A Longitudinal Study of Contrastive Length in Albanian-Speaking Children

Enkeleida Kapia, Josiane Riverin-Coutlée, Conceição Cunha, and Jonathan Harrington

1. Introduction

This study focuses on dialect change among child speakers of the Gheg dialect of Albanian. The Albanian language comprises two main dialects, Gheg and Tosk, and a Tosk-based standard variety. In this article, we investigate whether contrastive vowel length in the Gheg dialect traditionally spoken in and around the capital of Albania, Tirana, changes as children start and progress through schooling. We hypothesize that this feature of Gheg could be changing under the influence of standard Albanian, to which children are increasingly exposed throughout their school years and which does not have contrastive vowel length. In order to verify this, we carried out a longitudinal acoustic study of vowel duration in Gheg-speaking schoolchildren as they progressed from first grade onwards and expected to observe longitudinal changes in their speech if standard Albanian does influence Gheg contrastive vowel length. In the following sections, we will explain the relationship between standard Albanian and Gheg (1.1), describe one of their main phonological differences, i.e. contrastive vowel length (1.2), and summarize previous findings on dialect change in Gheg which serve as a basis for this study (1.3).

1.1. Standard Albanian and Gheg

Albanian (*shqip* in Albanian) is a language of the Indo-European family spoken by 6-7 million people (Rusakov 2017) who live mostly in Albania and Kosovo, but also in North Macedonia, Italy, Greece, Montenegro and Serbia. In

this paper, we focus on Albanian spoken in Albania, which has a standard variety adopted during the National Congress of Orthography held in Tirana in 1972 (Kostallari 1973). Standard Albanian is largely based on the Tosk dialect and is therefore different from the Gheg dialect spoken by the participants in this study with respect to several lexical, morphosyntactic, phonological and phonetic features (e.g. Beci 2002; Beci 1995; Beci 2019; Byron 1976; Çabej 1936; Çabej 1964; Dozon 1879; Gjinari 1966; Moosmüller & Granser 2006). Examples of phonological differences between standard Albanian and Gheg include a contrast between oral and nasal vowels in Gheg, e.g. /pi/ 'drink (imperative, 2nd pers. sing.)' vs. /pĩ/ 'numb (imperative, 2nd pers. sing.)' (Beci 1995), while standard Albanian only has oral vowels (the contrast above is realized as /pi/ vs. /mpi/). Another phonological difference, which will be described in further details in Section 1.2, is the presence of contrastive vowel length in Gheg, while standard Albanian only has phonologically short vowels.

The adoption of standard Albanian in 1972 came about to achieve national linguistic unity, in line with the ideology of the then-communist state (Byron 1976; Kostallari 1973; Kostallari 1984). It was intended to be the unique system taught in schools and used in the public space, for instance in the media. This policy was strictly enforced, thereby restricting dialect use to informal and local contexts (Ismajli 2005; Kolgjini 2004; Kostallari 1973; Kostallari 1984). Still today, standard Albanian as designed in 1972 is spoken and written countrywide in the media, governmental institutions and education system. Children are expected to learn and use the standard throughout their school years.

1.2. Contrastive vowel length

A major phonological difference between standard Albanian and Gheg is the presence of contrastive vowel length in the latter but not in the former (e.g. Beci 1978; Beci 1995; Çabej 1976; Gjinari et al. 2007; Topalli 2007). As shown in examples (1) and (2), there are minimal pairs based on length in Gheg. In (1), standard Albanian marks the difference between the two words with the presence/absence of a final schwa, but this final schwa is often dropped (Çeliku 1971), leading to cases of homophony in standard Albanian for both (1) and (2).

