https://doi.org/10.46538/hlj.17.2.6 August, 2020

Morphosyntactic Restructuring in Child Heritage Georgian

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ABSTRACT
This study investigates morphosyntactic restructuring in Heritage Georgian, a highly agglutinative language with polypersonal agreement. Child heritage speakers of Georgian (n = 26, age 3-16) completed a *Frog Story* narrative task and a lexical proficiency task in Georgian. Heritage speaker narratives were compared to narratives produced by age-matched peers living in Georgia (n = 30, age 5-14) and Georgian children and young adults who moved to the United States during childhood (n = 7, age 9–24). Heritage Georgian speakers produced more instances of non-standard nominal case marking and non-standard verbal subject agreement than their homeland peers. Individual morphosyntactic divergence was predicted by lexical score, but not by oral fluency or age. Patterns of divergence in the nominal domain included overuse of the default case (nominative) as well as over-extension of non-default cases (ergative, dative). In the verbal domain, person agreement was more consistently marked than number. Subject agreement exhibited more divergence from the baseline than object agreement, contrary to previous evidence from similar heritage languages (e.g., Heritage Hindi, Montrul et al., 2012). Results indicate that morphosyntactic production in child Heritage Georgian generally displays the same divergences as adult heritage-language grammars, but language-specific differences also underscore the need for continued documentation of lesser-studied heritage languages.

KEYWORDS: *child heritage speakers, Georgian, morphosyntax, case marking, verbal agreement, phi-features, lexical knowledge*

1. INTRODUCTION

The study of heritage languages (HLs) has come far as a field. Over the last twenty years, the field has moved from identifying heritage speakers (HSs) (Valdés, 2000), to describing the abilities of HSs (e.g., Benmamoun et al., 2013) and refining its terminology (e.g., Rothman, 2009). Recently, researchers have begun to sketch a theory of how HL grammars develop (Polinsky & Scontras, 2020b). As researchers work to elaborate theories of HL grammars, it is crucially important that these explanations be founded on a typologically robust base of HLs. This paper aims to contribute to the understanding of morphosyntactic restructuring in HLs by investigating Georgian (Kartvelian, South Caucasian, ISO 639-3 kat) (International Organization for Standardization, n.d.), a previously undocumented HL, as spoken by HSs raised and living in Brooklyn, New York.

This study simultaneously seeks to address another empirical gap in HL studies: the lack of documentation of school-aged HSs. Montrul (2016a, p. 5) notes that while much literature exists describing the abilities of adult HSs and childhood bilinguals (i.e., future HSs), there exist few descriptions of HSs' abilities during the middle years of childhood (some notable examples are Montrul & Sánchez-Walker, 2013; O'Grady et al., 2011; and Polinsky, 2011, 2018). Documenting the HL production and comprehension of school-aged children is necessary to develop robust theoretical explanations. When HSs enter the formal school system, their language dominance

https://doi.org/10.46538/hlj.17.2.6 August, 2020

shifts from their first language, or HL, to the societal majority language. We selected participants who were child HSs of Georgian in order to test which factors may influence on-going grammatical restructuring in the HL. Specifically we tested for influences of age, lexical knowledge (Polinsky, 2006) and oral fluency (Polinsky, 2008).

Our study therefore has two main goals. First, we compare the morphosyntax of child Heritage Georgian to the restructuring found in other HL grammars. Second, we investigate whether individual children's HL production is predicted by their age, lexical knowledge, and oral fluency.

2 BACKGROUND

2.1 Morphosyntactic Restructuring in Heritage-Language Grammars

The recent surge of interest in HLs can be attributed in part to the potential of HL studies to inform both the wider field of bilingual studies and formal linguistic theories (Benmamoun et al., 2013). The literature categorizes the many aspects of HL grammars which are prone to either diverge from or reflect their baselines (for thorough reviews, see Montrul, 2016b; Polinsky, 2018; for an overview, see Polinsky & Scontras, 2020b). In this study, we investigate only the morphosyntactic characteristics of Heritage Georgian. We chose this focus because HL morphology is well-documented and is an area where HSs consistently diverge from the baseline. Georgian's morphosyntactic system features several case marking paradigms and verbal agreement with both subjects and objects. Few previously studied HLs have comparable morphological systems; to our knowledge, the most similar are Heritage Hungarian (Bolonyai, 2007; de Groot, 2005; Fenyvesi, 2000), Heritage Labrador Inuttitut (Sherkina-Lieber, 2015; Sherkina-Lieber et al., 2011), and Heritage Hindi (Montrul et al., 2012, 2019). Studying Heritage Georgian can help demonstrate whether characterizations of HL morphology generalize from commonly studied HLs (e.g., Russian, Spanish) to more highly synthetic HLs.

Benmamoun, Montrul, and Polinsky (2013) provide the first descriptive generalizations of grammatical divergences seen in the productive morphosyntax of HLs. They note a wealth of studies showing that both nominal and verbal inflection are susceptible to divergence from the baseline. Interestingly these divergences seem to occur within a predictable hierarchy: namely, nominal inflection is more susceptible to divergence from the baseline than verbal inflection (the same was observed earlier by Bolonyai, 2007). This hierarchy is observed across a variety of both fusional and agglutinative heritage languages, with some documented examples being Heritage Hindi (Montrul et al., 2012), Russian (Polinsky, 2006), Arabic (Albirini et al., 2013), and Hungarian (Bolonyai, 2007; de Groot, 2005; Fenyvesi, 2000). In each of these studies, HSs produced quantitatively more non-standard forms of nominal case marking compared to verbal agreement. Preliminary evidence suggests that this hierarchy of inflectional divergence holds for comprehension as well (for examples from Heritage Labrador Inuttitut, see Sherkina-Lieber, 2011; and Sherkina-Lieber et al., 2011).

Within the nominal domain, case marking is particularly susceptible to divergence from the baseline. HSs in production studies have consistently shown simplifications of nominal case paradigms (for discussion, see Montrul, 2016b; and O'Grady et al., 2011). That is, HSs tend to reduce case distinctions in their HL. Polinsky (2018, p. 199-200) provides a list of 79 studies of 23 HLs that document case marking restructuring. In simplifying case paradigms, HSs exhibit a

https://doi.org/10.46538/hlj.17.2.6 August, 2020

few tendencies. They often overuse the default, or citation form of a noun, such as the nominative in nominative-accusative languages or the absolutive in absolutive-ergative languages (Montrul, 2016b, p. 59-61). In some instances though, HSs may extend the use of a more frequent case marking or a phonetically salient marking (Polinsky, 2018, p. 197).

Within the verbal domain, different types of verbal inflection are variably susceptible. Tense inflection seems to be the most resilient to divergence; HSs regularly use tense similarly to the baseline (Benmamoun et al., 2013; Polinsky & Scontras, 2020b). Aspect is less resilient than tense; HL grammars regularly restructure aspectual distinctions (e.g., for Heritage Spanish see Silva-Corvalán, 1994; for Heritage Russian see Laleko, 2010). Verbal agreement is also noted as an area of divergence, but not all agreement is similarly affected. Polinsky (2018) observes that resistance to restructuring in agreement seems to follow the phi-feature hierarchy:

(1) [PERSON] > [NUMBER] > [GENDER] (Harley & Ritter, 2002)

Person agreement in HLs seems to approximate the baseline (e.g., for Heritage Hungarian see Fenyvesi, 2000; for Heritage Russian see Polinsky, 2006). Gender and number verbal agreement exhibits divergence in HS production (e.g., for Heritage Egyptian and Palestinian Arabic see Albirini et al., 2013; for Heritage Hindi see Montrul et al., 2012). Some evidence in comprehension also shows that number agreement is susceptible to restructuring (for Heritage Labrador Inuttitut, see Sherkina-Lieber et al., 2011). Gender agreement, observed mostly in studies of noun phrase internal agreement or concord, is highly vulnerable in HL grammars (e.g., Montrul et al., 2008).

Georgian features polypersonal verbal agreement. That is, the Georgian verb inflects to agree in person and number with both the subject and object of the clause, as is described in §2.2.2. To our knowledge, the only HL production studies of object verbal inflection investigate Heritage Hungarian and Heritage Hindi. Hungarian verbs have two inflectional paradigms that reflect the (in)definiteness of their object. This inflectional reflex of object definiteness is highly vulnerable to restructuring in HL grammars (Fenyvesi, 2000, 2005), more so than subject agreement. In Hindi, verbal agreement interacts heavily with case marking. The verb can agree with the subject, with the object, or with neither, depending on whether its arguments are overtly marked for case. In a study featuring both oral production and acceptability judgment tasks, HSs of Hindi display more vulnerability in object than subject agreement (Montrul et al., 2012). While the inflectional systems in these languages differ, these studies suggest that HL verbal inflection for objects may be more susceptible to divergence than inflection for subjects (Benmamoun et al., 2013, p. 142).

