

# HOW FLUENT ARE CHILD HERITAGE SPEAKERS OF BULGARIAN?<sup>1</sup>

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**Abstract:** This study examines the temporal characteristics of speech in heritage and L2 speakers, comparing articulation rate as well as the proportion and types of pauses in read speech and retelling. The results indicate that heritage speakers speak faster but with more frequent interruptions, whereas L2 speakers produce slower yet more structured speech. These differences are attributed to variations in language input and social context. The study underscores the importance of tailored approaches for training heritage speakers and offers insights into bilingualism.

**Key words:** speech fluency; heritage language; second language; read speech; retelling

## 1. Introduction

Over the past two decades, research on heritage languages has advanced considerably, driven by a growing interest in the unique features of bilingualism resulting from early exposure to a minority language within a family setting. Heritage languages, acquired in early childhood but often subjected to limited input due to the dominance of another societal language, constitute a key area of study in contemporary linguistics [Benmamoun et al. 2013; Stoyanova 2014; Polinsky 2015].

The term heritage language refers to a language learned primarily in the home environment, whose development may be incomplete because of reduced exposure outside the family and the pervasive influence of a dominant societal language. Heritage speakers typically display uneven linguistic competence: certain domains, such as phonology, may be well preserved, while morphosyntactic and lexical structures can show signs of attrition or incomplete acquisition [Benmamoun et al. 2013].

Examining speech fluency in heritage speakers is particularly informative, as it provides insight into the interplay between early linguistic exposure, maintenance of the heritage language, and the influence of the dominant language environment. Fluency encompasses multiple dimensions, including speech rate, hesitation patterns, and lexical retrieval, and serves as a window into the cognitive and linguistic mechanisms underpinning bilingual language use [Breit, Treffers-Daller 2022].

Empirical studies have assessed heritage language fluency through various methodologies. For example, research on Spanish heritage language learners has analysed discourse markers such as pauses and self-repairs, to evaluate oral fluency, finding that these indicators vary according to age of onset and the relative dominance of the languages involved [Lindsey, Kagan 2021]. Moreover, intergenerational language attrition has been observed, with second-generation speakers often exhibiting distinct patterns, compared to their immigrant parents, reflecting dynamic

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<sup>1</sup> This paper draws on findings from a previous study.

processes of language change influenced by input quantity and quality, societal attitudes, and individual motivation [Schwartz 2010].

Understanding the complexities of fluency in heritage language speakers contributes both theoretically and practically. Theoretically, it informs models of bilingual language processing and language attrition. Practically, insights into factors that promote or hinder language maintenance can guide educational and policy interventions aimed at supporting heritage language learners, thereby fostering linguistic diversity and cultural preservation in multilingual communities.

## **2. Heritage speakers: Profile and linguistic characteristics**

The term *heritage speaker* designates a particular category of bilingual individuals whose linguistic development is shaped by early exposure to a language that differs from the socially dominant one. Typically, at least one parent or ancestor transmits this language at home, using it as a primary means of communication during the child's formative years. As Valdés 2000 and Polinsky, Kagan 2007 emphasize, the heritage speaker acquires this language in early childhood – either through active production or receptive comprehension – before it is partially or completely displaced by the dominant societal language. This dominant language subsequently becomes the main vehicle of communication, education, and public life [Polinsky 2008; Pascual y Cabo, Rothman 2012; Benmamoun et al. 2013].

In most cases, heritage speakers grow up in bilingual family environment, with the minority language used at home and the majority language predominating in education, media, and institutional contexts. Such asymmetrical input conditions have long been recognized as crucial in shaping bilingual competence [Montrul 2016]. The interaction between the two linguistic systems during early acquisition results in variable outcomes in the heritage language, ranging from near-native proficiency to substantial attrition. Some speakers maintain robust, productive use of their heritage language within family and community settings, whereas others experience partial or total loss of active command due to limited input and restricted communicative necessity. This variability differentiates heritage speakers from both fully proficient L1 speakers and late L2 learners, whose acquisition trajectories are more clearly defined.

Several key characteristics define the heritage speaker profile:

- **Early exposure:** Heritage speakers are typically exposed to the heritage language before or alongside acquisition of the dominant language, resulting in simultaneous or early sequential bilingualism.