(1)   *plak* 'an old man'   *plakë* 'an old woman'
    Standard: /plak/   /plakə/
    Gheg: /plak/   /plaːk/
(2)   *prek* 'touch' (imperative)   *(ti) prek* '(you) touch' (indicative)
    Standard: /pɾek/   /pɾek/
    Gheg: /pɾek/   /pɾeːk/

Gheg vowels are also lengthened in indefinite nouns as opposed to their definite counterparts in three different contexts: when the vowel is in an open syllable, as shown in example (3); when the stressed vowel is followed by a liquid consonant, as in (4); and when the schwa marking indefiniteness in standard

Albanian is absent from Gheg, as in (5) (e.g. Çabej 1976; Çeliku 1971; Demiraj 1996; Topalli 2007).

(3)   *dhia* 'the goat'   *dhi* 'a goat'
    Standard: /ðia/   /ði/
    Gheg: /ðia/   /ði:/
(4)   *guri* 'the stone'   *gur* 'a stone'
    Standard: /guɾi/   /guɾ/
    Gheg: /guɾi/   /gu:ɾ/
(5)   *lopata* 'the shovel'   *lopatë* 'a shovel'
    Standard: /lopata/   /lopatə/
    Gheg: /lopata/   /lopa:t/

1.3. Dialect change in Gheg

The issue of whether traditional dialect features are undergoing levelling in Gheg spoken in and around Tirana has recently been addressed in Riverin-Coutlée et al. (2022). In this study, an apparent time comparison was made of adults and first grade children who lived in urban and rural areas (Tirana and the village of Bërzhitë respectively). The urban speakers were found to produce less traditional Gheg features than rural speakers. Additionally, whenever a change towards a standard Albanian feature was initiated in a given location, the change was more advanced in children than adults. However, contrastive vowel length was found to be well preserved in adults and children living in urban and rural areas alike. In a separate study, Riverin-Coutlée et al. (2021) investigated longitudinally a subset of the same Gheg-speaking children when in first and second grades. The change towards a phonetic feature of standard Albanian, i.e. unrounded /a/ in post-nasal context, was more advanced in second than first grade, but contrastive vowel length was stably produced.

These findings regarding contrastive vowel length in Gheg-speaking children merit further attention for at least two reasons. First, they contradict earlier observations that contrastive vowel length was disappearing from Gheg. As early as the 1960s, impressionistic studies reported this trend in the speech of city dwellers and attributed it to contact with Tosk, which – like standard Albanian – does not have contrastive length (Beci 1974; Beci 1978; Shkurtaj 1969). More recently, based on longitudinal data collected over a thirty-year span, Çeliku (2020) noted that contrastive length was disappearing from the speech of adult Gheg speakers living in and around Tirana due to the omnipresence of standard Albanian.

Second, the possibility has to be considered that the children investigated in Riverin-Coutlée et al. (2021; 2022) had not yet begun the transition towards standard Albanian for this feature. Even though systematic exposure to the standard started when they were in first grade and that it likely led them to change some aspects of their speech, contrastive vowel length could have been lagging behind. Children may indeed replicate some of their family's speech patterns into

primary school and be influenced by their peers, or by the standard, only later on (Foulkes & Vihman 2015). In a study by Nardy et al. (2014), primary school children were also found to have commonly adopted a non-standard variant even after their exposure to the standard had started. In a longitudinal study of Bavarian-speaking children in first, second and third grades, Wolfswinkler and Harrington (2021) observed for phonetic features which were changing towards standard German a progressive increase in standardization from first to second to third grade.

All this calls for a follow-up study of contrastive vowel length in the children investigated in Riverin-Coutlée et al. (2021; 2022). First, there is a tendency for dialect levelling among these children for other features of Gheg. Second, the results about the stability of contrastive length are contradicted by those obtained in other studies. Third, child speech has been found to start or to continue changing after the very first years of primary school. For these reasons, we set out to examine contrastive vowel length in a subset of the Gheg-speaking children previously investigated in Riverin-Coutlée et al. (2021; 2022) when they are in fifth grade, that is, after three more years of schooling and exposure to standard Albanian.

