

Simplification principles and child language development in Armenian

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Abstract. At certain stages of their language acquisition, children apparently employ their innately cognitive knowledge and skills to meet the challenges they face in L1 acquisition. Among other things, children use different sets of simplification strategies, such as cropping words, replacing or displacing syllables or syllabic constituents, omitting suffixes, and using simpler syntax. We catalog processes like fortition, reduplication, and the various stages of acquisition, with a focus on phonology and morphology. This paper presents some language development data in Armenian children. Empirically, our study is one of the few (if only) known studies on the language acquisition of Armenian. The data provides valuable theoretical insight into the strategies that children pursue in communication, as well as in cognitive processing of speech.

Keywords. child language; language acquisition; child phonology; child simplification strategies; child morphology

1. Introduction. Analyses of various interactions between language-universal and language-specific regularities and constraints reveal interesting facts about how human beings acquire language. Analyses showcase how humans employ specific mechanisms to communicate effectively in a certain social-cultural environment (Kuhl 2007; Messum & Howard 2015; Werker & Yeung 2005; Werker 2018). In this study we tried to observe some strategies and mechanisms that Armenian children ‘exploit’ to cope with some common difficulties in both acquisition and communication, with a focus on phonology and morphology.

In this paper we analyze the data of one child – F01 in detail. We compare F01’s utterances against data collected from other children – for a total sample of four boys and three girls altogether. This paper builds on previous work by the first author (Հովհաննիսյան 2015).

To obtain materials for this study, we have used diary records, systematic audio/video recording sessions, and some experimental production methods (discussed by Ambridge & Rowland 2013). The present paper focuses on presenting an overview of the data, with the goal of creating a data repository on child data. We assume that the outcomes of children’s speech may be interpreted mostly as simplification at different levels of language acquisition (no matter how intricate and baffling the ‘simplified’ variations may appear). Our analyses also show that the mechanisms that Armenian children ‘employ’ elegantly manipulate between universal and language-specific rules and principles.

Before describing and/or analyzing the facts that we think may well account for universally attested simplification regularities (or “rules”), it is crucial to acknowledge that some aspects of language acquisition require a thorough and accurate study of properties that characterize not only strictly linguistic but also general cognitive abilities (Smith 2010). Hence, variations in general memory and learning, visual/auditory perception, processing speed, etc. may affect individual choices of simplification strategies in language

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acquisition. This is explicitly evidenced by many examples in our data, by various representations for the same linguistic unit(s).¹

2. Background on Armenian. Armenian is an Indo-European language spoken in the southern Caucasus. We focus on Standard Eastern Armenian as spoken in Yerevan, Armenia.

Armenian has rich inflectional morphology and with primarily uses SOV word order. In terms of phonology, the Armenian consonant segment inventory is shown in Table 1.

	Labial	Coronal						Dorsal/Back		
Stop	b p p ^h	d t t ^h					g k k ^h			
Affricate		$\widehat{d}z$ $\widehat{t}s$ $\widehat{t}s^h$	$\widehat{d}ʒ$ $\widehat{t}ʃ$ $\widehat{t}ʃ^h$							
Nasal	m	n								
Fricative	f v	s z ʃ ʒ					χ ʁ h			
Liquid and glides		r	r	j	l					

Table 1. Consonant inventory of Eastern Armenian

Armenian has a three-way laryngeal contrast for stops and affricates: **D**, **T**, **T^h** (Hacopian 2003; Seyfarth & Garellek 2018; Seyfarth et al. 2023). The contrast is maintained in all word positions: initial, medial, and final.

D		T		T^h	
doʁ	‘shiver’	դոդ	տոդ	t ^h oʁ	‘let!’(imperative 2SG)
kod	‘code’	կոդ	կոտ	kot ^h	‘haft’
adam	‘Adam’	Ադամ	ատամ	at ^h am	geographic name
					թոդ կոթ Աթամ

Table 2. Three-way laryngeal contrast in all prosodic positions

Stress is generally final: stress is on the rightmost non-schwa vowel in the word (1).

- (1) ka.^hpiʁ ‘monkey’ կապիկ
ka.^hpi.kə ‘the monkey’ կապիկը

Armenian allows various types of syllables (Table 3). Complex onsets are generally banned except for /C^j/ clusters. Such clusters are arguably palatalized monosegments (Vaux 1998; 81). Complex codas are generally allowed with falling sonority, though some exceptional final clusters exist such as with final /-k^h/, which is morphologically a nominalizer suffix.

Because Armenian has final stress, conventional analyses treat it as having a final iambic foot (Vaux 1998; 136). It has been argued to be syllable-timed (Վանկյան 2008). Armenian generally disallows word-medial onsetless syllables (Vaux 1998; 112).

¹ We use the Leipzig Glossing Rules and the following additions: TH (theme), AOR (aorist), VX (verb stem-extender).

V	'u	'and'	ու
CV	'du	'you (nominative singular)	դու
VC	'ap ^h	'shore'	ափ
CVC	'p ^h ir	'elephant'	փիղ
CVCC	'mar ^h	'man'	մարդ
CjVCC	'kjan ^h k	'life'	կյանք
CV.CjVC	se'njak	'room'	սենյակ
CVCK ^h	'petk ^h	'need'	պետք
CVCCk ^h	'kurtsk ^h	'breast'	կուրծք

Table 3. Syllable shapes in Armenian

3. Background on data collection. The bulk of our data come from F01. F01 is right-handed.² The child has passed all the standard cognitive and motor milestones age-appropriately.