- **Uneven bilingualism:** Their linguistic competence is often asymmetrical, with the dominant language becoming structurally and functionally more developed over time.

- **Cultural and familial anchoring:** The heritage language serves not only as a communicative tool but also as a symbolic link to familial history and ethnic identity, reinforcing cultural continuity across generations.

- **Non-standard input:** The linguistic variety transmitted within the home may differ from standardized or codified norms, often reflecting regional, diasporic, or contact-induced variation.

As Benmamoun et al. (2013) argue, the term *heritage speaker* encompasses a wide continuum of linguistic proficiency, extending from speakers whose skills approach native-like competence to individuals who possess only receptive knowledge and limited productive ability. The determining factor behind these differences lies in the quantity, quality, and continuity of exposure, as well as in opportunities for active language use. In environments where the heritage language is regularly spoken at home, acquisition may be either **passive**, with comprehension outpacing production, or **active**, where the language is integrated into everyday family communication. Conversely, in households where the dominant societal language is preferred, the heritage language often remains underdeveloped, leading to incomplete acquisition or gradual attrition.

Moreover, intergenerational transmission plays a decisive role in sustaining heritage language competence. When parents or caregivers reduce their own use of the language, the next generation often exhibits marked decreases in fluency and grammatical accuracy. Over time, such processes contribute to the characteristic outcomes of heritage grammars – systems that are both systematic and variable, shaped by reduced input and restructured under the influence of the dominant language [Polinsky 2008]. In some cases, individuals who have not achieved sufficient mastery of their heritage language in early childhood may later attempt to (re)learn it as a foreign language in formal educational contexts, thereby re-entering the linguistic continuum from a different point [Stoyanova 2014].

In sum, heritage speakers occupy a unique position within the bilingual spectrum, reflecting a complex interplay between linguistic environment, input quality, social identity, and intergenerational transmission. Their linguistic profiles provide valuable insights into the mechanisms of language maintenance, change, and loss in contact settings – processes that lie at the intersection of individual bilingual experience and broader sociolinguistic dynamics.

### **3. Heritage and L2 speakers: Differences in language acquisition**

A fundamental step in understanding the linguistic profile of heritage speakers is to distinguish them from individuals who acquire a language as a second language (L2). While both groups exhibit varying degrees of bilingualism, their developmental trajectories differ substantially in terms of **age of onset**, **acquisition context**, and **type of input** – factors that jointly determine their linguistic competence and processing mechanisms [Montrul 2016; Polinsky 2018; Rothman 2009].

Heritage speakers typically acquire their heritage language in early childhood, within the naturalistic and affectively rich environment of the family. This early exposure allows for the establishment of phonological categories and basic morphosyntactic structures through implicit learning mechanisms. In contrast, L2 speakers begin acquisition much later – most often during adolescence or – formal educational settings characterized by explicit instruction and metalinguistic awareness. As Montrul (2016) and Polinsky (2018) argue, this difference in timing and context profoundly affects the cognitive representation of linguistic knowledge: heritage speakers tend to internalize intuitive, proceduralized knowledge that may remain incomplete in certain grammatical domains, whereas L2 learners rely on

declarative, rule-based learning strategies that can lead to less natural fluency despite higher explicit grammatical control.

These two parameters – **age of acquisition** and **context of exposure** – constitute the central axis along which heritage and L2 speakers diverge [Kupisch, Rothman 2018]. Heritage speakers' linguistic experience is shaped by informal, interactional communication within the home, often involving regionally or socially marked varieties rather than standardized registers. L2 learners, by contrast, acquire language primarily through literacy-based input and pedagogically curated materials in institutional contexts. As a result, while heritage speakers often exhibit near-native phonological and prosodic patterns but reduced morphosyntactic accuracy, L2 learners tend to develop more target-like morphosyntax alongside less native-like pronunciation and prosody [Montrul 2016; Kupisch et al. 2014].