2. Methods

The participants in this study were 10 Gheg-speaking children screened for dialect background and speech, language and hearing impairments. They were first recorded when in first grade and aged 6 to 7 years old, then in second grade and aged 7 to 8 years old, and finally in fifth grade and aged 10 to 11 years old. The recordings took place in quiet rooms of the primary schools they attended in the greater Tirana area. A control group of 28 Gheg-speaking adults was also recruited; they were parents, grandparents or acquaintances recorded on the premises of these schools.

The participants carried out a picture-naming task designed for children not yet proficient in reading, as they were in first grade. Each picture was presented four times, in a random order, on a laptop screen using SpeechRecorder (Draxler & Jänsch 2004). The images represented concepts that were age appropriate and culturally relevant, as exemplified in Figure 1. The participants were prompted to produce nouns in their indefinite form. When another word than that expected was produced (for example, *rat* instead of *mouse*), the Albanian-speaking experimenter gave the participants extra clues to try and obtain the target item. In this study, we use 6 words featuring short stressed vowels and 19 words expected to have long stressed vowels. This imbalance is due to the limited time that we could reasonably ask young children to participate in the task: it was deemed appropriate to collect more words with long vowels, which were expected to change, than with short vowels, which serve as control. The children were also too young when first recorded to master the type of syntactic knowledge necessary for us to obtain definite-indefinite pairs of nouns (Maratsos 1974; Schaeffer & Matthewson 2005; van Hout, Harrigan & de Villiers 2009), which would have

been ideal to study lengthening (see examples 3 to 5). Thus, the target words with short and long vowels of our corpus do not form (near-)minimal pairs, but the vowels analyzed were always the stressed ones (see Appendix for the word list).

Figure 1. Examples of images used for the picture-naming task (from left to right: *bukë* 'bread', *mi* 'mouse', *llokum* 'lokum'). All images were under Pixabay license or owned by the authors.

The speech signal was forced-aligned using the language-independent settings in WebMAUS (Kisler, Reichel & Schiel 2017; Schiel 1999). The material was then structured into a speech database using EMU-SDMS (Winkelmann, Harrington & Jänsch 2017). The boundaries marking the onset and offset of the vowels as determined by the forced-aligner were hand corrected when necessary. In total, 2621 vowel tokens produced by the children were analyzed in this study, in addition to 2752 tokens produced by the adult control group.

To test whether the length contrast was disappearing as children progressed through schooling, we fitted a linear mixed-effects regression model using the *lme4* and *lmerTest* R packages (Bates et al. 2015; Kuznetsova, Brockhoff & Christensen 2017; R Core Team 2022) and syntax shown in (6):

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(6) lmer(log(duration) ~ Length*SchoolYear + (Length+SchoolYear|Speaker) +
    (SchoolYear|Word))
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where the response variable, *duration*, was log-transformed in order to reduce the skewness of the residuals. The full model included an interaction between the fixed factors *Length* (2 levels: short, long) and *SchoolYear* (3 levels: 1st, 2nd, 5th grades). Random intercepts per *Speaker* and *Word* were included, as well as random slopes per *Length* and *SchoolYear* where appropriate.

3. Results

Figure 2 shows duration data for the long and short vowels produced by the 10 children in first, second and fifth grades, and by the control adults. Overall, whichever the phonological length category, children produced vowels with longer durations than adults, a tendency that has been repeatedly reported in the literature and attributed to a slower speech rate and immature motor control in childhood (e.g. Lee, Potamianos & Narayanan 1999; Martins et al. 2007). Figure 2

