MAJORITY ENGLISH OF HERITAGE SPEAKERS

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8. April 2024, Kaiserslautern

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Study 1

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Chapter 1. Introduction

Over the last three decades, bilingualism research has extensively explored a unique group of bilinguals – heritage speakers (HSs). HSs grow up speaking two languages – the heritage language of their family, and the majority language of the larger society. The heritage language has a minority status in the society where HSs reside and is not typically formally taught or reinforced in the mainstream educational settings (Bayram et al., 2024; Montrul, 2016; Montrul & Polinsky, 2021; Pascual Y Cabo & Rothman, 2012). HSs usually begin acquiring the heritage language at birth and the majority language sometime between birth and the onset of formal schooling. Through schooling, HSs usually become dominant in their majority language by adolescence and early adulthood (Pascual Y Cabo & Rothman, 2012; Polinsky & Scontras, 2020). Their proficiency in the heritage language, on the other hand, varies quite considerably from full proficiency to basic understanding skills.

Many studies in research on heritage speakers have focused on their heritage language (for overviews, see Montrul, 2016; Montrul & Polinsky, 2021; Polinsky, 2018), which is understandable from a societal perspective since there is a strong interest in heritage language maintenance. From the linguistic research standpoint, the study of heritage languages offers important insights into the effects of language contact and language development under reduced input and dominance shift.

Research on the majority language, even though it has been somewhat less central in the field, is also valuable for at least two reasons. First, it contributes to our understanding of cross-linguistic influence, general effects of bilingualism, or speaker experiences on bilinguals' more dominant language. Several studies have documented cross-linguistic influence from the heritage language to the majority language and from late L2 to L1 (see, for example, Chang, 2016; Georgiou & Giannakou, 2024; van Rijswijk et al., 2017 for the influence of the heritage language on the majority; Chen et al., 2013 and Schoonbaert et al., 2007 for late L2-to-L1 structural priming; Gorba, 2019; Hohenstein et al., 2006 and Pavlenko

& Jarvis, 2002 for late L2-to-L1 cross-linguistic influence). However, these studies are relatively sparse and primarily experimental. Consequently, the scope of the influence of the less dominant language on a more dominant one still needs to be more clearly delineated, especially in language use outside of experimental settings. Moreover, it is also possible to observe general effects in the majority language that are not traceable to any particular heritage language, which would provide evidence that bilingualism or heritage speaker experience can cause dynamicity in language patterns. Heritage speaker experience can be multifaceted and involve being in close contact with L2 speakers of the majority language, majority language anxiety or societal pressure to conform to the standard of the majority language.

Second, majority language research on adolescent and adult HSs is of practical importance for language education policies, which often guard against heritage language maintenance due to its supposed negative effects on the ultimate attainment in the majority language (e.g., Dursun et al., 2023; McCardle, 2015; Raguenaud, 2009; Tracy & Gawlitzek, 2023, pp. 30–33). Here, the aim of majority language research is to quantify and qualify the differences between adolescent and adult HSs' majority language and the language of monolingually-raised speakers (MSs), in order to explore if there is a large-scale detrimental effect of heritage language retention on the majority language in the long-term perspective.

Previous research has indicated numerous differences between the majority language as produced or comprehended by adult and adolescent HSs compared to MSs (e.g., Bylund et al., 2012; Contemori et al., 2023; Scontras et al., 2017), as well as several similarities (e.g., Kupisch et al., 2017; Lloyd-Smith et al., 2020). However, the existing literature has three important gaps, which we aim to address in the present collection.

First, most of the majority language studies employ experimental set-ups to zoom into certain aspects of language production or comprehension, for instance, perception of consonants (Chang, 2016), scope assignment (Lee et al., 2011; Scontras et al., 2017), use of

definite articles (Felser & Arslan, 2019) and passives (van Lieburg et al., 2023). This group of methods provides valuable insights into very narrow aspects of language structure; however, it lacks ecological validity – it does not tell us whether there are any detectable differences in majority language between HSs and MSs in everyday language use.