The modality and quality of input further contribute to these differences. Heritage speakers predominantly receive auditory input embedded in spontaneous, affect-laden interactional settings – conversations with family members, overheard speech, or community-based exchanges. Visual input and literacy experience in the heritage language are often limited or absent. L2 speakers, by contrast, encounter a multimodal learning environment that integrates both auditory and visual stimuli – listening, reading, and writing – under explicit pedagogical guidance. These divergent conditions shape different processing profiles: heritage speakers often display automaticity in phonological and prosodic processing but limited awareness of metalinguistic norms, while L2 speakers demonstrate the reverse pattern, relying on conscious rule application rather than proceduralized fluency [Polinsky, Kagan 2007; Rothman 2009].

Another critical dimension concerns the quantity and continuity of exposure. Heritage speakers typically experience several years of intensive but domain-restricted input in early childhood, followed by a shift to the dominant societal language once formal schooling begins. The result is a form of „incomplete acquisition“ or „attrition“ [Montrul 2008; Polinsky 2011], in which linguistic structures that were initially acquired may become underrepresented or unstable due to reduced input and use. By contrast, L2 learners, though starting later, are exposed to the language in contexts that emphasize normativity, standardization, and grammatical correctness – features that can compensate for the lack of early naturalistic exposure but may limit spontaneity and sociolinguistic flexibility [Pascual y Cabo, Rothman 2012].

Comparing these two populations helps clarify the interaction between early implicit and later explicit learning mechanisms and into how input quantity, quality, and timing shape bilingual cognition [Kupisch, Rothman 2018; Polinsky 2018]. Such research sheds light not only on how heritage speakers maintain or restructure their linguistic competence across the lifespan, but also on how educational interventions can best support language retention and reactivation. From a theoretical perspective, it also contributes to ongoing debates on representational deficits versus processing limitations in bilingual grammars and on the role of input-driven variability in shaping language outcomes [Benmamoun et al. 2013; Rothman 2009].

The present study aims to contribute to this comparative discussion by examining speech fluency among heritage bilinguals and L2 speakers, using objective, empirically grounded assessment methods. Specifically, it seeks to:

1. **Develop and apply a method for assessing speech fluency** that integrates temporal, phonetic, and prosodic parameters – such as speech rate, pause duration and frequency, and the phonological and prosodic structuring of utterances, including fluctuations and self-corrections.

2. **Compare the fluency profiles of heritage speakers and L2 learners**, analysing differences in temporal characteristics across two modes of speech production: read speech and spontaneous retelling.

By integrating perspectives from heritage language acquisition, second language research, and bilingual speech processing, this study aims to clarify how early exposure and late learning interact in shaping fluency outcomes. Ultimately, it seeks to contribute to a more nuanced understanding of bilingualism as a continuum rather than a dichotomy, highlighting how different acquisition pathways give rise to distinct, yet systematically related linguistic profiles.

#### **4. Method**

The present study involved two groups of speakers, selected to examine differences in speech fluency between heritage and L2 language acquisition trajectories. The heritage speaker group consisted of four individuals of Bulgarian descent: one female aged 14 and three males aged 10, 18, and 20. All participants were born and raised in Germany within bilingual households, where the mother's native language was Bulgarian and the father's was German. Bulgarian was acquired naturally in the home as a heritage language, providing early, immersive input during critical periods of language development. The control group comprised ten participants (six females, four males) aged 16–20, all native speakers of German who had acquired English as a second language at B1–B2 level according to the Common European Framework of Reference for Languages (CEFR). None of the control participants had prior exposure to Bulgarian.

The experimental materials consisted of three fables by Aesop, carefully chosen to allow comparisons across reading and retelling tasks while maintaining linguistic and narrative consistency. Heritage speakers first read 'The Fox and the Crow' in Bulgarian, followed by a short reflection period and then a retelling. After an additional pause, they proceeded to the second task: reading 'The Fox and the Grapes' in German, again followed by a retelling. This design allowed investigation of cross-linguistic fluency patterns and potential transfer effects from the heritage to the dominant language. Control participants read and retold only one text, 'The North Wind and the Sun', first in English and then in German, providing a baseline for L2 speech fluency in reading and retelling tasks.

For acoustic analysis, syllables, articulated speech intervals (IAPs), pauses, and filled hesitation pauses were automatically segmented using a Praat script. The script detected intensity peaks and grouped them into phrases separated by pauses longer than 300 ms. All boundaries were manually verified and adjusted as needed to ensure reliability (see Fig. 1).