also shows that this child-adult difference is progressively reduced over time, as children decrease their overall vowel duration from first to fifth grade. A reduction in variability for short vowels can also be seen, as the more spread distribution of durations in first grade reflected in the more elongated violin later becomes more compact and adult-like. The immature motor control of children has been identified as a great source of variability within and across speakers (e.g. Cheng et al. 2007; Koenig, Lucero & Perlman 2008; Lee, Potamianos & Narayanan 1999; Vorperian & Kent 2007). The results of the statistical analysis carried out on child data (Table 1) show that the observed downward trend in duration over time is not significant (that is, the effect of *SchoolYear* is not significant).
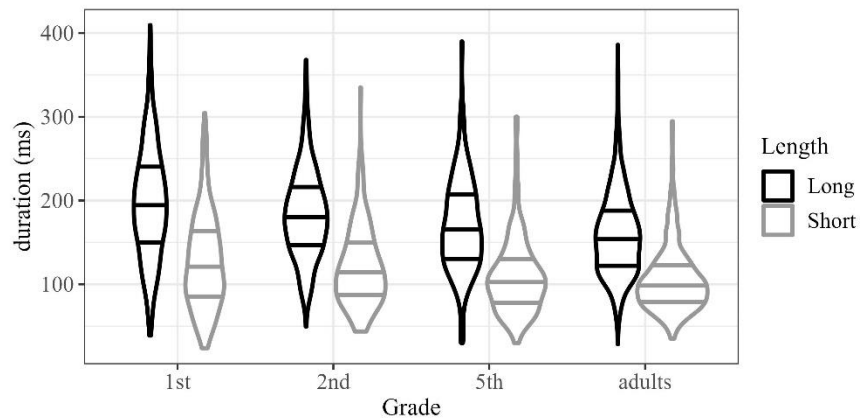

Figure 2. Violin plots of duration of long and short vowels produced by a cohort of 10 Gheg-speaking children in 1st, 2nd and 5th grades, and by a control group of 28 Gheg-speaking adults.

Table 1. Output of the statistical model in (6).

Factor(s)	Sum Square	Mean Square	d.f. (num, dem)	F value	p value
Length	3.530	3.530	1, 26.871	48.419	**<0.001**
SchoolYear	0.237	0.118	2, 12.897	1.628	0.234
Length*SchoolYear	0.028	0.014	2, 20.487	0.197	0.822

In addition, Figure 2 shows that phonologically long vowels (black) have been produced with a longer duration than phonologically short vowels (gray). The effect of *Length* is indeed significant, as displayed in Table 1. However, there is no evidence that contrastive length is disappearing, neither visually nor statistically. The absence of a significant interaction between *Length* and *SchoolYear* suggests that the relationship between short and long vowels remained similar over time, that is, the distinction did not decrease or increase.

4. Discussion and conclusion

The main aim of this study was to shed light on the potential influence of standard Albanian on a feature of the vowel system of the Gheg dialect, namely contrastive vowel length, which standard Albanian lacks. Specifically, we investigated child speech longitudinally starting from the assumption that Albanian children's exposure to the standard starts when they enter school, and that any influence which the standard may have on their speech is likely to increase as they progress through schooling. A cohort of 10 Gheg-speaking children from the Tirana area were recorded in first, second and fifth grades, as well as a control group of Gheg-speaking adults. The duration of vowels that are traditionally short and long in Gheg was measured and compared over the children's school years.

No evidence was found for the loss of Gheg contrastive vowel length and its replacement by the short vowel system of standard Albanian. The child participants produced phonologically long vowels with a significantly longer duration than phonologically short vowels at all time points investigated. The difference between short and long vowels remained stable over time, that is, it was not reduced from first and second grades to fifth grade as would have been the case if the influence of standard Albanian on contrastive length had simply been delayed to fifth grade. These results lend further support to the preliminary observations in Riverin-Coutlée et al. (2021; 2022) according to which contrastive vowel length is well preserved in the Gheg dialect spoken in and around Tirana. However, our results are at odds with those from previous impressionistic studies which have suggested since the 1960s that contrastive length was disappearing from Gheg spoken in urban settings under the influence of Tosk and/or standard Albanian (Beci 1974; Beci 1978; Çeliku 2020; Shkurtaj 1969). It is possible that the length contrast is not as large as it used to be, or that it is not as salient as in some other Gheg communities where a three-degree length contrast has been described (Çabej 1970; Shkurtaj 1975; Topalli 2007). Methodological differences could also be involved: the studies suggesting that the feature is disappearing are impressionistic, while acoustic measurements and statistical analyses as used here may capture much finer phenomena than the ear.