F01's language data were collected regularly from the age of 1;4 – when her first word-like utterances began – to 4;6 years. It's worth mentioning that by the age of 4 the child had essentially acquired the adult segmental and syntactic systems of Armenian.

F01's data were collected during interaction with the child in the following ways:

- Note-taking in phonetic transcription.
- Audio-recording; and transcription of the audio material.
- Video-recording and transcription of the audio material; and taking notes on relevant body language (looking around, turning, pointing, nodding, showing emotions).

For each year of language development, approximately 300 video sessions (~ 1200 in total) are stored. Precise dates of the sessions are also documented. To get good quality video recording, we used an iPhone; and indoors recordings were made with the phone/camera mounted on a tripod. Both audio and video recordings, used for data analyses, played a big role in supporting the details and/or nuances of relevant pronunciations and utterances. The data of the other kids used in this study have been shared with us by their parents. Those were mostly collected by conventional note-taking.

4. One-word stage: Applying simplification strategies. At 1;5, F01 had a limited phonological system and a minimal productive language. We thus could not make valid assumptions about any rules or regularities. However her day-by-day growing lexicon provided some interesting data.

4.1. REDUPLICATION. F01 used reduplication extensively. Because she was not yet able to reproduce the adult utterances fully (perhaps because of her limited phoneme inventory), she seemed to be trying to compensate that 'shortcoming' by keeping the exact *syllable count* in her utterances (cf. Schwartz et al. 1980; Fee & Ingram 1982; Lleó 1990; Berg 1992; Vihman 1981, 1996). She was already good at counting syllables.

² F01's mother has systematically encouraged her to use both hands in many different tasks (to improve the left hand motor skills). Thus the child can use her left hand effortlessly and with almost equal precision.

Adult utterance	Child utterance	Gloss	Orthography
$\widehat{\text{tsa}}\widehat{\text{r}}.\widehat{\text{ra}}.\widehat{\text{tsu}}$	$\widehat{\text{tsa}}.\widehat{\text{tsa}}.\widehat{\text{tsu}}$	‘clown’	ծաղրածու
$\widehat{\text{tsi}}.\widehat{\text{ja}}.\widehat{\text{tsan}}$	$\widehat{\text{tsa}}.\widehat{\text{tsa}}.\widehat{\text{tsam}}$	‘rainbow’	ծիածան
$\text{ba.na.}^{\text{li}}$	$\text{ba.da.}^{\text{da}}$	‘key’	բանալի
$\text{gə.ri.}^{\text{k}^{\text{h}}\text{or}}$	$\text{go.go.}^{\text{go}}$	personal name	Գրիգոր
du.^{duk}	du.^{du}	‘duduk (musical instrument)’	դուդուկ
$\text{t}^{\text{h}}\text{a.t}^{\text{h}}\text{a.}^{\text{χel}}$	$\text{t}^{\text{h}}\text{a.}^{\text{t}^{\text{h}}\text{a}}$	‘to dip’	թաթախել
ta.^{tik}	ta.^{ta}	‘grandma’	տատիկ

Table 4. Reduplication by F01 at age (1;6-1;7)

F01 was able to instinctively break down words into syllables. She was probably trying to share as much phonological information as she could by a) leaving the onset constituent of the initial syllable intact, and b) maintaining the number of syllables of the adult utterance.

4.2. ASSIMILATION AND SUBSTITUTION. By ‘playing’ with the sound inventory that she had at the moment, F01 was trying to communicate as “effectively” as possible. Interestingly, hints of natural class ‘awareness’ may be observed in her utterances. In Table 5, universally recognized substitution and assimilation processes are observed (Rose & Penney 2021; Pater & Werle 2003; Renner 2017).

Adult utterance	Child utterance	Gloss	Orthography
$\text{na.pas.}^{\text{tak}}$	$\text{pa.}^{\text{b}^{\text{ə}}\text{m}}$	‘hare’	նապաստակ
pa.^{pik}	$\text{pa.}^{\text{b}^{\text{ə}}\text{m}}$	‘grandpa’	պապիկ
ka.^{tu}	$\text{ka.}^{\text{t}^{\text{ə}}\text{ŋ}}$	‘cat’	կատու
ka.^{rel}	$\text{ka.}^{\text{t}^{\text{ə}}\text{m}}$	‘to sew’	կարել
ka.^{pel}	$\text{ka.}^{\text{t}^{\text{ə}}\text{m}}$	‘to tie’	կապել
$\text{ka.}^{\text{t}^{\text{h}}\text{ik}}$	$\text{ka.}^{\text{k}^{\text{ə}}\text{m}}$	‘milk (diminutive)’	կաթիկ
ga.^{gik}	$\text{ga.}^{\text{g}^{\text{ə}}\text{ŋ}}$	personal name	Գագիկ
$\text{də.}^{\text{t}^{\text{h}}\text{um}}$	$\text{da.}^{\text{d}^{\text{ə}}\text{m}}$	‘pumpkin’	դդում
kar.^{mir}	$\text{ka.}^{\text{d}^{\text{ə}}\text{m}}$	‘red’	կարմիր
$\text{kaŋg.}^{\text{nel}}$	$\text{ka.}^{\text{g}^{\text{ə}}\text{ŋ}}$	‘to stand’	կանգնել

Table 5. Assimilation and substitution by F01 at age 1;5-1-6

The stressed final syllable ends with an excrescent schwa and syllable nasal [ə̃m] or [ə̃ŋ]. This is interesting because adult speech does not have syllabic nasals. One possible explanation for this large proportion of nasal sounds in the baby’s utterances could be the newly acquired velum gesture – the lowering movement of the velum which causes nasal sounds (Lalevée & Vilain 2006; 84).

