճառյան, Հրաչյա. 1926. *Քննություն Մարաղայի Բարբառի [Examination of the Maragha dialect]*.

Աճառյան, Հրաչյա. 1940. *Քննություն Նոր-Ջուղայի Բարբառի [Examination of the New Julfa dialect]*.

Աճառյան, Հրաչյա. 1941. *Քննություն Պոլսահայ Բարբառի [Study of the Armenian dialect of Istanbul]*. Երեւան: Պետական Համալսարանի Հրատարակչություն.

Աճառյան, Հրաչյա. 1947. *Քննություն Համշենի Բարբառի [Study of the dialect of Hamshen]*. Երեւան: ՀՍՍՃ Գիտությունների Ակադեմիայի Հրատարակչություն.

Աճառյան, Հրաչյա. 1952a. *Լիակատար Քերականություն Հայոց Լեզվի [Complete grammar of the Armenian language]*, vol. 1. Երեւան: Հայկական ՍՍՃ Գիտությունների Ակադեմիա Հրատարակչություն.

Աճառյան, Հրաչյա. 1952b. *Քննություն Վանի Բարբառը [Study of the the dialect of Van]*. Երեւան: Երեւանի Պետական Համալսարանի Հրատարակչություն.

Աճառյան, Հրաչյա. 2003. *Քննություն Կիլիկիայի Բարբառի [Study of the dialect of Cilicia]*. Երեւան: Երեւանի Համալսարանի Հրատարակչություն.

Այտընեան, Արսէն. 1867. *Քերականութիւն Աշխարհաբար Կամ Արդի Հայերէն Լեզուի [Grammar of the Civil or Modern Armenian language]*. Վիէննա: Մխիթարեանց տպարան.

Անթոսյան, Սամուէլ Մինասի. 1961. *Կեսարիայի Բարբառը [The dialect of Kayseri]*. Երեւան: Հայկական ՍՍՃ ԳԱ Հրատարակչություն.

Ասատրյան, Մանվել. 1962. *Ուրմիայի (Խոյի) Բարբառը [Dialect of Urmia or Khoy]*. Երեւան: Երեւանի Պետական Համալսարանի Հրատարակչություն.

Ասատրյան, Մանվել Եգորի. 1968. *Լոռու Խոսվածքը [The speech of Lori]*. Երեւան: «Միտք» Հրատարակչություն.

Ասատրյան, Մանվէլ Եգորի. 2004. *Ժամանակակից Հայոց Լեզու: Ձևաբանություն [Modern Armenian language: Morphology]*. Երեւան: ԵՊՀ Հրատարակչություն 4th edn.

Ավետիսյան, Յուրի Սրապիոնի. 2007. *Արևելահայերենի և Արևմտահայերենի Զուգադրական Քերականություն [Comparative grammar of Eastern and Western Armenian]*. Երեւան: Երեւանի Պետական Համալսարանի Հրատարակչություն.

Արունիկյան, Ա. Ի. 1967. Ոզմի Բարբառը (Ձևաբանություն, Գոյական, Ածական, Թվական) [The dialect of Vozim (morphology: Noun, adjective, numeral)]. *Լրաբեր Հասարակական Գիտությունների* 5, 66–78.

Բադրամյան, Ռ. 1958. Կոզնեի Բարբառի Ուսումնասիրության Շուրջը [Research on the dialect of Kirzen]. *Լրաբեր Հասարակական Գիտությունների* 6, 73–84.

Բադրամյան, Ռուբեն. 1979. Արեշի Բարբառը [The dialect of Aresh]. *Լրաբեր Հասարակական Գիտությունների* 5(5), 79–87.

Դանիելյան, Թևան. 1967. *Մալաթիայի Բարբառը [The dialect of Malatya]*. Երեւան: Հայկական ՍՍՃ Գիտությունների Ակադեմիա Հրատարակչություն.

Դավթյան, Կարո Ստեփանի. 1966. *Լեռնային Ղարաբաղի Բարբառային Քարտեզը [Dialectal map of Mountainous Karabakh]*. Երեւան: Հայկական ՍՍՃ Գիտությունների Ակադեմիայի Հրատարակչություն.

Դաւիթ-Բէկ, Մելիք Ս. 1919. *Արաբկիրի Գաւառաբարբառը [The provincial dialect of Arapgir]*. Վիէննա: Մխիթարեանց տպարան.