The stability of contrastive length within the community could be due to its involvement in marking morphology. As explained in Section 1.2 and illustrated in examples (2) to (5), length contributes to expressing mood and definiteness. It could therefore be more resistant to change than other phonetic or phonological features that do not play such an important grammatical role (see Riverin-Coutlée et al. 2022 for more discussion). Anecdotal evidence also suggests that length may not be a stigmatized feature of Gheg like some others which are changing (Kapia 2021; see also Siegel 2010).

Beyond the children consistently producing the length contrast, the data show that the duration of their vowels is not like that of adults. Both phonologically short and long vowels are longer in children than adults and tend to be more variable. A visual trend towards adult durations from first to second to fifth grade

was also identified. As mentioned in Section 3, children typically have a slower speech rate (Martins et al. 2007) which is reflected here in longer durations. This is due to immature cognitive functions and motor control that continue to be developed well into adolescence (Beckman et al. 2014; Lee, Potamianos & Narayanan 1999; Vorperian & Kent 2007). Acoustic measurements as used in this study, as well as various types of articulatory data (Richtsmeier 2010), are particularly well suited to reveal such developmental subtleties in speech that is otherwise considered phonologically correct and/or adult-like (Donegan 2013; Schölderle, Haas & Ziegler 2020; Stoel-Gammon & Herrington 1990).

Future directions include analyzing data from more children, but also other speech features. We are particularly interested in observing the rate of change over primary school of phonetic and phonological features that were already closer to standard variants in first grade children than adults (Riverin-Coutlée et al. 2022). A longitudinal analysis of the Gheg vowel space would also provide much needed empirically-based developmental norms of vowel production which can be used to describe, diagnose and treat speech disorders (e.g. Chung et al. 2012; Lustyk, Bergl & Cmejla 2014; Sandoval et al. 2013; Storkel 2019) in communities where these resources are still scarce (UNICEF 2018).

Appendix

Table 2. Words with stressed short and long vowels analyzed in this study.

Short	karkal**e**c *grasshopper*	llok**u**m *lokum*	përqaf**o**n *to hug*	p**i** *drink*	p**o**shtë *under*
	t**y**m *smoke*				
Long	b**o**rë *snow*	b**u**kë *bread*	dj**a**th *cheese*	d**o**rë *hand*	flam**u**r *flag*
	g**u**r *stone*	k**a**lë *horse*	m**i** *mouse*	m**o**llë *apple*	p**e**shk *fish*
	p**u**shkë *rifle*	p**y**ll *forest*	rak**i** *raki*	s**y** *eye*	**y**ll *star*
	zinxh**i**r *zipper*	zj**a**rr *fire*			

References

Bates, Douglas, Martin Maechler, Ben Bolker & Steve Walker. 2015. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67(1). 1–48. https://doi.org/10.18637/jss.v067.i01.

Beci, Bahri. 1974. E Folmja e Luznisë së Dibrës. In Mahir Domi (ed.), *Dialektologjia Shqiptare*, vol. II, 223–282. Tiranë: Akademia e Shkencave e Shqipërisë.

Beci, Bahri. 1978. Rreth tipareve karakteristike të dy dialekteve të shqipes. *Studime Filologjike* 15(4). 53–87.

Beci, Bahri. 1995. *Të folmet veriperëndimore të shqipes dhe sistemi fonetik i të folmes së Shkodrës*. Tiranë: Mihal Duri.

Beci, Bahri. 2002. *Dialektet e shqipes dhe historia e formimit të tyre: Autoktonia e shqiptarëve në dritën e të dhënave të dialektologjisë historike shqiptare*. Tiranë: Dituria.