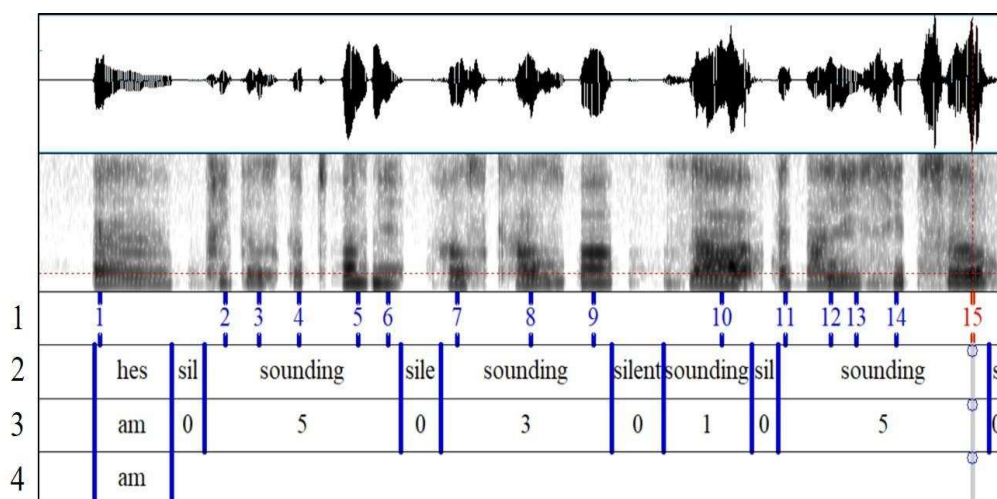


Figure 1. Data annotation: (1) syllables; (2) IAP boundaries (sounding), pauses (silence), and filled hesitation pauses (hes); (3) number of syllables per IAP; (4) phonetic composition of filled hesitation pauses (e.g., [ə:m] – ‘am’)

For each participant and speech style, the number and total duration (in seconds) of IAPs and pauses were extracted automatically. Articulation rate was calculated as the number of syllables divided by the total IAP duration, while the proportion of pauses was defined as total pause duration divided by the sum of IAP and pause durations, multiplied by 100. Averages were computed across individual measurements for each speaker and task.

This methodology allows for a fine-grained comparison of speech fluency in heritage versus L2 speakers, linking differences in temporal and prosodic patterns to early versus late acquisition contexts. By combining reading and retelling tasks, the study captures both controlled and spontaneous speech, revealing how early input, exposure continuity, and acquisition modality shape bilingual speech production.

## 5. Results

This section presents the quantitative and qualitative analyses of speech production in heritage speakers of Bulgarian and L2 speakers of English. We focus on articulatory fluency, temporal characteristics, and the distribution of pauses, including filled hesitation markers. The analyses examine how speech style (read vs. retelling) and language dominance interact to shape articulation rate, syllable realization, and pausing behaviour. To analyse differences in speech fluency between heritage speakers and second language (L2) learners, linear mixed-effects models (LMMs) were fitted for each acoustic parameter as the dependent variable. Language (heritage/dominant/L1/L2) and style (read speech/retelling) were included as fixed effects, along with their potential interaction. Speaker and text were included as random effects to account for variability across participants and materials. Statistical significance was set at  $p \leq .05$ . When necessary, post-hoc pairwise comparisons were conducted using Tukey’s HSD to identify specific group differences.

### 5.1. Articulation Rate

Figure 2 illustrates the mean articulation rate (syllables per second) for heritage speakers with Bulgarian as their heritage language and German as their dominant

language (left panel), as well as for L1 German–L2 English speakers (right panel), across two speech styles: retelling and read speech.