In general, the onsets of the actual first syllables in Table 5 are similar to those in the adult utterances. It could be the case that children realize (subconsciously) the importance of onsets as “alignment points for lexical search process in continuous spoken word recognition” (Content et al. 2001).

Some of the child forms are homophonous. The use of homophony is cross-linguistically attested in child speech (Vihman 1981). With the growth of the inventory of distinctive sounds and the emergence of longer, three-syllable words, F01 started to pronounce the previously homonymous types of words more adult-like and gradually discontinued using them (cf. Lleó 1990; 269).

To understand the patterns in Table 5, we need to study more data and relevant phonological facts in detail. We might need to consider not only the phonetics of these utterances and/or the speech control development (Lalevée & Vilain 2006; 84-87), but also a larger system of language-specific sound properties – those functioning on segmental and lexical levels (Rose & Penney 2021; Lleó 1990a; 267; Vihman 1981; 239; Vihman et al. 2023).

4.3. PRODUCTION OF FINAL CONSONANTS. Final environments are, in general, phonologically/phonetically very informative with respect to lexical contrasts and morpheme/syllable boundaries. Armenian exploits enhancement techniques - aspiration, stress - to edgemark the word-final boundary. Preserving laryngeal features is thus useful utterance-finally. We argue that Armenian children employ simplification strategies that respect the distinctions in word-/morpheme-final contexts. We look at utterances of four child speakers –F01, M02, F02 and M01, by records taken between 1;2 and 1;8.

In **M01**'s (male, 1;2) monosyllabic CVC₁C₂ utterances (C₁=j) the final C₁C₂ clusters surfaced in reverse order taking the form of CVC₂C₁ (Table 6). Note how the child placed final stress on the schwa, even though schwa stress is avoided in adult speech.

Adult	Child	Gloss	Ortho.	Adult	Child	Gloss	Ortho.
gajl	ga.'l̩ə	'wolf'	գայլ	tsajr	tsa.r̩'ə	'end'	ծայր
dujl	du.'l̩ə	'bucket'	դույլ	k ^h ajl	k ^h a.l̩'ə	'step'	քայլ
hajr	ha.'r̩'ə	'father'	հայր	majt ^h	ma.t ^h 'ə	'sidewalk'	մայրթ
lujs	lu.'s̩'ə	'light'	լույս	nujn	nu.n̩'ə	'same'	նոյն

Table 6. Replacing final glide-consonant sequences by M01 (1;2): CVC₁C₂ → CV.'C₂'ə

To enhance perception of the adult's final consonant, the child added a new syllable to the originally monosyllabic word and relocated the coda element of that word to an onset position of the new syllable. He produced the newly 'designed' bisyllabic lexical unit with language-specific final stress, thus, making the second syllable stronger and more audible. So, what phonological problem was the child trying to resolve? And what was a possible derivation for these simplified child utterances? We suppose that M01 simplified/reduced the consonant clusters CC → Cj in the first place: /gajl/ → //galj// → /gal/ where double slashes //...// mark intermediate representations. Then he avoided the final consonant by epenthesizing a schwa: //ga.l̩'ə//. This schwa then received stress [ga.'l̩ə] and formed a bisyllabic (iambic) word (a very common procedure for Armenian children). The final consonant of the originally monosyllabic words is granted an onset position and thus made more prominent.

For monosyllabic CVC₁C₂ (C₁=j) words, **F02** (female, 1;8) swapped the initial and final consonants, thus adult [lujs] 'light' լույս was pronounced [su.l̩i]. The monosyllabic word became bisyllabic, placing the consonants in 'fortified' onset positions.

M02 (1;2) reduced his monosyllabic CVC₁C₂ words/morphemes into CVC₂ (C₂=obstruents) forms (Table 7). The final consonants in simplified CVC structures were distinctly prolonged and emphasized, thus, strengthening the right edge of the word. He used the final consonant to edge-mark the morpheme. His final consonants acted as onsets followed by a schwa. This syllable had stress and formed a licit iambic structure [(C)V.'Cə].

Adult	Child	Gloss	Ortho.	Adult	Child	Gloss	Ortho.
lujs	lu.'sə	'light'	լույս	tʃ ^h ors	ts ^h o.'sə	'four'	չորս
durs	du.'sə	'outside'	դուրս	jerk ^h	je.'k ^h ə	'song'	երգ
mart ^h	ma.'t ^h ə	'man'	մարդ	duntʃ ^h	du.'ts ^h ə	'chin'	դուլչ
artʃ ^h	a.'ts ^h ə	'bear (animal)'	արջ	tort ^h	to.'t ^h ə	'cake'	տորթ

Table 7. Reducing final consonant-consonant sequences by M02 (1;2): (C)VCC → (C)V.'Cə

This procedure suggests that the child applied language-universal CC reduction (Peccei 2006; Saffran et al. 2001), followed by a language-specific 'retouch' to create a well-formed prosodic pattern.

Similarly, in words containing a syllable of the form CVC₁C₂ (C₁ = sonorant /j, r, n/; C₂ = obstruent /ts^h, k, s, t^h, g/) **F01** (1;6) retained the final obstruents (C₂), whereas the pre-final sonorants (C₁) were systematically deleted (Table 8). The final consonant was geminated.