In a study of child Heritage English, Polinsky (2018, p. 49) explains that inflectional restructuring resulted in three distinct patterns: overregularization (e.g., *goed* as a suppletive form for the irregular past *went*), overmarking (e.g., *talkeded*), and substantial intra-speaker variation. We predict that inflectional restructuring in child Heritage Georgian might exhibit these same patterns.

In the next section, we review standard Georgian's complex system of morphosyntactic marking between verbs and their arguments. It is this system, which is taught as the spoken and written standard in Georgian public schools, that constitutes the assumed baseline against which we measured our participants' narratives.

https://doi.org/10.46538/hlj.17.2.6 August, 2020

2.2 Standard Georgian Morphosyntax

Georgian is notable for its relatively free word order and extensive *pro-drop*. Within a basic clause, the verb and its arguments may appear in any order, depending on information-structural factors. In neutral contexts word order is typically SOV or SVO (Skopeteas et al., 2009). Additionally, all discourse-salient arguments can be dropped (2).

(2) a. (ivane) (k'at'a-s) u-q'ur-eb-s[1]
John.NOM cat-DAT PRV-watch-TS-3SG
'John is watching the cat.'
b. (Ivane) u-q'ur-eb-s (k'at'a-s)
c. u-q'ur-eb-s (ivane) (k'at'a-s)
d. (k'at'a-s) (ivane) u-q'ur-eb-s
e. (k'at'a-s) u-q'ur-eb-s (ivane)
f. u-q'ur-eb-s (k'at'a-s) (ivane) (Wier, 2014, p. 37-38)

Arguments of the verb are identified for their role (i.e., subject, direct object, indirect object) based on their case marking. Arguments of the verb, whether dropped or not, are referred to by polypersonal agreement on the verb. That is, every finite verb inflects to agree with the person and number[2] of its subject and objects, though some agreement is phonetically null and there are some syncretic ambiguities. It is this system of nominal case marking and verbal agreement which we expect will undergo restructuring or simplification in the production of Georgian HSs.

2.2.1 Standard Case Marking

Georgian features a split-ergative system of case marking, meaning that for certain tense-aspect-mood (TAM) forms of the verb, an ergative-absolutive system is used (3a), and for other TAM forms[3] of the verb, nominative-accusative marking is used (3b).

(3) a. bit͡ʃ'-ma da-i-nax-a baq'aq'-i *ergative-absolutive*
boy-ERG PVB-PRV-see-3SG frog-NOM
'The boy saw the frog.'

b. bit͡ʃ'-i xed-av-s baq'aq'-s *nominative-accusative*
boy-NOM see-TS-3SG frog-DAT
'The boy sees the frog.'

Georgian verbs fall into four classes based upon their morphosyntactic properties[4]. As shown in Table 1**,** only class I and class III verbs feature this alternation between nominative-accusative and ergative-absolutive noun declension. Class II verbs require their subject to take the nominative and their object to take the dative. Class IV verbs cause their arguments to have inverse marking; their subject takes dative case and the object takes nominative case. The copula does not select for any of the declension paradigms presented in Table 1; instead, it assigns nominative case to all of its arguments.

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Table 1

Standard Georgian Case Marking Paradigms, Simplified

TAM series[5]	Verb Classes						
	I. III.			II.		IV.	
	Subj.	D.O.	Id.O.	Subj.	Obj.	Subj.	Obj.
Present, Future	NOM	DAT	DAT	NOM	DAT	DAT	NOM
Aorist, Optative	ERG	NOM	DAT				

NOM = nominative, DAT = dative, ERG = ergative

Adapted from *Georgian: A reading grammar, corrected edition* by H. I. Aronson, 1990, Slavica Publishers, p. 462

Imedadze and Tuite (1992, p. 57-58), summarizing from the first author's own research and extant diary studies (Avalishvili, 1961; Kaxadze, 1969), describe the path of first language acquisition of this complex split-ergative system of case marking. During the one-word stage, children use nouns in the citation form, the nominative. Children begin using all three cases around age three and produce relatively few errors from the beginning. Interestingly, the ergative case is not over-applied to subjects that take the nominative—such as class II verbs or class I and III verbs in the present and future tenses. Similarly, the dative is used unproblematically for subjects of class IV verbs but is not extended to subjects of the other verb classes. That is, from the time case marking emerges in their productive grammars, Georgian children unproblematically assign the three cases appropriately across the different classes of verbs and the TAM series.

2.2.2 Standard Verbal Agreement

The Georgian verb features agglutinative agreement with subjects and objects. Specifically, Georgian verbs agree with their arguments in person and number.[6] Table 2 shows the two paradigms of agreement morphemes. For Class I, II, and III verbs, the Type A inflection agrees with the subject, while Type B inflection agrees with the object.[7] Class IV verbs display the opposite pattern, with Type B inflection agreeing with the subject and Type A inflection agreeing with the object.

Table 2

Standard Georgian Verbal Agreement Markers

Type A

	Singular	Plural
1st person	v-	v-…-t
2nd person	∅(x)-	∅(x)-…-t
3rd person	-s/a/o	-(a/e)n/es/nen

Type B

	Singular	Plural
1st person	m(i)-	gv(i)-
2nd person	g(i)-	g(i)-…-t
3rd person	(s/h/u)∅-	(s/h/u)∅-…(t)

Adapted from *Georgian: Ergative or Active?* by B.G. Hewitt, 1987, Lingua, 71(319-340), p. 320.

https://doi.org/10.46538/hlj.17.2.6 August, 2020

For monolingual children learning Georgian, verbal agreement is mostly set by the end of the third year. At that point, the only problems that remain with verbal agreement are the use of an incorrect third person marker—which vary greatly, being conditioned by verb class, TAM series, and verb-stem phonology—or underuse of third plural agreement with animate plural subjects (Imedadze & Tuite, 1992).

2.3 Georgians in the United States

Since the dissolution of the Soviet Union, Georgian immigration to the United States has soared, with over 30,000 individuals obtaining resident status between 1992-2018 (U.S. Department of Homeland Security, 2020). In the Northeast, particularly in Brooklyn, Georgian immigrants have established vibrant communities replete with community centers, churches, restaurants, dance studios, and festivals.

Due to the recency of this population's migration, the first generation of Georgian HSs in the United States are just now reaching adulthood. The majority of Georgian HSs are still children. These second-generation Georgian-Americans are experiencing the familiar challenges of growing up as HSs in the United States, such as HL insecurity and navigating multicultural identities.

In recruiting child HSs of Georgian to participate in our study, we accomplish two goals. First, we are able to provide an initial snapshot of some features of Heritage Georgian production that will likely carry over into adult grammars. Second, we seek to understand the ongoing restructuring of Heritage Georgian during the tumultuous schooling years, when HSs increase their use of and exposure to the societal majority language. This age is poorly documented in the HL literature (Montrul, 2016a).

2.4 Research Questions

In this study, we used findings in the HL literature to predict morphosyntactic restructuring in Georgian, a previously unstudied HL. We simultaneously investigated an understudied heritage population, school-aged HSs. Our study was guided by two questions:

1. Does Heritage Georgian show divergence from its baseline in morphosyntactic features that have been documented to restructure in other heritage languages, namely in nominal case marking and verbal agreement?

Specifically, we expected nominal case marking in HS production to differ from the baseline. We predicted that HSs would reduce the complexity of Georgian's split-ergative case system by either leveling across its paradigms—for example, perhaps relying on nominative to mark all subjects and using dative to mark all objects—or ignoring case distinctions and over-using Georgian's default case, the nominative, for all arguments (Montrul, 2016b). In addition, we expected there to be quantitatively more divergence in case marking than in verbal agreement (Benmamoun et al., 2013). For verbal agreement, we predicted that phi-feature agreement would be differentially affected following the feature hierarchy, with number agreement showing more divergence than agreement in person (Polinsky, 2018). Additionally, we expected object agreement marking to show more restructuring than subject agreement, similar to findings in Heritage Hungarian (e.g., Fenyvesi, 2000) and Heritage Hindi (Montrul et al., 2012).

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2. Which individual variables predict grammatical restructuring in child Georgian heritage speakers?

Restructuring in adult HL grammars has been shown to correlate with other measures of individual HL competence, particularly HL oral fluency (Polinsky, 2008) and HL lexical knowledge (Polinsky, 2006). It is an open question whether these measures will correlate with divergence in the HL grammars of school-age children. The middle childhood years, when young HSs are receiving instruction and socialization in the dominant language in school yet still interact in the HL in the home environment, are known to be a dynamic time of shifting bilingual preference and performance (Caldas & Caron-Caldas, 2000). Therefore we tested whether individual restructuring is correlated with HL fluency, proficiency, and age.