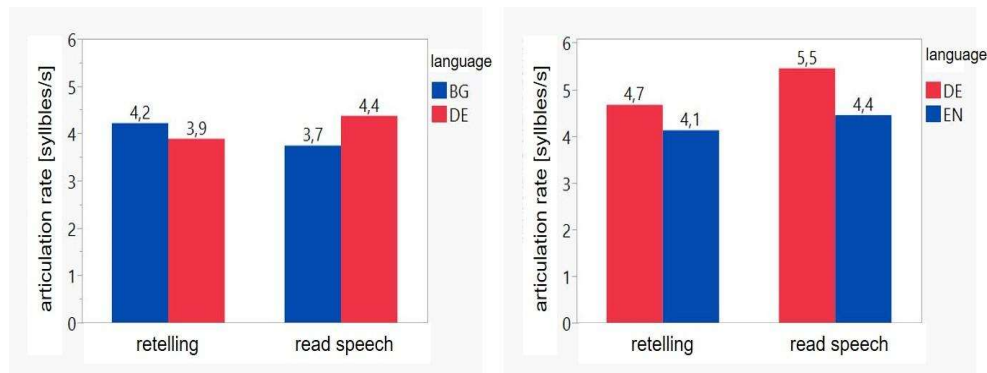


Figure 2. Influence of language and speech style on articulation rate in heritage speakers (left panel) and L2 speakers (right panel)

#### 5.1.1. Heritage Speakers

The study examined differences in articulation rate among heritage speakers as a function of language (Bulgarian vs. German) and speech style (read speech vs. retelling). A linear mixed-effects model indicated that speech style did not exert a significant main effect on articulation rate [ $F(1, 675.8) = 0.4725$ ,  $p = 0.4921$ ], suggesting that the rate of articulation in read speech does not differ substantially from that in retelling. Similarly, language did not show a significant main effect [ $F(1, 673.1) = 0.5060$ ,  $p = 0.4771$ ], indicating that mean articulation rate does not differ significantly between Bulgarian and German, when style is not considered.

However, a significant interaction between language and style was observed [ $F(1, 673.1) = 23.3829$ ,  $p < 0.0001$ ], revealing that these factors influence articulation rate only in combination. Post-hoc analyses using Tukey HSD indicated the following patterns: the highest articulation rate occurred when reading German (4.4 syllables/s), whereas retelling in Bulgarian showed a slightly lower rate (4.2 syllables/s). Retelling in German was considerably slower (3.9 syllables/s) compared to reading in German, and the slowest production was observed during reading in Bulgarian (3.7 syllables/s).

These results indicate an asymmetry in the speech behaviour of heritage speakers. During retelling, heritage speakers articulated more rapidly in Bulgarian than in German. In contrast, read speech was faster in German than in Bulgarian (see Fig. 2, left panel). This pattern suggests that speech style differentially affects articulation rate depending on the language: the heritage language (Bulgarian) is articulated more quickly in spontaneous speech, whereas the dominant language (German) is produced more rapidly in reading contexts. These findings reflect the degree of automatization and functional use of the two languages across different communicative contexts.

#### 5.1.2. L2 Speakers

The statistical analysis revealed a significant effect of language on articulation rate [ $F(1, 27) = 13.8460$ ,  $p = 0.0009$ ]. Participants articulated German more rapidly than English across both speech styles, with the difference particularly pronounced in read speech (5.5 syllables/s in German vs. 4.4 syllables/s in English). In the retelling

task, articulation rate remained higher in German (4.7 syllables/s) compared to English (4.1 syllables/s), although the magnitude of the difference was smaller (see Fig. 1, right panel). A significant main effect of speech style was also observed [ $F(1,27) = 7.0461$ ,  $p = 0.0132$ ], with read speech produced faster than retelling. This likely reflects the reduced cognitive and planning demands associated with reading compared to spontaneous speech. No significant interaction between language and style was found [ $F(1,27) = 1.2052$ ,  $p = 0.2820$ ], indicating that the observed language differences in articulation rate were consistent across speech styles. These findings support the hypothesis that the native language is processed more automatically, yielding higher articulation rates, whereas the second language imposes greater cognitive demands, resulting in slower articulation.

## 5.2. Realized Syllable Count in Read Speech

### 5.2.1. Heritage Speakers

Table 1 summarizes the realized syllable counts for heritage speakers when reading a Bulgarian text comprising 359 syllables and a German text of 255 syllables. The data reveal inter-speaker variability, with percentages in parentheses indicating deviations from the original text.