Adult utterance	Child utterance	Gloss	Orthography
lujs	jus:	'light'	լույս
zəŋg	jak:	'bell'	զանգ
artʃ ^h	hats ^h :	'bear (animal)'	արջ

Table 8. Reassigning final (coda) consonants by F01 (1;6): CVC₁C₂ → CVC₂:

We suppose that F01, like other child speakers, noticeably emphasized the word-final consonants in her CVC utterances for the same purposes as mentioned above. Moreover, this continued to be the case later (at 1;8) in her words of two or more syllables (Table 9). Sometimes the enhanced syllable was repeated for several times (e.g. lu.si.nə.nə.nə.nə):

Adult utterance	Child utterance	Gloss	Orthography
lu.'sin	lu.si.'nə	'moon'	լուսին
na.'pon	na.po.'nə	'hare (definite, diminutive)'	նապոն
va.'zem	va.ze.'mə	'I run (subj.)'	վազեմ
gən.'dak	gən.da.'kə	'ball'	գնդակ

Table 9. Replacing final consonants by F01 (1;8)

However, F01 didn't seem to have any problem deleting both word-final and syllable-final consonants in bisyllabic words, and simplifying/reducing them to CV.CV canonical

structures (Table 10). There were no extra efforts towards ‘improving’ the perception aspect of her utterances. She might instinctively rely on the fact that more phonetic and phonological content in these relatively longer words (as compared to short monosyllabic words) implies better understanding and more perceptual cues (unchanged initial onsets, syllable number, stress, etc.) for word recognition.

Adult utterance	Child utterance	Gloss	Orthography
nəs.tir	ni.t̪i	‘sit (imp, 2SG)’	նստիր
pu.t̪jur	pu.t̪su	‘tiny’	պուճուր
bə.loḁʒ	bi.ju	‘beetle’	բլոջ
na.rek	na.ji	personal name	Նարեկ
ha.mar	ha.ma	‘for’	համար

Table 10. Deleting final consonants by F01 at age 1;7

4.4. OTHER EPENTHESIS PATTERNS. At 1;9 F01 found a way to deal with complex and demanding production tasks: she dealt with phonetic transitions involving a set of articulatory gestures through the epenthesis of homorganic sounds (Table 11).

Adult utterance	Child utterance	Gloss	Orthography
ʒa.ma.t̪s ^h ujts ^h	zam.bam.bu	‘clock/watch’	ժամացույց
p ^h i.ru.za.gujn	p ^h i.jaŋ.gu.gu	‘turquoise (color)’	փիրուզագույն
kə.ku.ner	kiŋ.ku.nej	‘cuckoos’	կկուկներ

Table 11. Epenthesis patterns by F01 (1;9)

4.5. REPLACING LIQUIDS. At 2;0 F01 was still applying gliding in her substitution strategies. However, at 2;2 (Table 12) she could already produce a rhotic [ɹ]. Her rhotic was very spirantized (cf. adult Armenian: Seyfarth et al. 2023). She was not yet able to pronounce the lateral [l]. Thus in F01’s speech, she merged the adult rhotic and lateral into a single rhotic segment (l/r → ɹ); she no longer produced them as a glide (l/r → j).

Adult phrase	Child utterance	Translation	Orthography
ləvanum a	ɹəvanum a	‘he is washing’	լվանում ա
t̪ ^h i galis	t̪ ^h i gaɹis	‘he is not coming’	չի գալիս
gəluχə	gəɹuχə	‘the head’	գլուխը
mek el	mek eɹ	‘all of a sudden’	մեկ էլ

Table 12. Repairing liquids by F01 (2;2)

4.6. METATHESIS. Simplification strategies discussed in this paper involve some specific cases of metathesis observed in Armenian children. Finley (2017) suggests that learners can encode syllable structure constraints when learning novel phonological patterns. This would imply that the decisions on ‘designing’ phonological patterns, such as metathesis, may be guided by a set of interrelated rules and constraints on input-output changes as well as language structure, in general.

The analysis of the metathesis data collected from Armenian children indicates that the child speakers' utterances are by all accounts determined by various phonological and morphological factors (Hume & Seyfarth 2019). To create perceptually/phonetically and structurally 'well-formed' structures, children seem to refer to their mental representations and exert efforts to process both the relevant underlying forms and the general abstract rules. We classified our data into three main types of metathesis according to the mechanisms that the children employed in their speech patterns.³ The most common mechanisms that we focus on here are the following:

- a) Switching the onset segments in adjacent syllables (Table 13).
- b) Reversing a coda-onset sequence within a syllable (Table 14).
- c) Reversing complex-coda segments, and creating a new syllable (15).

Adult utterance	Child utterance	Gloss	Orthography
χə.mem	mə.χem	'I drink (subj.)'	խմեմ
tʃ̃a.kat	ka.tʃ̃at	'forehead'	ճակատ
sa.nər	na.sər	'comb'	սաևր
χən.dzɔr	tʃ̃hə.χol	'apple'	խնձոր
a.ra.vot	a.va.jot	'morning'	արավոտ
na.pas.tak	nas.ta.pak	'hare'	նապաստակ

Table 13. Switching the onset segments in adjacent syllables (ages between 1;9 and 1;11)

Adult utterance	Child utterance	Gloss	Orthography
gə.luχ	gə.χur	'head'	գլուխ
a.kandʒ	an.dʒak	'ear'	ականջ
χə.lurd	χə.duj	'mole'	խլուրդ
lujs	sulʃi	'light'	լոյս
je.lak	ji.kal	'strawberry'	ելակ

Table 14. Transposition of Coda-Onset tautosyllabic constituents (ages between 1;9 and 1;11)

Adult utterance	Child utterance	Gloss	Orthography
uχt	u.təχ	'camel'	ուղտ
gajl	ga.ʃə	'wolf'	գայլ
p ^h ajt	p ^h a.tʃə	'wood'	փայտ

Table 15. Interchange of adjacent tautosyllabic consonants (ages between 1;9 and 1;11)

We assume that children use metathesis not only to resolve difficult motor tasks, but they also manipulate the abstract frames of underlying forms corresponding to the Armenian-specific well-formed syllable/morpheme structures, stress and prosodic patterns.