Beci, Bahri. 2019. *Historia e formimit të strukturës dialektore të shqipes*. Tiranë: Akademia e Shkencave e Shqipërisë.

Beckman, Mary E., Fangfang Li, Eun Jong Kong & Jan Edwards. 2014. Aligning the timelines of phonological acquisition and change. *Laboratory Phonology* 5(1). 151–194. https://doi.org/10.1515/lp-2014-0007.

Byron, Janet. 1976. *Selection Among Alternates in Language Standardization: The Case of Albanian*. Paris: Mouton.

Çabej, Eqrem. 1936. *Elemente të gjuhësisë e të literaturës shqipe*. Tiranë: Shtypshkronja e Ministrisë së Arsimit.

Çabej, Eqrem. 1964. Disa faza më të moçme të shqipes në dritën e gjuhëve fqinje. *Revistë shkencore e Institutit Pedagogjik Dyvjeçar Shkodër* 1. 5–27.

Çabej, Eqrem. 1970. *Hyrje në historinë e gjuhës shqipe: Fonetika historike e shqipes*. Prishtinë: Universiteti i Prishtinës.

Çabej, Eqrem. 1976. *Studime etimologjike në fushë të shqipes*. Vol. 2. Tiranë: Akademia e Shkencave e Shqipërisë.

Çeliku, Mehmet. 1971. Kuantiteti i zanoreve të theksuara në të folmet e shqipes. *Studime Filologjike* 8(4). 65–100.

Çeliku, Mehmet. 2020. *Gegërishtja jugperëndimore*. Tiranë: Akademia e Studimeve Albanologjike.

Cheng, Hei Yan, Bruce E. Murdoch, Justine V. Goozée & Dion Scott. 2007. Electropalatographic assessment of tongue-to-palate contact patterns and variability in children, adolescents, and adults. *Journal of Speech, Language, and Hearing Research* 50(2). 375–392. https://doi.org/10.1044/1092-4388(2007/027).

Chung, Hyunju, Eun Jong Kong, Jan Edwards, Gary Weismer, Marios Fourakis & Youngdeok Hwang. 2012. Cross-linguistic studies of children's and adults' vowel spaces. *Journal of the Acoustical Society of America* 131(1). 442–454. https://doi.org/10.1121/1.3651823.

Demiraj, Shaban. 1996. *Fonologjia historike e gjuhës shqipe*. Tiranë: Akademia e Shkencave e Republikës së Shkipërisë.

Donegan, Patricia. 2013. Normal vowel development. In Martin J. Ball & Fiona Gibbon (eds.), *Handbook of Vowels and Vowel Disorders*, 24–60. New York: Routledge.

Dozon, Auguste. 1879. *Manuel de la langue chkipe ou albanaise: grammaire, chrestomathie, vocabulaire*. Paris: E. Leroux.

Draxler, Cristoph & Klaus Jänsch. 2004. SpeechRecorder – A universal platform independent multi-channel audio recording software. In *Proceedings of the 4th International Conference on Language Resources and Evaluation*, 559–562. Lisbon, Portugal.

Foulkes, Paul & Marilyn Vihman. 2015. First language acquisition and phonological change. In Patrick Honeybone & Joseph Salmons (eds.), *The Oxford Handbook of Historical Phonology*, 289–312. Oxford: Oxford University Press.

Gjinari, Jorgji. 1966. Sprovë për një ndarje dialektore të gjuhës shqipe. *Studime Filologjike* 3(4). 99–118.

Gjinari, Jorgji, Bahri Beci, Gjovalin Shkurtaj, Xheladin Gosturani & Anastas Dodi. 2007. *Atlasi dialektologjik i gjuhës shqipe*. Napoli: Università degli Studi di Napoli.