*Table 1. Realized syllable counts by heritage speakers in read speech*

speaker	realized syllables BG (359)	realized syllables DE (255)
10-year-old (m)	–	–
14-year-old (f)	378 (+5.3%)	267 (+4.7%)
18-year-old (m)	363 (+1.1%)	264 (+3.5%)
20-year-old (m)	459 (+27.9 %)	279 (+9.4%)

All participants produced more syllables than were present in the source texts. For instance, the 20-year-old male speaker articulated 459 syllables in Bulgarian (+27.9%) and 279 syllables in German (+9.4%). The 14-year-old female speaker produced 378 syllables in Bulgarian (+5.3%) and 267 in German (+4.7%). The 18-year-old male exhibited the smallest deviation, realizing 363 syllables in Bulgarian (+1.1%) and 264 in German (+3.5%). The 10-year-old male participant was unable to read Cyrillic.

These results indicate a systematic tendency to add syllables in Bulgarian, most notably among certain speakers. This pattern is likely attributable to phonetic adaptation processes, including syllable lengthening, insertion of epenthetic vowels, and repetitions. A similar but less pronounced effect is observed in German. Overall, these findings reflect inter-individual differences in linguistic competence, reading fluency, and compensatory strategies to mitigate uncertainty in speech production across the two languages.

### 5.2.2. L2 Speakers

Table 2 summarizes the realized syllable counts for participants with L1 German and L2 English. The German reading passage comprised 173 syllables, whereas the English passage contained 144 syllables. Individual deviations from the expected syllable counts are reported for each participant.

Table 2. Realized syllable counts from L2-speakers in read speech

speaker	realized syllables L1 (173)	realized syllables L2 (144)
S1 (f)	171 (-1.2 %)	131 (-9.3 %)
S2 (f)	164 (-5.2 %)	184 (+27.8)
S3 (m)	172 (-0.6 %)	155 (+7.6 %)
S4 (m)	148 (-14.4 %)	127 (-11.8)
S5 (f)	164 (-5.2%)	141 (-2.1)
S6 (f)	168 (-2.9)	152 (+5.6 %)
S7 (f)	165 (-4.6 %)	118 (-18.1 %)
S8 (f)	180 (+4.1 %)	197 (+36.8 %)
S9 (m)	160 (-7.5%)	156 (+8.3 %)
S10 (m)	154 (-11.0)	134 (-6.9 %)

Considerable variability emerged in the second language (L2). Some participants produced substantially more syllables than the target (e.g., S2: +27.8%, S8: +36.8%), whereas others produced considerably fewer (S7: -18.1%, S4: -11.8%). Such deviations may reflect articulation challenges, the insertion of hesitation elements, or omissions in speech. In contrast, syllable counts in the native language (L1) were more consistent, with most participants remaining close to the nominal value of 173 syllables. The reduced variability in L1 underscores the greater automatization and stability of speech production in the native language.

Notably, certain participants (e.g., S8) exhibited elevated syllable counts in both languages, potentially indicating reading uncertainty or difficulties in word recognition. Conversely, participants such as S4 and S7 showed reductions in both languages, which may reflect faster articulation or a tendency to elide elements of speech. Overall, the findings indicate that speech production in L2 is more variable than in L1, consistent with the higher cognitive demands associated with second language processing. These demands can manifest as either lengthened speech (greater syllable count) or truncated speech (fewer syllables), reflecting constraints on fluency and the efficiency of linguistic planning.

### 5.3. Proportion of Pauses

Figure 3 illustrates the proportion of realized silent pauses (expressed as a percentage) for speakers with heritage Bulgarian and dominant German (left panel) and for speakers with L1 German and L2 English (right panel), stratified by speech style (retelling vs. read speech).