3 METHODS

3.1 Participants

Thirty-three Georgian-English bilinguals participated in our study in Brooklyn, New York. Each participant spoke Georgian as a first language with their parents. During recruitment, we realized that some participants did not fit the typical definition of a heritage speaker because they arrived in the U.S. in middle childhood after receiving some years of public education in Georgian. We therefore decided to divide the Georgian-English bilinguals post-hoc into two groups: Georgian heritage speakers (n = 26), who were born in the United States or arrived in early childhood before schooling age, and Georgians who arrived in the U.S. in late childhood (n = 7), after having some formal schooling in Georgia. The Georgians who came to the U.S. in late childhood were termed the late arrival group. We expected them to show some grammatical divergence, but to a lesser extent than the HSs. As a comparison group[8], we recruited 30 age-matched Georgian children living in Tbilisi and the Gori region of Georgia. Group demographics are given in Table 3**.**

Table 3

Participant Group Demographics

	n	**Age**	**Age of Arrival (AoA)**
Georgian Heritage Speakers	26	3;10-16;1 (*M* = 8;7, *SD* = 3;1)	Born in U.S. (*n* = 21) 0-6 (*n = 5*) (*M* = 3;5, *SD* = 1;10)
Late Arrivals	7	9;8–24 (*M* = 16;1, *SD* = 5;9)	7-14 (*M* = 9;3, *SD* = 2;4)
Homeland Children	30	5;5-14;2 (*M* = 8;7, *SD* = 2;6)	N/A

3.2 Procedure

The Georgian HS and late arrival groups were interviewed in English by the first author. First, participants gave responses to an orally administered language history and background questionnaire. Then participants completed an HL lexical task, described below. Finally, participants produced an oral *Frog Story* narrative (Berman & Slobin, 1994). Participants first told

https://doi.org/10.46538/hlj.17.2.6 August, 2020

a narrative in Georgian using the wordless picture book, *Frog, Where Are You?* (Mayer, 1969). Upon finishing, they were asked to tell the story again in English. The collected English narratives are not examined in this study. The comparison group of Georgian homeland children were interviewed by the first author in Georgian. First, they responded to a brief oral language and background questionnaire. Then, they completed the same *Frog Story* narrative task, in Georgian only.

Georgian fluency scores were calculated for the Georgian HS and late arrival groups by counting the number of syllables per minute produced during their narratives. Given the fact that Georgian spelling is reliably phonetic, this process was automated. Each vowel in the transcribed narratives was counted as denoting a syllable.

The lexical knowledge task given to the Georgian HSs and late arrivals was created for this study to assess knowledge of Georgian vocabulary. Participants were given words in English and asked to translate them into Georgian. One point was awarded for each correct translation, for a maximum of seventy-five points. The words were given by order of frequency, with the most frequent words first. When participants failed to correctly translate five words in a row, the task was ended. Words were chosen based on their matched frequency in each language, as determined by the COCA (Davies, 2008) free oral frequency list (retrieved from Word Frequency Data website, n.d.) and a Georgian frequency dictionary (Gabunia et al., 2006). There were fifteen words from each thousand of the 5,000 most frequent words in each language (15 words from 0-1,000 most frequent, 15 words from 1,001-2,000 most frequent, etc.). The words were also chosen according to category. Overall, 56% were nouns, 25% were verbs, and 19% were adjectives. The lexical test was piloted with two fluent Georgian-English bilinguals, one living in Tbilisi and the second living in the U.S. The test is provided in the Appendix for reference.

3.3 Analysis

The Georgian narratives for all three groups were transcribed by clause by the first author and checked by a native speaker of Georgian. Each finite clause was then coded for the features listed in Table 4. Each instance of case marking and verbal agreement was coded as standard or non-standard based on the standard dialect of Georgian taught in Georgian public schools. False starts, repetitions, and code-switches[9] were excluded from coding. Sentences with a copula (11.1% of the data) were also excluded because the copula does not participate in Georgian's nominal declension patterns. Indirect objects were so infrequent (present in 2.4% of clauses for the HS group, 4.8% for late arrivals, and 4.2% for the homeland children) that, although they were coded, they were excluded from analyses. All statistical analyses were conducted in R (R Core Team, 2018) using the RStudio environment (RStudio team, 2015).

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Table 4

Coding Schema of Morphosyntactic Features Applied to Each Finite Clause of the Narratives

word order *(e.g., OVS)*	subj. presence *(overt or null)*	subj. case *(standard or not)*	subj. agreement *(standard or not)*
verb class *(I, II, III, IV)*	d. obj. presence *(overt or null)*	d. obj. case *(standard or not)*	obj. agreement *(standard or not)*
verbal series (e.g., aorist)	ind. obj. presence *(overt or null)*	ind. obj. case *(standard or not)*	

4. RESULTS

Results are organized according to our research questions. First we present group differences and describe qualitative trends in the non-standard morphosyntax used by each group. Then we investigate which individual factors were predictive of HL grammatical restructuring.

4.1 Group Differences in (non)Standard Morphosyntax

4.1.1 Nominal Case

Descriptive statistics of non-standard case marking on subjects and objects by group are provided in Table 5**.** A majority of HSs produced at least one instance of non-standard case marking on subjects (19 out of 26), while almost half produced at least one object with non-standard case (11 out of 26). Three participants in the late arrival group also produced non-standard subject cases, and one used non-standard object case. Out of the 30 homeland children, four produced non-standard subject case and two used a non-standard case for an object.

Table 5

Descriptive Statistics of non-Standard (NS) Nominal Case Marking

	Mean # NS (*SD*)		**Mean % NS (*SD*)**		**# of speakers**	
	Subj	**Obj**	**Subj**	**Obj**	**Subj**	**Obj**
Georgian HSs (*n* = 26)	4.23 (5.45)	0.65 (0.94)	21.09 (19.98)	6.29 (9.33)	19	11
Late Arrivals (*n* = 7)	0.71 (0.95)	0.14 (0.38)	3.24 (5.05)	1.19 (3.15)	3	1
Homeland Children (*n* = 30)	0.43 (1.41)	0.10 (0.40)	1.28 (3.85)	0.76 (3.21)	4	2

Participants' percentages of non-standard case-marking are graphed in Figure 1**,** with group means and 95% confidence interval bars. Georgian HSs used non-standard case in an average of 21.09% of clauses for subjects and in 6.29% of clauses for objects. The late arrivals produced less non-standard case marking than the HSs (3.24% for subjects, 1.19% for objects), but more on average than the homeland group (1.28% for subjects, 0.76% for objects). The HS group was characterized by high variance in their non-standard production of both subject (*SD* = 19.98%) and object case (*SD* = 9.33%) as compared to the other groups (late arrivals: subject *SD* = 5.05%, object *SD* = 3.15%; homeland children: subject *SD* = 3.85%, object *SD* = 3.21%). This high variance indicates that the HS group was more heterogenous in performance. Indeed, the HSs ranged from 0% to 60.71% of clauses produced with non-standard subject case.

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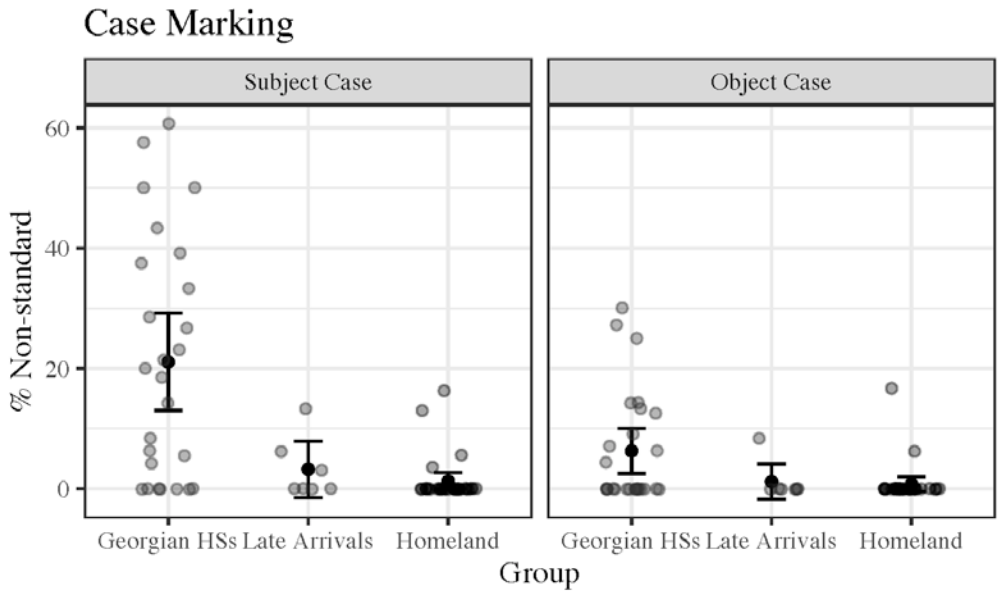
To test for differences between groups, we fit mixed effects logistic regression models using the function `lme4::glmer` (Bates et al., 2015) to the presence of non-standard case marking with a fixed effect of group and a random effect of participant. Significance testing of the main effect was conducted through model comparisons using the function `lmtest::lrtest` (Zeileis & Hothorn, 2002). In each case, group was significant at $\alpha = .05$. Post-hoc comparisons of group were derived using the Tukey HSD test in the `multcomp` package (Hothorn et al., 2008).