Hout, Angeliek van, Kaitlyn Harrigan & Jill de Villiers. 2009. Comprehension and production of definite and indefinite noun phrases in English preschoolers. In Jean Crawford, Koichi Otaki & Masahiko Takahashi (eds.), *Proceedings of the 3rd Conference on Generative Approaches to Language Acquisition North America (GALANA 2008)*, 76–87. Somerville: Cascadilla Proceedings Project.

Ismajli, Rexhep. 2005. *Drejtshkrimet e shqipes: studim dhe dokumente*. Prishtinë: Akademia e Shkencave dhe e Arteve e Kosovës.

Kapia, Enkeleida. 2021. Ghamori dhe evolucioni në gjuhë. *Peizazhe*. Tiranë. https://peizazhe.com/2021/06/30/gamori-dhe-evolucioni-ne-gjuhe/.

Kisler, Thomas, Uwe D. Reichel & Florian Schiel. 2017. Multilingual processing of speech via web services. *Computer Speech & Language* 45. 326–347. https://doi.org/10.1016/j.csl.2017.01.005.

Koenig, Laura L., Jorge C. Lucero & Elizabeth Perlman. 2008. Speech production variability in fricatives of children and adults: Results of functional data analysis. *Journal of the Acoustical Society of America* 124(5). 3158–3170. https://doi.org/10.1121/1.2981639.

Kolgjini, Julie M. 2004. *Palatalization in Albanian: An acoustic investigation of stops and affricates*. Arlington: University of Texas at Arlington PhD dissertation.

Kostallari, Androkli. 1973. Gjuha e sotme letrare kombëtare shqipe dhe disa probleme themelore të drejtshkrimit të saj. In *Aktet e Kongresi i Drejtshkrimit të gjuhës shqipe*, vol. I. Tiranë.

Kostallari, Androkli. 1984. Gjuha e sotme kombëtare shqipe dhe epoka jonë. *Studime Filologjike* 21(4). 25–59.

Kuznetsova, Alexandra, Per B. Brockhoff & Rune H. B. Christensen. 2017. lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software* 82(13). 1–26. https://doi.org/10.18637/jss.v082.i13.

Lee, Sungbok, Alexandros Potamianos & Shrikanth Narayanan. 1999. Acoustics of children's speech: Developmental changes of temporal and spectral parameters. *Journal of the Acoustical Society of America* 105(3). 1455–1468. https://doi.org/10.1121/1.426686.

Lustyk, Tomas, Petr Bergl & Roman Cmejla. 2014. Evaluation of disfluent speech by means of automatic acoustic measurements. *Journal of the Acoustical Society of America* 135(3). 1457–1468. https://doi.org/10.1121/1.4863646.

Maratsos, Michael P. 1974. Preschool children's use of definite and indefinite articles. *Child Development* 45(2). 446–455. https://doi.org/10.2307/1127967.

Martins, Isabel Pavão, Rosário Vieira, Clara Loureiro & M. Emilia Santos. 2007. Speech rate and fluency in children and adolescents. *Child Neuropsychology*. Routledge 13(4). 319–332. https://doi.org/10.1080/09297040600837370.

Moosmüller, Sylvia & Theodor Granser. 2006. The spread of standard Albanian: An illustration based on an analysis of vowels. *Language Variation and Change* 18(2). 121–140. https://doi.org/10.1017/S0954394506060066.

Nardy, Aurélie, Jean-Pierre Chevrot & Stéphanie Barbu. 2014. Sociolinguistic convergence and social interactions within a group of preschoolers: A longitudinal study. *Language Variation and Change* 26(3). 273–301. https://doi.org/10.1017/S0954394514000131.

R Core Team. 2022. R: A language and environment for statistical computing. https://www.R-project.org.

Richtsmeier, Peter. 2010. Child phoneme errors are not substitutions. *Toronto Working Papers in Linguistics* 33(1). 1–15.

