

## A Case of “Elsewhere Reversal” in Iranian Armenian Verbs

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We introduce a case of “elsewhere reversal” in Tehrani Iranian Armenian (IA), a variety of Eastern Armenian spoken in Iran. Descriptively, a default morphological rule has swapped places with a conditioned rule. We argue that this unusual reversal is actually the diachronic consequence of over-regularization, a common phenomenon in language acquisition. The Tolerance Principle (TP; Yang, 2016), a cognitively-grounded mechanism for the acquisition of productive rules, precisely quantifies the conditions in which this “reversal” was possible.

**Background:** Regular simplex verbs in Armenian fall into two inflectional classes distinguished by theme vowel, the *A-Class* and much larger *E-Class*. The family distinguishes perfective and imperfective aspects in the past. In conservative Eastern Armenian spoken in Armenia (EA), the past imperfective is formed agglutinatively, suffixing <-TH-i> (TH=theme vowel). For regular verbs, the perfective is formed by suffixing <TH-c<sup>ʿ</sup>-i>. Most irregular verbs have an *-e-* theme vowel but form the perfective with the suffix <-a->.

Eastern Armenian as spoken in Armenia is conservative in its past tense morphology, having inherited it from Classical Armenian. Thus it can be used to represent a starting state for the innovative Iranian Armenian. IA diverges from EA in two relevant ways: **(1)** the E-Class imperfective <-e-i> surfaces as /-i-/ replacing /-ej-i-/ (vowel deletion replaced glide epenthesis). **(2)** Regular E-Class perfectives take <-a-> like irregulars. This is elsewhere reversal: the former default <-TH-c<sup>ʿ</sup>-i> is now specific to the A-Class and the former irregular <-a-> is now analyzable as applying elsewhere. The innovations are bolded in Table 1. Simplified vocabulary items demonstrating the elsewhere reversal are provided in Table 2.

	A-Class ‘read’		E-Class ‘sing’		Irregular ‘eat’		
<b>EA</b> INF	/kɑrt <sup>h</sup> -ɑ-l/	<kard-a-l>	/jerk <sup>h</sup> -e-l/	<erg-e-l>	/ut-e-l/	<ut-e-l>	√-TH-INF
PST.PFV.3PL	/kɑrt <sup>h</sup> -ɑ-ts <sup>h</sup> -i-n/	<kard-a-c <sup>ʿ</sup> -i-n>	/jerk <sup>h</sup> -e-ts <sup>h</sup> -i-n/	<erg-e-c <sup>ʿ</sup> -i-n>	/ker-∅-∅-ɑ-n/	<ker-∅-∅-ɑ-n>	√-TH-PFV-PST-3PL
PST.IPFV.3PL	/kɑrt <sup>h</sup> -ɑj-i-n/	<kard-ay-i-n>	/jerk <sup>h</sup> -ej-i-n/	<erg-e-i-n>	/ut-ej-i-n/	<ut-e-i-n>	√-TH-PST-3PL
<b>IA</b> INF	/kɑɹt <sup>h</sup> -ɑ-l/	<kard-a-l>	/jeɹk <sup>h</sup> -e-l/	<erg-e-l>	/ut-e-l/	<ut-e-l>	√-TH-INF
PST.PFV.3PL	/kɑɹt <sup>h</sup> -ɑ-ts <sup>h</sup> -i/	<kard-a-c <sup>ʿ</sup> -i-n>	<b>/jeɹk<sup>h</sup>-∅-∅-ɑ-n/</b>	<b>&lt;erg-∅-∅-ɑ-n&gt;</b>	/keɹ-∅-∅-ɑ-n/	<ker-∅-∅-ɑ-n>	√-TH-PFV-PST-3PL
PST.IPFV.3PL	/kɑɹt <sup>h</sup> -ɑj-i-n/	<kard-ay-i-n>	<b>/jerk<sup>h</sup>-∅-i-n/</b>	<b>&lt;erg-∅-i-n&gt;</b>	<b>/ut-∅-i-n/</b>	<b>&lt;ut-∅-i-n&gt;</b>	√-TH-PST-3PL

Table 1: Past Perfective and Imperfective in conservative EA and innovative IA. Examples are presented in /IPA/ and standardized <Hübschmann-Meillet-Benveniste transliteration>. Innovations are **bolded**.