The HSs were significantly more likely to use non-standard subject case than both the homeland children (β = -3.826, *SE* = 0.729, *z* = -5.245, *p* < .001) and the late arrival group (β = -2.503, *SE* = 0.972, *z* = -2.576, *p* = .026). For object case marking, HSs were more likely to use non-standard case than the homeland group (β = -2.391, *SE* = 0.793, *z* = -3.017, *p* = .006). The HS group was not significantly different than the late arrivals in object case-marking (β = -1.842, *SE* = 1.243, *z* = -1.482, *p* = .290), presumably because the model was underpowered. In §4.1.4 we describe qualitative patterns in the groups' use of non-standard case marking.

Figure 1

Percentage of non-Standard Use of Nominal Case by Group



Note. Group means with 95% confidence interval bars are shown in solid black. Each gray dot represents an individual's percentage of divergence.

4.1.2 Verbal Agreement

Descriptive statistics of non-standard subject and verbal agreement by group are given in Table 6**.** Nearly all HSs produced non-standard subject agreement (22 out of 26) but very few used non-standard object agreement (4 out of 26). Late arrivals performed similarly with half (4 out of 7) producing non-standard subject agreement, but none used non-standard object agreement. Over a third of the homeland children also produced non-standard subject agreement (12 out of 30) and zero used non-standard object agreement.

https://doi.org/10.46538/hlj.17.2.6 August, 2020

Table 6

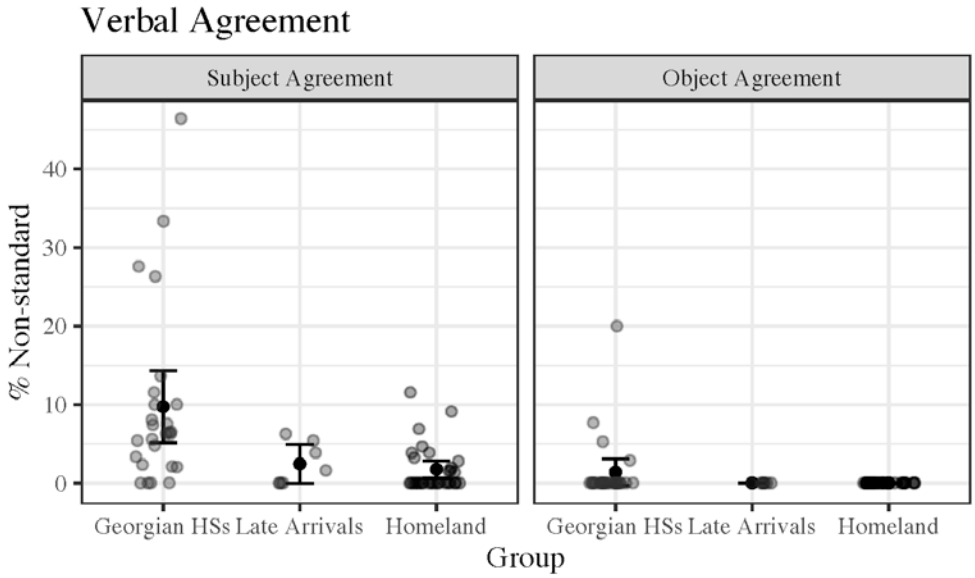
Descriptive Statistics of non-Standard (NS) Verbal Agreement

	Mean # NS (*SD*)		Mean % NS (*SD*)		# of speakers	
	Subj	**Obj**	**Subj**	**Obj**	**Subj**	**Obj**
Georgian HSs (*n* = 26)	3.35 (3.61)	0.15 (0.37)	9.72 (11.36)	1.38 (4.22)	22	4
Late Arrivals (*n* = 7)	1.14 (1.46)	0 (0)	2.44 (2.70)	0 (0)	4	0
Homeland Children (*n* = 30)	0.60 (0.85)	0 (0)	1.74 (2.95)	0 (0)	12	0

Participants' percentages of non-standard verbal agreement are shown in Figure 2**,** with group means and 95% confidence interval bars. HSs produced non-standard agreement with the subject for an average of 9.72% of clauses. Statistical modeling and significance testing for verbal agreement were conducted identically to the procedure described for nominal case. HSs were indeed more likely to produce non-standard subject agreement than both the homeland children (β = -2.020, *SE* = 0.414, z = -4.883, $p < .001$) and the late arrival group (β = -1.502, *SE* = 0.630, z = -2.387, p = .043). On the other hand, the three groups did not greatly differ in their use of non-standard object agreement. HSs used numerically more non-standard object agreement (1.38%) than the other two groups, but this difference was not large enough to fit a statistical model. In §4.1.4 we describe qualitative patterns in the groups' use of non-standard verbal agreement.

Figure 2

Percentage of non-Standard Use of Verbal Agreement by Group



Note. Gray dots represent each individual's percentage divergence. Group means with 95% confidence interval bars are shown in solid black.

https://doi.org/10.46538/hlj.17.2.6 August, 2020

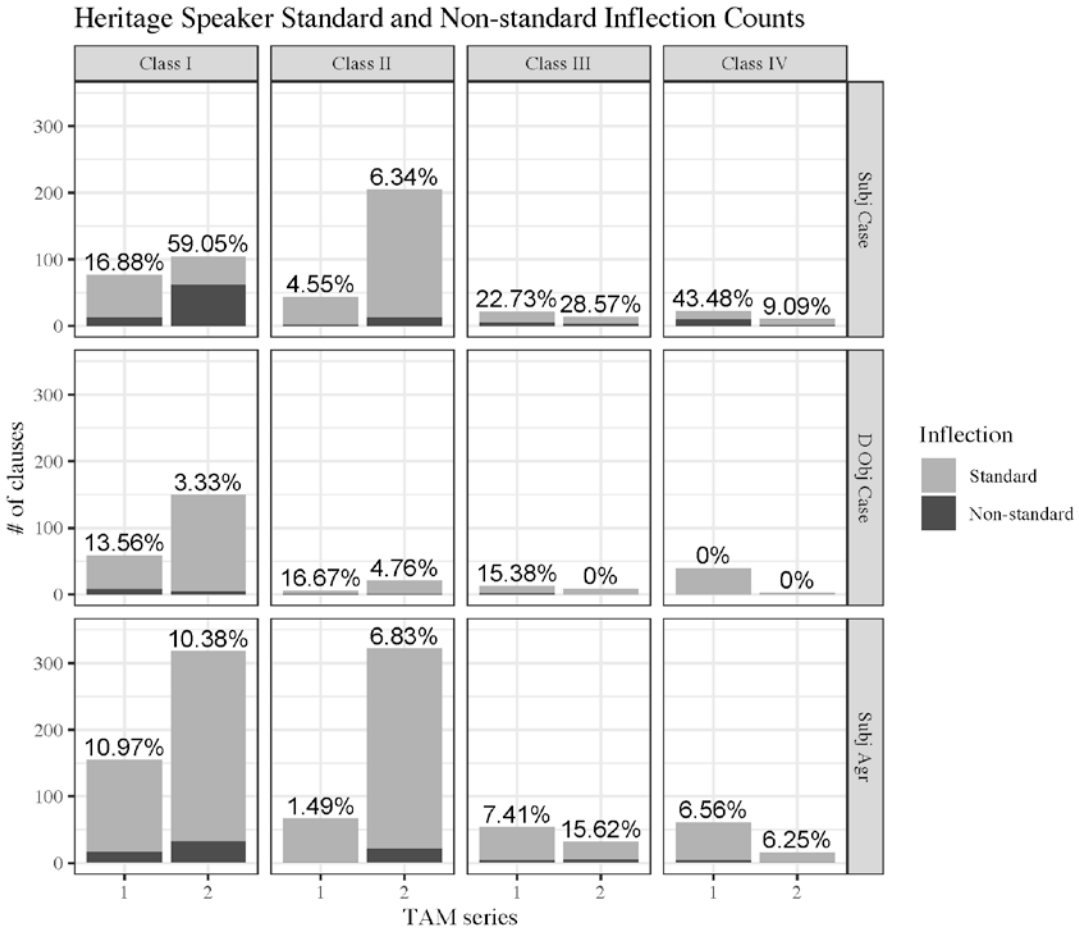
4.1.3 Heritage Speaker Production across Morphological Categories

Comparing HSs' use of case marking to their production of verbal agreement, they produced on average more non-standard instances of nominal case than agreement (across subject and object average 13.69% non-standard for case marking, 5.55% for agreement). Within verbal agreement, HSs' produced more non-standard agreement markings for subjects (average 9.72%) than for objects (average 1.38%).