³ To show a wider range of metathesis patterns, we used other child speakers' data.

5. Two-word utterances: Telegraphic stage. At 1;7-1;8 F01 was able to ‘recite’ short nursery rhymes, ‘sing’ songs, even ‘tell’ fairy tales with the help of adult family members. Adults would start telling her one of her favorite stories and pause intermittently to let her fill the gaps. She really enjoyed this kind of activity, and she often initiated these speech-games herself. At this stage F01 practiced her first connected utterances, and seemed to be testing and challenging her own memory, auditory and visual processing skills, which provided us with valuable facts about her developing morphology, phonology, and the interactions between these two domains.

With the emergence of F01’s two-word utterances, her connected speech revealed her ‘knowledge’ of phonology at the lexical level. She modified the simplification mechanisms she employed at the one-word level so that they would conform to a different linguistic environment – two-word phrases.

As it was mentioned above, with respect to the language-specific perception requirements, F01 and other children were very accurate with monosyllabic words (even with the early attempted word forms), trying to keep the input form as intact as possible. This specifically refers to the final consonants.

At two-word level the same word would appear either with or without a final consonant, e.g. /*durs*/ ‘outside’ դւրս would surface as [du] or [dus]. A close examination of the lexical units that selectively underwent final C deletion suggests that the deletion was determined by the following conditions. In case the words were produced in isolation, F01 reduced VCC]_σ clusters to VC]_σ (This could be identified with the one-word level simplification strategies.) However, in morphologically/phonologically complex environments she explicitly deleted CC clusters.

F01 re-organized the sequences so that the output had a CV.CV structure. She did so via CC cluster reduction and/or coda segment deletion, leaving the onsets intact, and applying stress. Word boundaries with relevant elements of prosodic/metrical structure were apparently ‘visible’ to the child, and she seemed to be employing both UG and language-specific principles in her utterances (Fikkert 1994; Levelt & Vijver 2004; de Boysson-Bardies 1999; Levelt et al. 2000; Kirk & Demuth 2006; Kehoe 2021).

Table 16 shows her two-word utterances. It should be noted that at syllable/morpheme boundaries coda-onset sequences either fused into a single onset segment or the coda was deleted.

Adult utterance	Child utterance	Translation	Age
ver # jek	ve.jek	‘go up (imp., 2PL)	1;8
mak ^h ur # rozi	ma.k ^h u.jo.zi	‘clean Rosie’	2;2
ʃarunakeŋk ^h # nerkele	sa.ʃu.na.ke.ne.ke.ɹə	‘let’s continue coloring’	2;3
kanatʃ ^h # tʃotʃanak	ka.ta.tʃ ^o .tʃ ^a .kak	‘green swing’	1;7
nor # ban	no.no.ba.n ⁱ ə	‘a new thing’	1;8
vos.ku # pes	vo.ku.pes	‘like gold’	1;8 & 2;3

Table 16. Two-word utterances by F01

F01 and the other children showed knowledge of derivational and inflectional rules of Armenian at a very early stage of their language development. Exposed to an extensively

inflected language with rich case morphology (where nouns/nominals may take different forms to express grammatical functions).

At 1;10 F01 asked and answered questions using logically and syntactically well-formed phrases.

- (2) a. Adult: Where's the moon, F01?
 F01:
 ve.je.v-um je.kə.k^h-um
 above-LOC sky-LOC
 'High above. In the sky.'
 cf. adult [verev-um jerkəŋk^h-um]
- b. Adult: Which ball do you want?
 F01:
 ka.put gu.n-i gən.da.k-ə
 blue color-GEN ball-DEF
 'The blue-colored ball.'
 cf. adult [kəpujt gujn-i gəndak-ə]
- (3) a. Adult: Whose daughter is Gayaneh?
 F01:
 va.t^he.-ji ba.ji.k-ə
 Vache-GEN child-DEF
 'Vache's child.'
 cf. Adult form [vat^he-jj balik-ə]
- b. Adult: Why do you want me to open the gate?
 F01:
 ba.t^h-ek^h, ma.ji.ja-n du g-a-∅, va.z-i
 open-IMP.2PL F01-DEF outside come-TH-PRS.3SG run-PRS.3SG
 'Open. F01 will go out to run.'
 cf. Adult form [bat^h-ek, marija-n durs g-a, vaz-i]

From 1;11 she formed sentences.

- (4) a. vaj mama en it^h an-um e-s
 INTJ mama that what do-IMPF.CVB AUX-2SG
 'Oh Mama, what are you doing?'
 cf. adult form [vaj mama, int^h e-s an-um]
- b. tuk-tuk-tuk ov e? mama-n e-m. duj-ə bat^h
 knock-knock-knock who AUX.3SG mama AUX-1SG door-DEF open.IMP.2SG
 'Knock knock. Who is it? I'm mama, open the door.'
 cf. adult form uses [dur-ə] for 'the door'

F01 also acquired agreement morphology with no noticeable effort – as early as at about 2 years old.