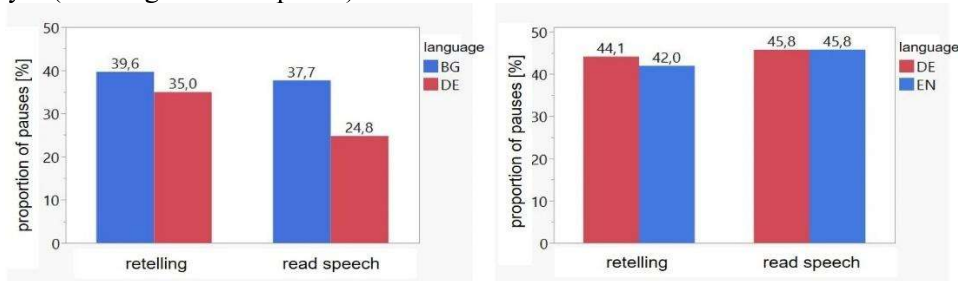


Figure 3. Influence of language and speech style on the proportion of realized pauses for heritage speakers (left panel) and L2 speakers (right panel)

Across both retelling and read speech, heritage speakers exhibit a higher proportion of pauses in Bulgarian compared to German, with the disparity being particularly pronounced in read speech. This pattern suggests that processing written material in the heritage language imposes greater cognitive demands, manifesting in increased speech fragmentation. Conversely, L2 speakers of English show negligible differences in pause proportion between their L1 (German) and L2 (English), with read speech values closely aligned across languages. These findings indicate that for heritage speakers, the automatization of Bulgarian is relatively underdeveloped, especially in formal contexts such as reading, where lexical and syntactic retrieval may be slower and less stable. By contrast, L2 speakers appear to apply comparable strategies for speech planning and pause structuring in both languages, potentially reflecting the typological proximity between German and English or a higher level of proficiency in their L2.

#### 5.4. Frequency and Type of Filled Hesitation Pauses

The frequency and distribution of filled hesitation pauses vary depending on the language and the cognitive processes involved in speech planning. Wieling et al. (2016) and de Leeuw (2007) found that in Germanic languages, [ə:m] occurs more frequently than [ə:::], a pattern that can be linked to specific cognitive processing and speech structuring strategies. In contrast, Muhlak et al. (2024) report that in Bulgarian, [ə:::] is a significantly more common filled pause. One possible explanation for these differences lies in the preferred syllable structures of Germanic and Slavic languages: closed syllables predominate in Germanic languages, whereas open syllables are more frequent in Slavic languages.

Analysis of the retelling data in the present study confirms these observations to some extent. Among heritage speakers of Bulgarian, [ə:m] was the most frequently used filled pause (18 occurrences), followed by [ə:::] (13 occurrences). Although these findings do not fully align with the data reported by Muhlak et al. (2024), the discrepancy may be attributed to the influence of the dominant German language on the use of hesitation markers. In the same speakers' German speech, the frequency of [ə:m] was considerably lower (9 occurrences) compared to [ə:::] (11 occurrences), which contrasts with typical patterns observed in Germanic languages in previous studies.

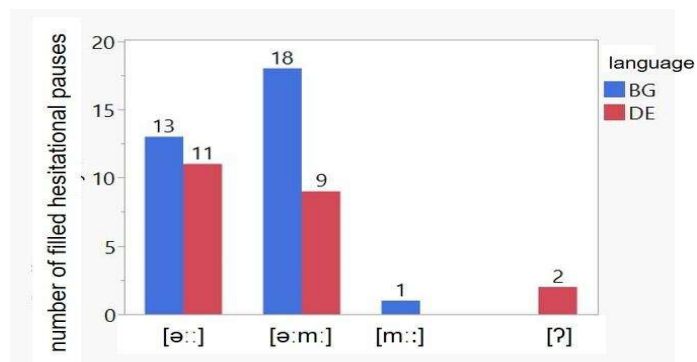


Figure 4. Frequency and type of filled hesitation pauses produced by heritage speakers during retelling

These results suggest that heritage speakers may employ hybrid strategies in their use of filled pauses: the frequency of [ə:m] in Bulgarian may be influenced by their dominant German, whereas the use of [ə:::] in German may reflect residual influence from Bulgarian. Other types of

filled pauses, such as [m::] and the glottal stop [ʔ], occurred with extremely low frequency and did not substantially affect the overall pattern (see Fig. 4).

## **6. Discussion**

The present study examined speech fluency, temporal dynamics, and pause behaviour in heritage speakers of Bulgarian with German as their dominant language and in L1 German–L2 English speakers. The findings illuminate the complex interplay between language dominance, speech style, and cognitive demands in bilingual speech production, revealing distinct patterns in articulatory fluency, syllable realization, and pause management across the two populations.