We were curious whether the HSs' non-standard morphological production varied across Georgian's case marking and agreement paradigms (described in §2.2). We calculated counts and percentages of clauses produced by the HSs with (non)standard inflection by verb class and TAM series, presented in Figure 3. There were not enough instances of non-standard object agreement to graph, so that category was excluded.

Figure 3

Heritage Speakers' Number of Clauses with Standard and non-Standard Subject Case (First Row), Direct Object Case (Second Row), and Subject Agreement (Third Row) by Verb Class and TAM Series.



Note. Percentages are Percent non-Standard of Total Clause Count For Each Category.

https://doi.org/10.46538/hlj.17.2.6 August, 2020

Verb class had a numerically large effect on the number of non-standard subject case markings that HSs produced, with a greater proportion occurring with Class I and IV verbs. In Class IV, subjects are standardly marked with the dative, which is the inverse of other paradigms. With Class I verbs, the greater number of non-standard subject case markings occurred in TAM series 2, where the ergative is standard. Direct object case marking was most affected by TAM series, with the greater proportion of non-standard markings occurring in TAM series 1, where verb classes I-III require objects to be marked with the dative. Patterns in (non)standard subject agreement were fairly consistent across TAM series and verb class and we did not discern any noticeable patterns.

4.1.4 Patterns in non-Standard Morphosyntax

All three experimental groups produced non-standard morphology in both case marking and verbal agreement. While the HSs produced relatively high amounts of non-standard morphology with large inter-speaker variation, both the late arrival and homeland groups produced non-standard morphology in line with the amount that can be expected of fluent speakers, under 5% (Poulisse, 1999). The late arrival and homeland groups' non-standard tokens may therefore be understood as production errors. Nevertheless, by comparing these groups' errors to the HSs' non-standard inflections, we can determine whether their production errors and the HSs' presumed morphological restructuring are qualitatively similar but quantitatively different, or whether they indicate qualitatively different phenomena.

In this section, we compare the patterns in non-standard inflection across all three groups, starting with case marking then turning to agreement. Non-standard instances are **bolded**. Below each translation, the standard equivalent is provided.

Nominal Case Marking

Beginning with homeland children's use of non-standard subject case (13 instances total), three children from age five and a half to seven used the nominative in place of the ergative (4). One Georgian child (age 5;6) used the nominative for the ergative seven times with five different verbs. There was also a single instance in which the nominative was used instead of the dative (5).

(4) **d͡zaɣl-i** t͡ʃamo-a-gd-o buz-eb-is saxl-i da
dog-NOM PVB-PRV-throw-3SG.AOR fly-PL-GEN house-NOM and
'the dog threw down the flies' house and'
Standard: d͡zaɣl-ma, dog-ERG *Part. 37 (6;8) Homeland*

(5) **d͡zaɣl-i** k'i or pex-ze da xel-eb-i bank'-ze akv-s
dog-NOM FOC two feet-on and hand-PL-NOM jar-on have.PRS-3SG
'THE DOG has two feet and hands on the jar'
Standard: d͡zaɣl-s, dog-DAT *Part. 40 (7;1) Homeland*

Two homeland children also used the ergative in place of the expected nominative once each (6).

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(6) da da-e-mʃvidob-a **baq'aq'-ma** tavis imas ded-ik'o-eb-s
and PVB-PRV-peace-3SG.AOR **frog-ERG** REFL.POSS.3SG 3SG.DAT mom-DIMIN-PL-DAT
da d͡zm-eb-s
and brother-PL-DAT
'and the frog said goodbye to its thing….mommies and brothers'
Standard: baq'aq'-i, frog-NOM *Part. 43 (6;11) Homeland*

For object case marking, one homeland child used the dative in place of a nominative twice (7) and one child used the nominative in place of a lexically specified genitive case.

(7) da **d͡zaɣl-s** da-i-nax-es
and **dog-DAT** PVB-PRV-see-3PL.AOR
'and they saw a/the dog'
Standard: d͡zaɣl-i, dog-NOM *Part. 37 (6;8) Homeland*

In contrast, the Georgian HSs' use of non-standard case marking was more systemic. Non-standard case marking was used by 21 out of the 26 HSs. The late arrivals, though having numerically few instances of non-standard case marking, patterned more similarly to the HS group than the homeland children.

The most frequent divergence in case marking was the overuse of the nominative case for both subjects (8-9) and objects (10-11). Out of 127 clauses with non-standard case (12% of the data), HSs over-extended the nominative in 68% of the utterances.

(8) da p'at'ara **bit͡ʃ'-i** ver da-i-nax-a
and little **boy-NOM** NEG PVB-PRV-see-3SG.AOR
'and the little boy didn't see it'
Standard: bit͡ʃ'-ma, boy-ERG *Part. 6 (10;5) HS*

(9) da mere **bit͡ʃ'-i** e-ʃin-od-a
and later **boy-NOM** PRV-fear-IPFV-3SG
'and then the boy was afraid'
Standard: bit͡ʃ'-s, boy-DAT *Part. 15 (8;4) HS*

When the nominative was used for objects by both the HSs and late arrivals, most instances seemed to be a result of lexical retrieval difficulties (10-11).

(10) tavis d͡zaɣl-i u-sun-eb-s uh tavis ... **baq'aq'-i**
REFL.POSS.3SG dog-NOM PRV-smell-TS-3SG POSS.REFLEX.3SG **frog-NOM**
'his dog smells uh his….frog'
Standard: baq'aq'-s, frog-DAT *Part. 15 (8;4) HS*

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(11) da da-xv-d-a … **es** **raɣat͡sa** ... baq'aq'-is gareʃe
and PVB-meet-INTR-3SG **this** **something.NOM** frog-GEN without
'and came across…this thing…without the frog'
Standard: am raɣat͡sa-s, this something-DAT *Part. 10 (11;0) Late Arrival*

A second trend for both the HS and late arrival groups was the over-extension of the ergative case in subject marking (12-13). This occurred in 29 utterances, constituting 23% of these groups' non-standard subject markings. One HS in particular (age 11;2), seemed to reanalyze the ergative as a subject marker, using it in 18 out of 28 clauses, 16 of which were non-standard uses.

(12) **bit͡ʃ'-ma** ga-u-braz-d-a d͡zaɣl-s
boy- ERG PVB-PRV-anger-INTR-3SG.AOR dog-DAT
'the boy became angry at the dog'
Standard: bit͡ʃ'-i, boy-NOM *Part. 27 (12;7) HS*

(13) da **bit͡ʃ'-ma** da **irem-ma** ga-i-kt͡s-**nen**
and **boy-ERG** and **deer-ERG** PVB-PRV-run.off-**3PL.AOR**
'and the boy and the deer ran off'
Standard: bit͡ʃ'-i, boy-NOM; irem-i, deer-NOM *Part. 28 (13;6) Late Arrival*

Interestingly, one HS produced two instances of double marking with the ergative (14). Another HS seemed to reanalyze the nominative case as part of the root of some nouns, stacking the dative on top of the nominative in two clauses (15).

(14) da **d͡zaɣl-ma-m** u-q'ur-eb-s
and **dog-ERG-ERG** PRV-watch-TS-3SG
'and the dog is watching it'
Standard: d͡zaɣl-i, dog-NOM *Part.15 (8;4) HS*

(15) tu xed-av-d-a **sun-i-s** baq'aq'-is
COMP see-TS-IPFV-3SG **smell-NOM-DAT** frog-GEN
'if he was seeing the frog's smell'
Standard: sun-s, smell-DAT *Part. 25 (9;4) HS*

A third trend in non-standard case marking, shown by three HSs and one late arrival, was the overuse of the dative case for subjects (16). One HS (age 9;1), out of 19 clauses with overt subjects, produced 7 non-standard dative-marked subjects.