- (5) a. rozi-n mazuk-ə vet^h-e-t^h-∅ u k^həs-e-t^h-∅ ləvan-a-ɪ
 Rosie-DEF paste-DEF take-TH-AOR-3SG and start-TH-AOR-3SG wash-TH-INF
 atam-ner-ə
 tooth-PL-DEF
 'Rosie took the paste and started brushing her teeth.'
 cf. adult form [rozi-n matsuk-ə vert^hr-e-t^h u skəs-e-t^h ləvan-a-l atam-ner-ə]

- b. **giserajin soɹik e-m hak^h-ts^hər-eɹ vorovetev k^hn-e-ɹ-u**
 night dress AUX-1SG wear-CAUS-PERF.CVB because sleep-TH-INF-FUT.CVB
ja
 AUX.3SG
 ‘I have put on sleepwear because it is going to sleep.’
 cf. adult form [giserajin soɹik e-m hak^h-ts^hər-el vorovhetev k^hən-e-l-u a]
- c. **andzerots^hik ts^h-e-m vets^h-eɹ moɹ-a-ts^h-eɹ e-m**
 tissue-DEF NEG-AUX-1SG take-PERF.CVB forget-TH-AOR-PERF.CVB AUX-1SG
 ‘I didn’t take a tissue; I forgot.’
 cf. adult form [andzerots^hik tʃ^h-e-m vertʃ^h-el, mora-ts^h-el e-m]
- d. **nis.t-i k^hez nəkəɹe-m**
 sit-IMP.2SG you.DAT draw-1SG
 ‘Sit, let me draw you.’
 cf. adult form [nəs.t-ir, k^hez nəkəɹe-m]

To form the past tense, F01 attached the regular past-tense morpheme to all verbs – both regular and irregular. The overgeneralization of the acquired rules of grammar is shown in Table 17 for the past tense of the verb, and Table 18 for the genitive forms of the noun in Armenian. Note how she sometimes uses irregular root allomorphs but only regular suffixes.

Adult				F01	
Regular verbs		Irregular verbs		Regular verbs	Irregular verbs
Infinitive	Past	Infinitive	Past	Past	Past
sir-e-l ‘to love’	sir-e-ts ^h -i	ut-e-l ‘to eat’	ker-a	sir-e-ts ^h -i	ut-e-ts ^h -i
par-e-l ‘to dance’	par-e-ts ^h -i	gət-n-e-l ‘to find’	gət-a	par-e-ts ^h -i	gət-e-ts ^h -i
k ^h ən-e-l ‘to sleep’	k ^h ən-e-ts ^h -i	tan-e-l ‘to carry’	tar-a	k ^h ən-e-ts ^h -i	tar-e-ts ^h -i
√-TH-INF	√-TH-AOR-PST	√-(VX)-TH-INF	√-PST	√-TH-AOR-PST	√-TH-AOR-PST

Table 17. Over-regularization of the past tense marking in the past perfective 1SG

Adult				F01	
Regular nouns		Irregular nouns		Regular nouns	Irregular nouns
Nominative	Genitive	Nominative	Genitive	Genitive	Genitive
χaɸ ‘game’	χaɸ-i	tun ‘house’	tan	χaɸ-i	tun-i
kapik ‘monkey’	kapik-i	muk ‘mouse’	mək-an	kapik-i	muk-i
t ^h ev ‘arm’	t ^h ev-i	ḍzi ‘horse’	ḍzi-ju	t ^h ev-i	ḍzi-ji

Table 18. Over-regularization of the genitive case marker

This is not surprising considering the UG facts of language acquisition. However, some of the word formation mechanisms, idiosyncratic ‘simplification’ regularities and the choice of rules were very insightful.

M03 (male, 1;2) simplifies the words, relying on the root/stem forms to communicate his utterance with no inflectional markers (6). Yet he clearly exhibits the appropriate word order, which is apparently evidence of a very early sensitivity to structure dependency principles. He clearly maintained the constituent structure for the NP and VP.

- (6) a. Adult sentence

hajrik-i senjak tʰ^h-e-m mət-el
 dad-GEN room NEG-AUX-1SG enter-PERF.CVB

‘I have not entered daddy’s room.’

Հայրիկի սենյակը չեմ մտել:

- b. Child speech (M03 1;2)

harik senak mət tʰ^he
 dad room enter NEG

M03 seemed to be economical with his lexical units, communicating via simple, underived root/stem morphemes, which he seemed to be well aware of, and used (especially content words) almost flawlessly. F01 was older than M03, so she already used the verb endings, leaving the other lexical units at root-morpheme level.

At 2;3 F01 constructed her own lexical units while learning new words. The adult words like /aʁveran/ ‘mountain resort area’ Աղվերան or /dʒəvatʁeʁ/ ‘fried eggs’ ձվածեղ became [aʁberan] and [dʒəvabeʁ], respectively. To learn the new words, she seemed to have scanned her mental lexicon and found the familiar words/morphemes /aʁ/ ‘salt’ and /beran/ ‘mouth’ բերան (note that this /veran/ part of the word /aʁveran/ has no meaning). So she parsed the monomorphemic word as a compound structure [aʁ#beran]. The other word is a compound noun with two morphemes: /dʒəvats/ ‘egged’ ձված and /eʁ/ ‘ghee’ եղ. Assuming that she didn’t know either of the words at the moment, she apparently displayed her knowledge of phonology and abilities of combining morphemes together: /dʒə.vats # eʁ/ [dʒə.va.dʒeʁ] took the form of /dʒə.va. # beʁ/, /beʁ/ meaning ‘mustache’ բեղ. As a result of syllabification/segmentation and the final stress, enhanced syllable onsets (in medial and final contexts) perform edge-marking function, signaling syllable-edges and morpheme boundaries. That is how /dʒeʁ/ is identified as a morpheme and takes the form of a word familiar to F01 as ‘beʁ’.