Second, previous majority language research (experimental or not) rarely considers register variation, which is also an integral part of everyday language use. Register is a language variety associated with particular situational characteristics and communicative purposes (Biber & Conrad, 2009, p. 6; Goulart et al., 2020). Register has emerged as an important factor in the literature on heritage language use, with many studies documenting a lack of register differentiation (i.e., using the same linguistic features in all productions, irrespective of their register; see Alexiadou et al., 2022; Alexiadou & Rizou, 2023; Tsehaye, 2023 as recent examples). Consequently, it is interesting to ask whether any register-related differences can be found in the majority language as well. To our knowledge, few if any studies have systematically compared HSs' and MSs' productions across registers in the majority language (see Labrenz, 2023 as a recent example of such a comparison), so this question remains open.

Third, only a few studies investigate more than one adult HS group (Böttcher & Zellers, 2023; Kupisch et al., 2014; Labrenz, 2023; Paradis, 2019; Polinsky, 2018, pp. 142–144). This is somewhat limiting since majority language researchers attempt to describe general tendencies in the majority language even though the relevant studies are based on HSs with only one heritage language background. If we would like to draw a more comprehensive picture of majority language, it is critical to consider several HS groups using the same method.

To address the gaps outlined above, we conducted four studies that focus on the use of majority English by HSs and MSs in a more ecologically valid set-up of elicited narratives, which were collected in four registers (formal spoken/written – a spoken/written witness

report to the police about a car accident, informal spoken/written – a voice/text message to a friend telling about the same car accident). Two of the four studies individually contrasted the English productions of four HS groups (German, Greek, Russian, and Turkish HSs) to those of English MSs, which allowed us to draw a more holistic picture of majority English use. All studies were completed within the Research Unit *Emerging Grammars in Language Contact Situations: A Comparative Approach* (RUEG) funded by the German Research Foundation (FOR 2357).

The four studies are united by the following research questions:

RQ1. What differences and similarities can we observe in the use of majority English by HSs and MSs in an ecologically valid setup of elicited narratives?

RQ2. What differences and similarities can we find in the way HSs and MSs differentiate registers?

RQ3. Do different HS groups perform similarly regarding selected structures in elicited narratives?

To answer these research questions, we identified three language phenomena that were likely to exhibit variation in HSs and MSs' productions – forms of referring expressions (including basic forms – full NP, pronoun and null anaphor – and modifiers), types of finite clauses (independent main, coordinate main and subordinate clauses plus subordinate clause types), and left dislocations. These structures are likely to be dynamic due to their location at the interface of a core area of language (e.g., syntax) and a non-core area of language (e.g., pragmatics, discourse). This follows the Interface Hypothesis (Sorace, 2011; Tsimpli, 2014), which posits that phenomena at the interface are particularly open to the development of dynamic patterns in bilinguals since they engender a higher cognitive load than structures involving only one area of language. In addition, the selected language phenomena exhibit register variation (i.e., different frequencies of use in different registers), thus lending themselves to a register analysis.

In the following chapters, we first lay out the existing literature on the majority language of HSs. Then we provide detailed characteristics of the speaker sample used in the four studies and explain our narrative elicitation method. Next, we present short summaries of the four studies in the collection, followed by their complete versions. We conclude with a general discussion of our findings and their implications for our understanding of majority language use by HSs.

Chapter 2. Literature Review

The main goal of this dissertation is to explore similarities and differences between the majority language as produced by several groups of HSs and MSs of this language, taking into account four registers (formal spoken and written as well as informal spoken and written) and three linguistic structures (forms of referring expressions, types of finite clauses, and left dislocations). We focus on adult and adolescent HSs in order to investigate if there is long-term detrimental effect of heritage language maintenance on the majority language. In this section, we review the existing research on the majority language of adult and adolescent HSs.

2.1 Similarities between HSs and MSs

Several studies on majority language use by HSs highlight the similarities between HSs speaking their majority language and MSs of this language. Considering *phonetics and phonology*, HSs are usually reported to not have a different accent from MSs of the majority language, as determined by native speaker raters. Kupisch et al. (2014) demonstrated that HSs speaking Italian, French and German majority languages were as likely to be rated as native speakers of these language as Italian, French and German MSs. The same result was obtained by Lloyd-Smith et al. (2020) for majority German of Italian HSs, irrespective of HSs' age of onset of German or current use of Italian.