(16) exla u-**tx**-a d͡zaɣl-s **bavʃv-s** shh
now PRV-**tell**-3SG.AOR dog-DAT **child-DAT** shh
'now the child told the dog shh'
Standard: bavʃv-ma, child-ERG *Part.14 (9;1) HS*

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Verbal Agreement

Homeland children produced 18 utterances (1.3% of their data) with non-standard verbal agreement. Of these cases, 16 involved singular agreement for a plural subject (17). Standard Georgian only marks plural agreement for animate nouns, not inanimates. Imedadze and Tuite (1992, p. 58) note that 3-4 year-old children occasionally overuse singular agreement for plural animate nouns. In our experiment, homeland children from age five to 13 demonstrated this usage.

(17) bit͡ʃ'-ma da d͡zaɣl-ma **i-p'ov-a** erti baq'aq'-i
boy-ERG and dog-ERG **PRV-find-3SG.AOR** one frog-NOM
'the boy and the dog found a frog'
Standard: i-p'ov-es, PRV-find-3PL.AOR *Part. 49 (10;4) Homeland*

While this mismatch of number agreement shown by homeland children seemed to be a tendency, for HSs, it was widespread. In the HS group, 18 out of 26 participants used singular agreement for plural animate subjects, in a total of 75 clauses out of 85 with non-standard agreement (18). Two participants in the late arrival group also produced mismatches in number agreement in a total of six utterances (19).

(18) bit͡ʃ'-i da d͡zaɣl-i-t͡s t͡s'q'al-shi **t͡ʃa-var-d-a**
boy-NOM and dog-NOM-too water-in **PVB-move-INTR-3SG**
'the boy and the dog also fell into the water'
Standard: t͡ʃa-var-d-nen, PVB-move-INTR-3PL *Part. 7 (7;0) HS*

(19) imit'om rom **mo-zdev-s** put'k'r-eb-i
because COMP **PVB-follow.PRS-3SG** bee-PL-NOM
'because the bees followed him'
Standard: mo-sdev-en, PVB-follow.PRS-3PL *Part. 20 (15;6) Late Arrival*

Person agreement also seemed vulnerable in the HL grammar, albeit to a lesser extent than number. A mismatch in person agreement characterized 12 of HSs' 85 non-standard tokens (20-21), and one of the late arrival's seven (22). It should be noted that in a few cases, the difference in person may be attributed to an articulation error. The example in (21) is such an instance: to change the observed verb to third person subject agreement requires only the addition of the suffix *-s*.

(20) da **ga-a-braz-e** buz-eb-i
and **PVB-PRV-anger-2SG.AOR** fly-PL-NOM
'and he angered the flies'
Standard: ga-a-braz-a, PVB-PRV-anger-3SG.AOR *Part. 13 (11;9) HS*

(21) exla p'at'ara bavʃv-i **u-q'ur-eb** baq'aq'-s
now little boy-NOM **PRV-watch-TS** frog-DAT
'now the little boy is watching the frog'
Standard: u-q'ur-eb-s, PRV-watch-TS-3SG *Part. 14 (9;1) HS*

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(22) ikneb **m-ap'at'i-os-o**
maybe **1SG-forgive-3SG.OPT-O**
'maybe he said "forgive me!"'
Standard: m-ap'at'i-e-o, 1SG-forgive-2SG.AOR-O *Part. 30 (9;8) Late Arrival*

The Georgian HSs also showed some divergence (4 instances) in their use of object markers, either using them when no object was present (23), or failing to use them when objects were present (24).

(23) da bit͡ʃ-i … da **tkv-a** imis d͡za ɣ-i shh
and boy-NOM and **say-3SG.AOR** 3SG.GEN dog-NOM shh
'and the boy…and he told his dog shh'
Standard: u-txr-a, PRV-tell-3SG.AOR *Part. 6 (10;5) HS*

(24) da bavʃhv-i **u-q'ur-eb-s** xe-ʃi
and child-NOM **PRV-watch-TS-3SG** tree-in
'and the child looked into the tree'
Standard: i-q'ur-eb-a, PRV-watch-TS-3SG *Part. 14 (9;1) HS*

Not all verbs in Georgian take phonologically overt object markers for third person objects. The fact that HSs produced non-standard agreement on verb stems that do have different morphology based on the presence or absence of an object indicates that HSs may show more restructuring with overt object markers (e.g., in the first and second persons) that did not occur naturally in the narrative task.

4.2 Predictiveness of Individual Factors in HL Grammatical Restructuring

The second goal of our study was to examine whether individual factors were predictive of child HSs' morphosyntactic restructuring. Specifically, we examined whether lexical knowledge, oral fluency, and age were predictive of non-standard case marking and verbal subject agreement. Because our HS participants were children, we anticipated that age might be a proxy for amount of English (the societal majority language) input. We also tested for the influence of lexical score and HL oral fluency, because these measures have been shown to correlate with adult HL grammatical restructuring (Polinsky, 2006, 2008).

For this analysis of intra-participant variables, we excluded two HS participants. One (age 9;3) was excluded as an outlier, because their percent non-standard subject verbal agreement (46.43%) was more than two standard deviations above the group mean. Including them would have resulted in questionable estimates in the statistical models. The second (age 3;10) was excluded because they could not produce enough English to complete the lexical score task. Descriptive statistics for the three individual variables of the remaining 24 HSs are given in Table 7**.**

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Table 7

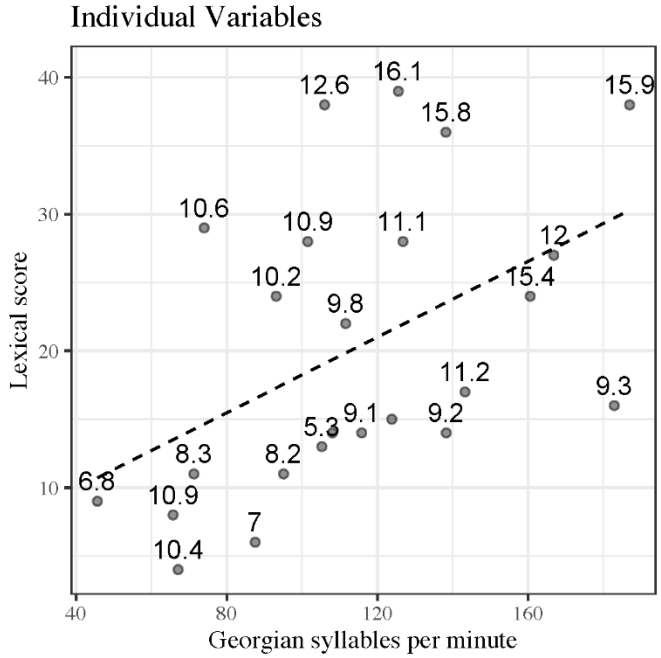
Individual Measures

	Mean age in yrs (SD, range)	Mean lex score (SD, range)	Mean Geo syl/min (SD, range)
Georgian HSs (*n* = 24)	10.78 (2.86, 5.33-16.08)	20.21 (10.72, 4-39)	114.21 (37.25, 45.66-186.97)

In Figure 4, we graph the relation between these three variables. All three were positively correlated with each other: lexical score and Georgian syllables per minute, $r(22) = 0.48$, $p = .017$; age and lexical score, $r(22) = 0.75$, $p < .001$; age and Georgian syllables per minute, $r(22) = 0.53$, $p = .008$. Before statistical modeling, these three factors were checked for multicollinearity by calculating the variance inflation factor using `usdm::vifstep` (Naimi et al., 2014) with a threshold of 3. None had collinearity problems, enabling us to fit all three as effects in the models.

Figure 4

Lexical Score by Georgian Syllables per Minute, with Labels of Age in Years



To determine the influence of these individual variables on HS grammatical restructuring, we used mixed effects logistic regression modeling using the function `lme4::glmer` (Bates et al., 2015). We ran three models: one for HS speaker production of non-standard subject case, one for non-standard object case, and one for non-standard subject agreement. An additional model of HSs' production of non-standard object agreement was overfitted due to lack of variance in the data and was therefore uninterpretable. That is, HSs did not produce enough instances of non-standard

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object agreement to statistically model. Each model had fixed effects of participant lexical score, Georgian syllables per minute, and age, with a random effect of participant; these three continuous variables were each mean centered and *z*-scaled to improve the fit and interpretability of the models. Significance of fixed effects was measured with Chi-squared tests in model comparisons using the function `lmtest::lrtest` (Zeileis & Hothorn, 2002).