6. Comparing child speakers’ utterances . A comparative analysis of the data suggests that the children construct their ‘own language’ and, continuously reorganize the knowledge/linguistic information they acquire on a daily basis – into new mental representations. The individual reorganization principles are possibly based on the child’s co-developing cognitive, linguistic and social systems. The time that children need for gaining mastery over the complex system of nerves and muscles that are responsible for human articulatory mechanisms may, of course, vary from one individual to another (Table 19).

Adult	Child				Gloss	Orthography
	F01	F03	M04	F02		
ʒa.ma.ts ^h ujts ^h	zam.bam.bu	za.ma.ts ^h uts ^h	za.nan.ts ^h u		‘clock/watch’	ժամացույց
a.kandz̄	a.kandz̄ ^j	a.nadz̄	aŋ.gandz̄ ^j	aŋ.gadz̄	‘ear’	ականջ
kə.ku	ki.ku	tu.tu	ku.ku		‘cuckoo’	կկոկ
lə.va.nal	ji.pa.pa	na.na.na		ji.na.na	‘to wash’	լվանալ
na.pas.tak	na.pa.kak	na.ta.ta	ma.ta.tak	nas.ta.pak	‘hare’	նապաստակ
spi.tak	si.pak		sip.tak	si.pak	‘white’	սպիտակ
spa.sir	pa.s ^j ə	pi.pas	pa.si	pa.si	‘wait (2SG, imp.)’	սպասիր
a.ra.vot	a.va.jot		a.ja.tot	a.ta.to	‘morning’	առավոտ

Table 19. Contrasting different children

As we observed in our data analysis, there can be a considerable variation between children in their preferences for different simplification processes/strategies.

The same lexical unit may have different phonemic and phonetic realisations by different children, e.g. /ləvanal/ ‘to wash’ becomes [ji.pa.pa] in F01’s speech, [na.na.na] in F03’s utterance, and in F02’s utterance it becomes [ji.na.na].

However, the *simplification* processes are quite systematic; and considering the com-petence vs. performance realities, we can assume that the speech of a child, who passes all the common cognitive and motor milestones age-appropriately, may be restricted a great deal by articulatory abilities rather than perception of language input; and learners of different languages may take markedly different paths in their development of phonetically similar sounds (Rose & Penney 2021). All of the children in this study are learners of the same language; however, they seem to have relied on their own sound inventory functioning at that given period of language development, and employed simplification methods so that they could reduce the number of sounds and contrasts between sounds they had to deal with. Thereafter, their utterances improved at different stages of general cognitive development before they started to communicate in their native tongue in more or less similar fashion.

7. Conclusion. The present study is a collection of child speech from Armenian. The data shows various simplification strategies that are cross-linguistically unsurprising. However, to our knowledge, this paper is the first to present them to a wider audience. Further research on Armenian child language might significantly contribute to the universal analyses regarding the cognitive functions and learning strategies underlying the early stages of language acquisition.

References

- Ambridge, Ben & Caroline F. Rowland. 2013. Experimental methods in studying child language acquisition. *Wiley Interdisciplinary Reviews: Cognitive Science* 4(2). 149–168. <https://doi.org/10.1002/wcs.1215>.
- Berg, Thomas. 1992. Phonological harmony as a processing problem. *Journal of Child Language* 19(2). 225–257. <https://doi.org/10.1017/S0305000900011405>.
- Content, Alain, Ruth K. Kearns & Uli H. Frauenfelder. 2001. Boundaries versus onsets in syllabic segmentation. *Journal of Memory and Language* 45(2). 177–199. <https://doi.org/10.1006/jmla.2000.2775>.