An experiment by Lee-Ellis (2012) showed that Korean HSs speaking majority English perceived an English contrast in nonce words as accurately as English MSs. The contrast included either two syllables, with the first one ending in a fricative (as in /kasta/), or three open syllables (as in /kasuta/). Korean speakers typically have difficulty detecting this contrast in English due to its absence in Korean because a fricative consonant is not allowed in the syllable-final position. However, Korean HSs perceived this contrast on a par with English MSs due to a significant amount of English input.

In the domains of *morphosyntax* and *syntax*, Kupisch et al. (2017) demonstrated that Turkish HSs perceived definiteness distinctions in majority German similarly to German MSs in an acceptability judgement task. Both MSs and HSs, regardless of HSs' age of acquisition of German, rejected definite forms in affirmative and negative existentials. This result speaks against cross-linguistic influence from Turkish, where definite forms are accepted in negative existentials, both by Turkish HSs and MSs.

In *discourse*, Labrenz (2023) showed that Greek, Russian and Turkish HSs speaking majority German use a polyfunctional lexical item *also* ("so/well") in very similar ways compared to German MSs in elicited narratives in four registers. Both HSs and MSs rarely used *also* as a consecutive adverbial connector. Both groups frequently used *also* for evaluations in informal communicative situations, for elaborations in formal situations and for repairs in the spoken mode. This is the only study that systematically compared majority language registers as produced by HSs and MSs, and it found no evidence of difference between the two groups.

2.2 Differences between HSs and MSs

On the other hand, a considerable number of majority language studies displays some differences between the majority language as produced or comprehended by HSs and by MSs. Note that most of these studies (but not all) are experiments that target a specific phenomenon in the majority language. In our view, this could be a contributing factor to why it was possible to discover the differences, especially given the fact that at least three studies that report the differences also note that HSs were indistinguishable from MSs in a regular conversation or spoke Swedish without noticeable deviations (Bylund et al., 2012, 2021; Paradis, 2019).

2.2.1 Phonetics and Phonology

With regard to *phonetics and phonology*, Chang's (2016) perception study found that Korean HSs perceived unreleased final stops more accurately in majority English than

English MSs using co-articulatory cues from the preceding vowel. The author argued that this was due to cross-linguistic influence from Korean, where all final stops are obligatorily unreleased, so HSs have more experience in distinguishing final stops by the cues from the preceding vowel than English MSs.

Another perception experiment was conducted by Bylund et al. (2021) with Spanish HSs in a majority Swedish context. The results indicated that Spanish HSs who acquired majority Swedish from birth did not differ in the perception of /b/ and /p/ from Swedish MSs. However, a difference was discovered between Swedish MSs and Spanish HSs with Swedish age of acquisition of 3-8 years old: these HSs placed the boundary between the two consonants at lower Voice Onset Time (VOT) values than Swedish MSs. This corresponds to the boundary in Spanish, which is located at low, usually negative VOT values. This result suggests that age of acquisition of the majority language sometimes plays a considerable role even in HSs' adulthood. Judging by the direction of difference between Swedish MSs and Spanish HSs who are sequential bilinguals, we believe that older age of acquisition of the majority language leads to some degree of to cross-linguistic influence from the heritage language.

In production, as opposed to perception, a recent study reported that Albanian HSs who speak majority Greek tended to produce Greek vowels with shorter durations and lower formant (F1, F2 or F3) values (Georgiou & Giannakou, 2024). Some, but not all of these differences can be attributed to the cross-linguistic influence from heritage Albanian, where vowels have similar characteristics to those produced in majority Greek by Albanian HSs. The differences that cannot be traced back to Albanian were suggested to stem from differential Greek input from HSs' parents and relatives, who are late L2 speakers of Greek. An alternative reason put forward by the authors might be a language-internal potential for language change.

Additionally, Polinsky (2018, pp. 142-144) demonstrated that HSs articulate more explicitly in their majority language than MSs. She showed that HSs of Russian, Korean, Spanish, and Cantonese released final stops more frequently in their majority English than English MSs, irrespective of the heritage language background. The author attributed this finding to HSs' "more general tendency to enunciate" (Polinsky, 2018, p. 144), which they develop in frequent communication with L2 English speakers, who might benefit from clear boundaries and absence of omitted or contracted material. Note that this explanation does not imply that L2 English speakers avoid omitted/contracted forms themselves, thus providing differential input to HSs, even though this is not excluded.