Եզեկյան, Լևոն. 2007. *Հայոց Լեզու [Armenian language]*. Երեւան: Երեւանի Պետական Համալսարանի Հրատարակչություն.

Եղիայեան, Արմենակ. 2022. *Արեւմտահայերէնի Ուղղագրական, Ուղղախօսական, Ոճաբանական Ուղեցոյց [Guide for Western Armenian orthography, orthopoedy, and stylistics]*. Պէյրութ: ԱՐԻ գրականության հիմնադրամ.

Կատվալյան, Վիկտոր. 2016. *Բայազետի Բարբառը և Նրա Լեզվական Առնչությունները Շրջակա Բարբառների Հետ [The dialect of Bayazet and its linguistic relationships with surrounding dialects]*. Երեւան: «Ասողիկ» Հրատարակչություն.

Հանեյան, Անահիտ Նշանի. 1978. *Տիգրանակերտի Բարբառը [The dialect of Tigranakert]*. Երեւան: Հայկական ՍՍՃ ԳԱ Հրատարակչություն.

Մարգարյան, Ալեքսանդր Սիմոնի. 1975. *Գորիսի Բարբառը [The dialect of Goris]*. Երեւան: Երեւանի Համալսարանի Հրատարակչություն.

Մարկոսյան, Ռազմիկ Արարատի. 1989. *Արարատյան Բարբառ [The dialect of Ararat]*. Երեւան: Լույս.

Մկրտչյան, Հակոբ Մկրտչի. 1952. *Կարնո Բարբառը (Հնչյունաբանություն, Ձեվաբանություն, Բառարան) [The dialect Karin (phonology, morphology, and dictionary)].* Երևան: Հայկական ՍՍՀ Գիտությունների Ակադեմիա Հրատարակչություն.

Մկրտչյան, Ներսես. 1971. *Բուրդուրի Բարբառը [The dialect of Burdur].* Երևան: Հայկական ՍՍՀ ԳԱ Հրատարակչություն.

Մուրադյան, Մարլենա Հայրիկի. 1962. *Շատախի Բարբառը [The dialect of Shatakh].* Երևան: Երևանի Պետական Համալսարանի Հրատարակչություն.

Չոլաքեան, Յակոբ. 2009. *Քեսապի Բարբառը [The dialect of Kesab].* Երևան: ԵՊՀՀրատարակչություին.

Չոլաքեան, Յակոբ. 2017. *Արեւմտահայերէն (Կանոնակարգ Եւ Խնդիրներ): Ա Գիրք [Western Armenian: Regulations and issues].* Երեւան: ՀՀ ԳԱԱ Հ. Աճառյանի անվան լեզվի ինստիտուտ.

Չոլաքեան, Յակոբ. 2018. *Գործնական Արեւմտահայերէն [Practical Western Armenian].* Անթիլիաս: Տպարան Կաթողիկոսութեան Հայոց Մեծի Տանն Կիլիկիոյ.

Պետոյան, Վարդան Ավետիսի. 1954. *Սասունի Բարբառը [The dialect of Sasun].* Երևան: Հայկական ՍՍՀ Գիտությունների Ակադեմիա.

Սարգսյան, Արտեմ. 1985. *Արևելահայ և Արևմտահայ Գրական Լեզուներ։ Զուգադրական-տիպաբանական Քննություն [Literary languages of Western and Eastern: A comparativetypological examination].* Երևան: Հայկական ՍՍՀ ԳԱ Հրատատրակչություն.

Տասնապետեան, Եղուարդ. 1990. *Քերականութին [Grammar].* Անթիլիաս: Տպարան Կիլիկիոյ Կաթողիկոսութեան.

Տօնէլեան, Զապէլ. 1899. *Գործնական Քերականութին Արդի Աշխարհաբարի. Բ. Գիրք [Practical grammar of Modern Armenian, book B].* Պոլիս: Տպարան Յ. Մատթէոսեան.

Քիրէճճեան, Մ.Ս. 1864. *Հայերէն Քերականութին Աշխարհաբար Լեզուի Նախակրթական Դպրոցաց u1344.ամար [Grammar of Modern Armenian: For elementary schools].* Կոստանդնուպօլիս: Տպարանի Յարութին Մինասեան.

Author's address: Department of Linguistics, Stony Brook University, United States, 100 Nicolls Road, Stony Brook, NY 11794-4376