Table 8

Mixed Effects Logistic Regression Model for Heritage Speakers' Subject non-Standard Case Marking

	β	**SE**	**χ^2**	***p*(χ^2)**
(Intercept)	-1.870	0.260		
Age in Months	0.233	0.389	0.355	.551
Lexical Score	-1.444	0.377	12.130	<.001
Geo SPM	0.033	0.269	0.015	.902

Table 8 reports the model for standard use of subject case. While controlling for age and verbal fluency, HSs' lexical score had a significant negative effect on non-standard use of subject case. This means that the more words in Georgian the HSs knew, the less likely they were to use non-standard case marking for subjects in their narratives. Neither age nor speech rate, measured in Georgian syllables per minute, significantly predicted use of standard subject case.

Table 9

Mixed Effects Logistic Regression Model for Heritage Speakers' Object non-Standard Case Marking

	β	**SE**	**χ^2**	***p*(χ^2)**
(Intercept)	-3.106	0.426		
Age in Months	-0.058	0.619	0.009	.925
Lexical Score	-0.444	0.599	0.544	.461
Geo SPM	0.198	0.375	0.279	.597

Table 9 reports the model for standard use of object case. None of the fixed effects were significant in predicting the use of non-standard case marking for objects. This means that HSs were equally likely to use non-standard case on objects regardless of their age, verbal fluency, or lexical score.

https://doi.org/10.46538/hlj.17.2.6 August, 2020

Table 10

Mixed Effects Logistic Regression Model for Heritage Speakers' non-Standard Subject Agreement

	β	SE	χ^2	$p(\chi^2)$
(Intercept)	-2.910	0.203		
Age in Months	0.156	0.286	0.287	.592
Lexical Score	-0.802	0.286	6.620	.010
Geo SPM	-0.287	0.219	1.801	.180

Table 10 reports the model for non-standard use of subject agreement. While controlling for age and verbal fluency, HSs' lexical score had a significant negative effect, meaning that HSs with higher lexical scores were less likely to use non-standard subject agreement. Neither age nor Georgian verbal fluency significantly predicted use of non-standard subject agreement.

4.3 Summary of Results

Georgian HSs produced significantly more non-standard case marking and subject agreement than homeland children and late arrivals. Additionally, HSs showed numerically more non-standard inflection in case marking than in agreement. Within verbal agreement, HSs showed more non-standard inflections for subject marking than object marking. The homeland group also produced non-standard instances of case marking and agreement, but at a rate that can be expected given normal production errors. The late arrival group was numerically similar to the homeland children in non-standard inflection, but qualitatively patterned like the HS group. HSs showed two trends in case marking divergences: they frequently overused the nominative and they occasionally employed a different case (ergative or dative) as the default subject cause. The overuse of the nominative was the dominant trend, reflected in counts and proportions across verb classes and TAM series were a non-nominative case is standard. In subject verbal agreement, HSs showed many mismatches in number and a few mismatches in person. Individual HL grammatical divergence in subject case marking and subject verbal agreement was most predicted by lexical knowledge, compared to HL speech rate and participant age.

5 Discussion

In this experiment, we analyzed *Frog Story* narratives produced by child Georgian HSs for the features of Georgian morphosyntax we predicted would be most likely to diverge from the baseline: nominal case marking and verbal agreement. We also analyzed the Georgian narratives of a smaller group of Georgian-English bilinguals who immigrated to the U.S. during their schooling years. We termed this group "late arrivals." We compared both the HS and the late arrival group to Georgian children raised and living in Georgia (the homeland group). In terms of a baseline grammar, we used Standard Georgian, which is taught as the spoken and written standard in Georgian public schools.

Overall, our results coincided with our predictions: child Georgian HSs were more likely to produce non-standard uses of nominal case and verbal agreement than the homeland children. That is, the Heritage Georgian narratives displayed similar divergences in inflection to those found in other HLs. The HSs also produced proportionally more non-standard uses of case marking than

https://doi.org/10.46538/hlj.17.2.6 August, 2020

verbal agreement, following the generalization noted in the literature that in HL grammars, case marking is particularly susceptible (Benmamoun et al., 2013).

The child HSs showed two patterns in the restructuring of their case marking system. The most frequent pattern was to discard case distinctions and to overuse the base form, the nominative, for all nouns. This corresponds to findings from other HLs, including Heritage Korean, where O'Grady and his colleagues observed that 8 year-old HSs displayed "a systematic disregard for case marking" (O'Grady et al., 2011, p. 229). A second pattern employed by some HSs was to overextend a non-default case, either the ergative or the dative, to mark subjects. While a couple of HSs were generally consistent in their use of subject case (one HS preferred ergative for subjects; another, the dative) the majority displayed what Polinsky has called "enormous variation across the speech of a single individual" (2018, p. 49), producing both standard case and various non-standard substitutions throughout their narrative. Also, in a few utterances, child Heritage Georgian speakers overmarked case by stacking ergative on ergative or adding the dative to a nominative-inflected base. This is similar to the "double marking" or multiple exponence observed in child Heritage English (Polinsky, 2018, p. 49) and child English generally (Harris, 2017, p. 98-106)[10].

With respect to verbal agreement, our main prediction was that HSs' non-standard inflection would reflect the hierarchy of phi-features, as predicted from previous studies (Polinsky, 2018, p. 205). That is, HSs would produce more instances of non-standard agreement in number than in person. This hypothesis was borne out in the HSs' production of subject agreement. HSs' person marking was mostly consistent with the baseline (although in a handful of instances person agreement did not match the subject), but their number agreement was often non-standard. Most HSs used singular agreement for third person plural subjects. Our results therefore provide converging evidence that within agreement, phi-features are differentially susceptible to restructuring or instability. Future studies should investigate whether this divergence in verbal number agreement marking results from grammatical restructuring, as has been observed for HL noun phrase internal agreement, or concord (Scontras et al., 2018).

Within verbal agreement, HSs' production was asymmetric, with subject agreement featuring more non-standard instances than object agreement. This finding was unexpected. Previous evidence from the production of verbal inflection by HSs of Hungarian (e.g., Fenyvesi, 2000) and Hindi (Montrul et al., 2012) documented greater divergence in object marking. Our observed lack of divergence may be explained by language-specific features of Georgian morphology. The majority of Georgian verbs show agreement with clausal objects only in person and not in number. This is true of verbs that take overt third person agreement as well as the larger group of verbs that take phonetically null object agreement. This lack of morphological distinction in number marking of the third person, combined with the absence of a need for HSs to produce overt person agreement, likely facilitated HSs' production of standard object agreement. We believe this facilitation can be explained as an effect of either a simpler grammatical representation or a simpler processing load. Some minimal evidence for this hypothesis is that when HSs did produce non-standard object agreement, it was either a failure to include required overt agreement when an object was present or the presence of overt agreement when the sentence lacked an object. It is possible that in a task where Heritage Georgian speakers needed to produce verbs with first and second person objects,

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which take overt morphology and mark plurality distinctions, they would produce more tokens of non-standard object agreement than was observed in this study.

The late arrivals group was treated separately in analyses because they did not meet the traditional definitions of a HS. That is, they all immigrated to the U.S. during middle or late childhood after having some formal schooling in Georgian. As a group, late arrivals produced few instances of non-standard morphology. Their rates, similar to the homeland group, fell within the normal range of production errors typical of fluent speakers. However, the late arrivals' non-standard production tended to pattern qualitatively with the HSs. For instance, some late arrival participants extended the ergative case as a general subject marker and others consistently used singular marking for plural subject agreement. On the whole, the late arrival group proved to be very heterogenous, which is consistent with an explanation of restructuring based on input-driven effects. The late arrivals, having more consistent input throughout childhood, show less non-standard usage. Critically, though, those late arrivals who had been in an English schooling environment for a few years exhibited restructuring qualitatively similar to the HSs. Unfortunately, our sample of this group was too small to investigate the effect of age of arrival or length of residence. Future studies that explicitly compare HSs with bilinguals who switch language dominance in late childhood (after age 7) would provide much needed evidence for the formulation of predictive theories of HL grammar development.

After documenting morphological divergence in Heritage Georgian, we investigated whether the restructuring of HSs' grammars was predicted by individual factors. It is a leading hypothesis that variation in input is a main driving force that shapes HL grammars (see discussion in Polinsky & Scontras, 2020a). We reasoned that HS age might be an approximate index of HL input. As HSs enter school and spend more time being socialized in the societal majority language, they receive correspondingly less input in the HL, both quantitatively and qualitatively. The adult HL literature has also found lexical knowledge and HL oral fluency to be predictive of grammatical restructuring. We therefore tested their relation to the observed HL grammatical divergences. All three individual factors correlated with each other, indicating that these factors may be measuring a similar construct: perhaps a general HL competence, relative language dominance, or HSs' particular path of bilingual development.