- de Boysson-Bardies, Bénédicte. 1999. *How Language Comes to Children*. Cambridge, MA: MIT Press.
- Fee, Jane & David Ingram. 1982. Reduplication as a strategy of phonological development. *Journal of Child Language* 9(1). 41–54. <https://doi.org/10.1017/S0305000900003603>.
- Fikkert, Paula. 1994. *On the acquisition of prosodic structure*: University of Leiden dissertation.
- Finley, Sara. 2017. Learning metathesis: Evidence for syllable structure constraints. *Journal of Memory and Language* 92. 142–157. <https://doi.org/10.1016/j.jml.2016.06.005>.
- Hacopian, Narineh. 2003. A three-way VOT contrast in final position: Data from Armenian. *Journal of the International Phonetic Association* 33(1). 51–80. <https://doi.org/10.1017/S0025100303001154>.
- Hume, Beth & Scott Seyfarth. 2019. Metathesis. In Mark Aronoff (ed.), *Oxford Bibliographies in Linguistics*, New York: Oxford University Press. <https://doi.org/10.1093/obo/9780199772810-0242>.
- Kehoe, Margaret. 2021. Coda consonant production in French-speaking children. *Clinical Linguistics & Phonetics* 35(6). 509–533. <https://doi.org/10.1080/02699206.2020.1795723>.
- Kirk, Cecilia & Katherine Demuth. 2006. Accounting for variability in 2-year-olds’ production of coda consonants. *Language Learning and Development* 2(2). 97–118. https://doi.org/10.1207/s15473341lld0202_2.
- Kuhl, Patricia K. 2007. Is speech learning ‘gated’ by the social brain? *Developmental Science* 10(1). 110–120. <https://doi.org/10.1111/j.1467-7687.2007.00572.x>.
- Lalévée, Claire & Anne Vilain. 2006. What does it take to make a first word? the development of speech motor control during the first year of life. In *Proceedings of the 7th International Seminar on Speech Production*, 83–90.
- Levelt, Clara C., Niels O. Schiller & Willem J. Levelt. 2000. The Acquisition of Syllable Types. *Language Acquisition* 8(3). 237–264. https://doi.org/10.1207/S15327817LA0803_2.
- Levelt, Clara C. & Ruben Van De Vijver. 2004. Syllable types in cross-linguistic and developmental grammars. In René Kager, Joe Pater & Wim Zonneveld (eds.), *Constraints in Phonological Acquisition*, 204–218. Cambridge University Press 1st edn. <https://doi.org/10.1017/CBO9780511486418.007>.
- Lleó, Conxita. 1990. Homonymy and reduplication: On the extended availability of two strategies in phonological acquisition. *Journal of Child Language* 17(2). 267–278. <https://doi.org/10.1017/S0305000900013763>.
- Messum, Piers & Ian S. Howard. 2015. Creating the cognitive form of phonological units: The speech sound correspondence problem in infancy could be solved by mirrored vocal interactions rather than by imitation. *Journal of Phonetics* 53. 125–140. <https://doi.org/10.1016/j.wocn.2015.08.005>.

- Pater, Joe & Adam Werle. 2003. Direction of Assimilation in Child Consonant Harmony. *Canadian Journal of Linguistics/Revue canadienne de linguistique* 48(3-4). 385–408. <https://doi.org/10.1017/S0008413100000712>.
- Peccei, Jean Stilwell. 2006. *Child language: A resource book for students*. Psychology Press.
- Renner, Lena F. 2017. *The Magic of Matching—speech Production and Perception in Language Acquisition*: Stockholm University dissertation.
- Rose, Yvan & Natalie Penney. 2021. Language and learner specific influences on the emergence of consonantal place and manner features. *Frontiers in Psychology* 12. 646713. <https://doi.org/10.3389/fpsyg.2021.646713>.
- Saffran, Jenny R., Ann Senghas & John C. Trueswell. 2001. The acquisition of language by children. *Proceedings of the National Academy of Sciences* 98(23). 12874–12875. <https://doi.org/10.1073/pnas.231498898>.
- Schwartz, Richard G., Laurence B. Leonard, M. Jeanne Wilcox & M. Karen Folger. 1980. Again and again: Reduplication in child phonology. *Journal of Child Language* 7(1). 75–87. <https://doi.org/10.1017/S0305000900007030>. https://www.cambridge.org/core/product/identifier/S0305000900007030/type/journal_article.
- Seyfarth, Scott, Hossep Dolatian, Peter Guekguezian, Niamh Kelly & Tabita Toparlak. 2023. Armenian (Yerevan Eastern and Beirut Western varieties). *Journal of the International Phonetic Association*. 1-34. [doi:10.1017/S0025100323000130](https://doi.org/10.1017/S0025100323000130).
- Seyfarth, Scott & Marc Garellek. 2018. Plosive voicing acoustics and voice quality in Yerevan Armenian. *Journal of Phonetics* 71. 425–450. <https://doi.org/10.1016/j.wocn.2018.09.001>.
- Smith, Neil. 2010. *Acquiring phonology: A cross-generational case-study*. Cambridge: Cambridge University Press.
- Vaux, Bert. 1998. *The phonology of Armenian*. Oxford: Clarendon Press.
- Vihman, M. Marilyn. 1996. *Phonological Development*. Oxford: Blackwell.
- Vihman, Marilyn May. 1981. Phonology and the development of the lexicon: Evidence from children's errors. *Journal of Child Language* 8(2). 239–264. <https://doi.org/10.1017/S0305000900003172>.
- Vihman, Marilyn May, Mitsuhiro Ota, Tamar Keren-Portnoy, Rui Qi Choo & Shanshan Lou. 2023. A Challenge to Whole-word Phonology? A Study of Japanese and Mandarin. *Language Learning and Development* 1–21. <https://doi.org/10.1080/15475441.2022.2149401>.
- Werker, Janet F. 2018. Perceptual beginnings to language acquisition. *Applied Psycholinguistics* 39(4). 703–728. <https://doi.org/10.1017/S0142716418000152>.
- Werker, Janet F. & H. Henny Yeung. 2005. Infant speech perception bootstraps word learning. *Trends in Cognitive Sciences* 9(11). 519–527. <https://doi.org/10.1016/j.tics.2005.09.003>.
- Հովհաննիսյան, Համփկ. 2015. Բանավոր խոսքի Չափական Առանձնահատկությունները Հայերենում [Prosodic features of spoken utterances in Armenian]. *Բանբեր Երևանի համալսարանի. Բանասիրություն* 3(18). 60–70.
- Վանյան, Լ. Վ. 2008. Հայերենի խոսքի Ռիթմի Բնույթի Մասին. Էլեկտրաակուստիկ Հետազոտություն [On rhythm nature of the Armenian language. Electro-acoustic research]. *Լրաբեր հասարակական գիտությունների* 3(3). 185–196.