Eastern Armenian	Iranian Armenian
ASP[PFV] T[PST] ↔ -∅-a / LIST ____ -c <sup>ʿ</sup> -i / elsewhere	ASP[PFV] T[PST] ↔ -c <sup>ʿ</sup> -i / TH____, TH=a -∅-a / elsewhere

Table 2: Past perfective elsewhere reversal expressed as simplified vocabulary items for conservative EA and innovative IA.

**Explaining the change:** We account for this change with a formal model of child language acquisition. Acquisition has long been identified as one of the primary drivers of change. Perhaps the most straightforward example of this is the relationship between over-regularization in child morphological productions and analogical leveling. Over-regularization, such as *\*feeled* for *felt* in English, is among the most common child innovations (Xu and Pinker, 1995) and is strikingly similar to leveling, the replacement of irregular forms with regulars.

The Tolerance Principle (TP), which has found success as a precise quantitative model of productivity learning, can be used to account for over-regularization (Yang, 2016). It has recently proven useful in accounting for acquisition-driven morphological change (Kodner, 2022; Ringe and Yang, 2022). Using the TP, we show that the apparent elsewhere reversal in Iranian Armenian can actually be explained as a more complex case of over-regularization. We propose that morphophonological change to the past imperfective **(1)** enabled the elsewhere reversal **(2)** to occur by creating a new surface generalization only available in IA: that the past is expressed simply as -V-, where the quality of vowel indicates perfectivity (<-i> for IMPFV, <-a> for PFV). An application of the TP to Armenian reveals multiple feasible paths for the reversal (Table 3).

Rule Scope	Up to vocab size	$N$	$e$	$\theta$
E-Class intransitives	90	23	10	< 12.01 ✓
E-Class disyll. intransitives	300	63	24	< 26.05 ✓
↓ Once productive for E-Class disyllables ↓				
E-Class intransitives	all	229	43	< 74.75 ✓
All E-Class	300	243	71	< 78.56 ✓
↓ Once productive for E-Class disyllables and intransitives ↓				
All E-Class	all	508	112	< 146.7 ✓

Table 3: Productive TP calculations providing paths to the elsewhere reversal.  $V$ =number of verbs known by the model learner. Calculated at  $V=10, 20, 30\dots90, 100, 200,\dots$

The TP specifies a quantitative threshold  $\theta = N / \ln N$  over learner input for the number of observed exceptions that a generalization can tolerate.  $N$  is the number of items in the scope of the generalization. As long as the number of attested exceptions  $e < \theta$ , the generalization can be acquired. Child input is estimated from the highest frequency items in frequency-sorted corpora (Nagy and Anderson, 1984; Yang, 2016). This has been shown to provide good estimates for this purpose regardless of genre (Kodner, 2019). We sourced counts from an EA frequency dictionary (Ղազարյան, 1982), with conservative EA standing in for the starting state for IA.

**Results:** Given the new generalization facilitated by (1), all past forms in the learner lexicon count toward  $N$ , while A-Class pasts and regular E-Class past perfectives count towards  $e$ . Nevertheless,  $e$  is sufficiently small at learner vocabulary sizes (cf. Fenson et al., 1994) for the generalization to hold. Verbal lexicon sizes of three to five-year olds fall in the hundreds across languages. The TP reveals potential paths of analogical extension through over-regularization (Table 3).

This new generalization is tenable for intransitives (which already show a few high frequency <-a-> past perfectives in conservative varieties) up to a learner vocabulary size of 90 verbs. It is tenable for disyllabic intransitives, which (disyllables also show such a tendency in conservative varieties (Martirosyan, 2009)) up to 300. If <-a-> became productive for disyllables up to 300, then it could extend to all intransitives regardless of vocabulary size or to all E-Class verbs up to 300. Once it became productive for intransitives, it could be extended to all E-Class verbs. Thus multiple paths were available for the elsewhere reversal to occur.

**Conclusions:** The innovation of elsewhere reversal (2) is fortuitous over-regularization facilitated by an unrelated morphophonological change (1). The use of a precise quantitative model of productivity renders our treatment more testable: claims about over-regularization in conservative EA can be evaluated against the productions of EA-learning children. Finally, this gets us closer to solving the actuation problem for this change: why did the elsewhere reversal occur in IA but not in other varieties of Armenian? In varieties without (1), the novel generalization leading to the elsewhere reversal was unavailable. According to our model, IA was the only variety in which it could have occurred.

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