Riverin-Coutlée, Josiane, Conceição Cunha, Enkeleida Kapia & Jonathan Harrington. 2021. Dialect features in heterogeneous and homogeneous Gheg speaking communities. In *Proceedings of Interspeech 2021*, 1449–1453. Brno, Czech Republic. https://doi.org/10.21437/Interspeech.2021-1090.

Riverin-Coutlée, Josiane, Enkeleida Kapia, Conceição Cunha & Jonathan Harrington. 2022. Vowels in urban and rural Albanian: The case of the Southern Gheg dialect. *Phonetica* 79(5). 459–512. https://doi.org/10.1515/phon-2022-2025.

Rusakov, Alexander. 2017. Albanian. In Mate Kapović (ed.), *The Indo-European Languages*, 552–608. 2nd edn. London: Routledge.

Sandoval, Steven, Visar Berisha, Rene L. Utianski, Julie M. Liss & Andreas Spanias. 2013. Automatic assessment of vowel space area. *Journal of the Acoustical Society of America* 134(5). EL477–EL483. https://doi.org/10.1121/1.4826150.

Schaeffer, Jeannette & Lisa Matthewson. 2005. Grammar and pragmatics in the acquisition of article systems. *Natural Language & Linguistic Theory* 23(1). 53–101. https://doi.org/10.1007/s11049-004-5540-1.

Schiel, Florian. 1999. Automatic phonetic transcription of non-prompted speech. In *Proceedings of ICPhS 14*, 607–610. San Francisco, USA.

Schölderle, Theresa, Elisabet Haas & Wolfram Ziegler. 2020. Age norms for auditory-perceptual neurophonetic parameters: A prerequisite for the assessment of childhood dysarthria. *Journal of Speech, Language, and Hearing Research* 63(4). 1071–1082. https://doi.org/10.1044/2020_JSLHR-19-00114.

Shkurtaj, Gjovalin. 1969. Rreth ndryshimeve në gjuhën e fshatit të sotëm të Veriut (sipas vëzhgimeve në zonën e Koplikut, rrethi i Shkodrës). *Studime Filologjike* 6(4). 161–169.

Shkurtaj, Gjovalin. 1975. E folmja e Kelmendit. In Mahir Domi (ed.), *Dialektologjia Shqiptare*, vol. III, 5–130. Tiranë: Akademia e Shkencave e Shqipërisë.

Siegel, Jeff. 2010. *Second Dialect Acquisition*. Cambridge: Cambridge University Press.

Stoel-Gammon, Carol & Paula Beckett Herrington. 1990. Vowel systems of normally developing and phonologically disordered children. *Clinical Linguistics & Phonetics* 4(2). 145–160. https://doi.org/10.3109/02699209008985478.

Storkel, Holly L. 2019. Using developmental norms for speech sounds as a means of determining treatment eligibility in schools. *Perspectives of the ASHA Special Interest Groups* 4(1). 67–75. https://doi.org/10.1044/2018_PERS-SIG1-2018-0014.

Topalli, Kolec. 2007. *Fonetika historike e gjuhës shqipe*. Tiranë: Shtëpia Botuese Dituria.

UNICEF. 2018. We All Matter! Situation Analysis of Children with Disabilities in Albania. https://www.unicef.org/albania/reports/we-all-matter.

Vorperian, Houri K. & Ray D. Kent. 2007. Vowel acoustic space development in children: A synthesis of acoustic and anatomic data. *Journal of Speech, Language, and Hearing Research* 50(6). 1510–1545. https://doi.org/10.1044/1092-4388(2007/104).

Winkelmann, Raphael, Jonathan Harrington & Klaus Jänsch. 2017. EMU-SDMS: Advanced speech database management and analysis in R. *Computer Speech & Language* 45. 392–410. https://doi.org/10.1016/j.csl.2017.01.002.

Wolfswinkler, Katrin & Jonathan Harrington. 2021. The influence of Standard German on the vowels and diphthongs of West Central Bavarian. *Journal of the International Phonetic Association* 1–33. https://doi.org/10.1017/S0025100321000232.