Consistent with previous research [Polinsky 2008; Montrul 2016], heritage speakers exhibited language- and style-dependent articulation patterns. Spontaneous speech in the heritage language (Bulgarian) was produced more rapidly than in the dominant language (German), whereas reading favoured faster articulation in German. This asymmetry suggests that speech automatization in heritage speakers is context-sensitive: while the dominant language benefits from structured, formal reading experience, the heritage language remains fluent in informal, spontaneous contexts. In contrast, L2 speakers consistently articulated their L1 faster than their L2, irrespective of speech style, reflecting the greater cognitive demands associated with producing a less automatized language. These results underscore that early exposure confers advantages for spontaneous processing, whereas late-acquired languages remain constrained by cognitive load during speech planning.

Analysis of realized syllables revealed systematic differences in reading strategies and fluency. Heritage speakers tended to exceed the target syllable count in Bulgarian, reflecting phonetic adaptation processes such as epenthetic vowels, syllable lengthening, and repetition, whereas German reading showed smaller deviations, indicating higher automatization in the dominant language. L2 speakers, by contrast, displayed greater variability in English (L2), with both additions and omissions of syllables. These patterns align with prior work on L2 fluency [Kormos 2014], highlighting the influence of cognitive effort, articulation challenges, and lexical retrieval on speech production. Taken together, the data indicate that heritage speakers maintain fluency through context-driven, familiar speech patterns, whereas L2 speech remains fragile and sensitive to task demands.

Heritage speakers produced a higher proportion of pauses in Bulgarian compared to German, particularly during reading, suggesting that formal reading in the heritage language requires additional cognitive effort due to limited exposure to written forms. L2 speakers, however, exhibited comparable pause proportions across languages, indicating that their planning strategies are consistently applied in L1 and L2, potentially facilitated by typological proximity or compensatory mechanisms. These findings reinforce the notion that fluency in heritage languages is highly context-sensitive, dependent on the degree of practice and automatization across modalities.

The distribution of filled hesitation pauses further illustrates the hybrid nature of heritage speakers' speech. In Bulgarian, [ə:m] predominated, whereas in German, [ə::] occurred more frequently, deviating from typical monolingual patterns. This suggests cross-linguistic influence between the heritage and dominant languages, resulting in hybridized strategies in pause production and reflecting the dynamic

negotiation of language dominance and modality-specific constraints [Wieling et al. 2016; Muhlak et al. 2024].

Overall, heritage and L2 speakers exhibited contrasting patterns across fluency measures. Heritage speakers benefit from early exposure, supporting spontaneous speech in the heritage language, but formal reading remains less automatized. L2 speakers show persistent disadvantages in their non-native language, reflecting higher cognitive demands and reduced automatization. These results have clear implications for language pedagogy: targeted interventions for heritage speakers could strengthen reading fluency and formal literacy, complementing existing spontaneous proficiency, while L2 instruction may benefit from strategies that alleviate cognitive load and promote automatization.

Despite these insights, the study's limitations must be acknowledged. The small and heterogeneous sample of heritage speakers constrains the generalizability of findings. Future research should include larger, age-stratified samples and examine additional acoustic correlates of fluency, such as pitch, intensity modulation, and prosodic variation. Cross-linguistic comparisons with other heritage communities could further clarify generalizable patterns of bilingual fluency and cognitive processing. Employing a combination of quantitative and qualitative methods would also enhance understanding of heritage speakers' speech dynamics across contexts.

## **7. Conclusion**

This study provides a detailed examination of fluency and temporal characteristics in heritage Bulgarian–German bilinguals and L1 German–L2 English speakers. The findings underscore the intricate interplay of early exposure, language dominance, and speech style in shaping fluency outcomes. Heritage speakers demonstrate context-dependent automatization, producing faster articulation in spontaneous heritage-language speech and in reading their dominant language, whereas L2 speakers consistently exhibit slower, more variable speech in their non-native language. Analysis of realized syllables, pause behaviour, and filled hesitation markers reveals hybridized strategies in heritage speech, reflecting cross-linguistic influence and modality-specific constraints. These results extend theoretical frameworks on heritage language acquisition and provide actionable insights for educational interventions aimed at enhancing fluency and literacy in heritage and L2 learners alike.

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