We tested the collective contribution of age, lexical knowledge, oral fluency to grammatical divergence using mixed models and found that among the three, lexical knowledge was the best predictor of HL grammatical restructuring in our data. There are a couple of reasons why lexical knowledge may have been most predictive. Previous studies have only run simple correlations of grammatical measures with individual factors one at a time. Assuming that measurements of lexical knowledge and oral fluency do index a similar construct, comparing their collective influence in a single model reduces the relative explanatory power of each. It is also possible that age was not a reliable index of input for the HSs. Our participants are members of an active Georgian community, have Georgian friends, and participate in Georgian cultural activities. Thus, the assumption that with increased age they may have had less exposure to Georgian may have been unfounded. What we can learn from this analysis is that limited lexical knowledge, especially of highly frequent words, is a reliable indicator of HL grammatical restructuring for HS children, as well as HS adults.

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6. Conclusion

In this article, we attempted two ambitious goals: to investigate a previously undocumented HL and to describe trends in the speech of an incredibly heterogenous population, child HSs. It is a testament to the quality of previous research in the field that our predictions were mostly borne out. Child HSs of Georgian *did* demonstrate morphosyntactic restructuring in case marking and verbal agreement. Furthermore, this divergence was predicted by another measure of HL ability and exposure, lexical knowledge.

The narratives of these child HSs cannot help but sound familiar to any student of HLs. The overgeneralizations and regularizations that are a hallmark of more familiar HLs shine clearly through as Georgian HSs re-organize their split-ergative case system and simplify their polypersonal agreement patterns. Analysis of Heritage Georgian also provides converging evidence that language-general classifications, such as the phi-feature hierarchy, play a driving role in the development of HL grammars. Clearly, the field's theories are on the right track and will continue to benefit from the documentation of lesser-studied HLs.

A major limitation of our study is that it represents a coarse-grained view of a complex phenomenon: bilingual development during the schooling years. Future studies of child and teenage HSs need to include fine-grained measurements of individual language input, use, and dominance. It is not possible to validly compare HL competence across individual speakers when such key covariates are not accounted for.

Finally, we would like to conclude by thanking the Georgian community of Brooklyn. They have created a vibrant local culture in which these heritage speakers are thriving, developing their own identities both social and linguistic. We are happy to play a part in documenting this community's success in raising a new generation of Georgian-English bilinguals.

Acknowledgements

We thank Shorena Barbakadze, Ivan Goderdzishvili, Tea Muradashvili, and Ana Qotolashvili for aid in recruitment and for providing space for the experiment. Thanks to Tamta Kobakhidze for reviewing transcripts and consulting on the Georgian language. For advice and encouragement throughout this project, we are grateful to Gita Martohardjono and Alan Juffs. Thanks to Christen N Madsen II and Martin Chodorow for statistics consultation, to Anthony J. Vicario for help with analysis, and to Michael C. Stern for feedback on an early draft of this article. We appreciate the participants in the 11th Heritage Language Research Institute (2020), especially Maria Polinsky, for their feedback and insights. Finally, we are thankful for the very helpful feedback of two anonymous reviewers. This project was supported in part by a grant to Cass Lowry from the Robert T. Henderson Endowment Fund at the University of Pittsburgh.

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APPENDIX

Lexical Test

1 – 1,000 most frequent

we (n)	ჩვენ
head (n)	თავი
big (adj)	დიდი
this (n)	ეს
who (n)	ვინ
have (v)	ქონა (ყოლა)
what (n)	რა
see (v)	ხედვა (დანახვა)
everything (n)	ყველაფერი
part (n)	ნაწილი
voice (n)	ხმა
water (n)	წყალი
game (n)	თამაში
read (v)	კითხვა
old (adj)	ძველი (მოხუცი)

1,001 – 2,000

stone (n)	ქვა
estimate (v)	დაფასება (შეფასება)
exercise (n)	ვარჯიში
gold (n)	ოქრო
obtain (v)	მოპოვება (მიგწევა)
witness (n)	მოწმე
cost (v)	ღირებულება
strange (adj)	უცნაური (უცხო)
mountain (n)	მთა
dangerous (adj)	საშიში
yard (n)	ეზო
forest (n)	ტყე
command (v)	ბრძანება (გამოცხადება, მოთხვონა)
slow (adj)	ნელი
faith (n)	რწმენა

https://doi.org/10.46538/hlj.17.2.6 August, 2020

2,001 – 3,000

load (v)	დატვირთვა
ordinary (adj)	ჩვეულებრივი
distant (adj)	შორეული
promise (n)	დაპირება
retain (v)	შეკავება
destruction (n)	განადგურება
substance (n)	ნივთიერება (შიგთავსი)
suppose (v)	ვარაუდი (ეჩვნარევად, ფიქრი, მიჩნევა, ვარაუდი)
bell (n)	ზარი
flag (n)	დროშა
withdraw (v)	ამოღება (გამოტანა)
explanation (n)	განმარტება (ახსნა)
pray (v)	ლოცვა
painful (adj)	მიტკივნეული
representation (n)	წარმომადგენლობა (წარმოდგენა)

3,001 – 4,000

indication (n)	მითითება (ჩვენება)
hostage (n)	მძევალი
behave (v)	(მო) ქცევა
bitter (adj)	მწარე (ცხარე)
broaden (v)	გაფართოება
satisfy (v)	დაკმაყოფილება
shame (n)	სირცხვილი
unify (v)	გაერთიანება (შეერთება)
artificial (adj)	ხელოვნური
tunnel (n)	გვირაბი
reliable (adj)	საიმედო (სანდო)
hunger (n)	შიმშილი
treason (n)	ღალატი
earthquake (n)	მიწისძვრა
flame (n)	ალი

https://doi.org/10.46538/hlj.17.2.6 August, 2020

4,001 – 5,000

establish (v)	დაარსება (დაფუძნება)
perish (v)	დაღუპვა
falsehood (n)	სიცრუე
confirmation (n)	დადასტურება
printed (adj)	დაბეჭდილი
fist (n)	მუშტი
chairmanship (n)	თავმჯდომარეობა
listing (n)	ჩამონათვალი
abandoned (adj)	(გა) მიტოვებული
root (n)	ფესვი
failure (n)	წარუმატებლობა
outspoken (adj)	გულახდილი
intention (n)	განზრახვა
shortage (n)	დანაკლისი, ნაკლებობა
irritate (v)	გაღიზიანება

https://doi.org/10.46538/hlj.17.2.6 August, 2020

NOTES

1. This article follows the Leipzig Glossing Rules. The abbreviations used in glossing are as follows: AOR = aorist; DAT = dative case; DIMIN = diminutive; ERG = narrative case; INTR= intransitive; IPFV = imperfective; NOM = nominative case; O = indexical shift particle; OPT = optative; PRV = preradical vowel, AKA version vowels, a unitary morphological class used in a number of valence-related processes; PVB = preverb; TS = thematic suffix, a.k.a. present/future stem-formant.

2. Only animate nouns cause agreement in number. Inanimates take singular agreement (Aronson, 1990).

3. The names for the TAM series we use here correspond to the terms used in the Georgian descriptive literature. Aorist is a past, typically perfective form. Optative is an irrealis perfective form.

4. Verbs are classified by adherence to the morphosyntactic paradigms. Verb classes can be loosely characterized semantically (I. Transitives, II. Intransitive passives, III. Intransitive actives, IV. Psych verbs) but there are many semantic exceptions within each class (Aronson, 1990).

5. For simplicity's sake, we omit from this table the perfect series, an additional TAM series that the HSs did not produce during the experiment. The perfect series further complicates the case paradigm by requiring an *inversion* of the nominative-accusative patterns (Aronson, 1990).

6. As our goal is to present a broad outline of this complex morphosyntactic system, we gloss over some details of the morphology of agreement for simplicity's sake. Full descriptions of Georgian agreement are provided by Aronson (1990), Harris (1981), Hewitt (1995) and Wier (2011).

7. Class I and III verbs show *inverse agreement* in the perfect TAM series (Hewitt, 1987). Since the HSs did not use verbs in the perfect series, we present a simplified agreement paradigm.

8. Selecting an appropriate experimental comparison group is a main issue in HL research (see discussion in Polinsky, 2018, ch. 1). Theoretically, the baseline grammar to which HLs are compared is the language of the HSs' parents, who provide the majority of the HL input. Experimentally, HL researchers often choose their comparison groups based on their specific research questions. Since the goal of our study was to investigate child language use and we did not have a description of the language development of contemporary children in Georgia, we chose homeland children to serve as our experimental comparison group. By comparing the HS children to age-matched peers, we hoped to control for developmental effects in morphosyntactic production.

9. Lexical insertions, or borrowings, from English that had overt Georgian morphology (e.g., deer-ma, deer-erg, "the deer") were included in the coding.

10. Thanks to an anonymous reviewer for noting that child English monolinguals also double mark the past tense, and for providing this reference.