Considering prosodic aspects, at least three studies have claimed cross-linguistic influence of the heritage language on the majority language. A narrative elicitation study by Queen (2012) reported that Turkish HSs speaking majority German produced a specific type of prosodic contour – a high rising terminal. It is not typical for German MSs but is quite widespread in narratives by Turkish MSs who speak German as late L2. Despite this difference to German MSs, Turkish HSs also extensively used another contour – a rising terminal, which is very common for German MSs. Rising terminals had the same acoustic characteristics in Turkish HSs' and German MSs' productions. The author concluded that Turkish HSs combined elements of intonational grammars of their heritage and majority languages and created a distinct intonation system in their majority language. However, these results should be taken with caution since the German MS group contained only two speakers.

Similarly, an experimental study by van Rijswijk et al. (2017) provided evidence for cross-linguistic influence of heritage Turkish on majority Dutch: Turkish HSs used the same pitch level throughout broad-focus sentences, unlike Dutch MSs who exhibited declination (pitch lowering) as the sentence progressed. This finding was attributed to early childhood transfer from Turkish, which has a limited peak range in the prenuclear area and allows declination only in the (post-)nuclear area. The post-nuclear area is not distinguished from

other areas in Dutch and, hence, Turkish HSs do not encounter the expected cue to lower the pitch. It was hypothesized that HSs introduced the prosodic characteristics from Turkish into Dutch in early childhood when they were dominant in the heritage language, thus creating a new variety of Dutch with novel prosodic features.

The third prosodic study of the majority language examined filler particles produced by German and Russian HSs in majority English narratives as compared to English MSs (Böttcher & Zellers, 2023). While the results indicated several similarities between HSs and MSs (in frequency of filler particles, their duration and segmental form), there was a difference in the pitch levels of filler particles. Russian HSs produced significantly larger slopes in rising intonation contours than German HSs and English MSs. The authors hypothesize that this difference might be due to cross-linguistic influence from heritage Russian.

2.2.2 Semantics

In the area of *semantics*, two studies demonstrated differences between HSs and MSs in scope interpretation in the majority language. Lee et al. (2011) examined sentences with a negation and a quantifier *all* (e.g., *Mary didn't read all the books*), which are ambiguous due to two possible scope interpretations. In the surface scope interpretation, the negation takes scope over the quantifier, resulting in the reading *Mary read some of the books (but not all).* In the inverse scope interpretation, the quantifier takes scope over negation, so the resulting reading is *Mary did not read any of the books*. English MSs prefer the surface scope interpretation, while Korean MSs prefer the inverse scope interpretation. In their truth-value judgement task, Lee and colleagues found that Korean HSs display strong preference for the inverse scope reading in majority English (with the quantifier taking scope over the negation) due to cross-linguistic influence from heritage Korean.

A similar result was obtained by Scontras et al. (2017), who investigated a different instance of ambiguous scope assignment in majority English spoken by Mandarin HSs. The

experimental materials contained sentences with double quantifiers, such as *A shark attacked every pirate*. In English, such sentences are ambiguous between a surface scope reading (*There was a single shark that attacked each pirate*) and an inverse scope reading (*For each pirate, there was a different shark that attacked him*). Despite a possibility of the inverse reading, English speakers show a robust preference for the surface reading. In contrast, Mandarin does not allow inverse scope readings altogether, and thus such sentences unambiguously have only a surface scope. Results of Scontras et al. (2017) indicate that Mandarin HSs strongly resist inverse scope in majority English, unlike English MSs, who rate inverse interpretations significantly higher than HSs. The authors do not attribute this finding to cross-linguistic influence from Mandarin, but rather to a unification of the scope-calculation system. They suggest that bilinguals prefer less ambiguous grammars for scope: if one of their languages allows multiple options and the other language allows only one (such as two scope interpretations in English and one in Mandarin), bilinguals are likely to converge on a system with the least options in both of their languages (in this case, the system with only the surface scope).

2.2.3 Reference

In the domain of *reference*, several studies have found dissimilarities in the majority language of HSs as compared to MSs. In a narrative elicitation study, Azar et al. (2020) found that Turkish HSs produce a similar proportion of nouns for referent maintenance and reintroduction in majority Dutch compared to Dutch MSs. At the same time, Turkish HSs produced more pronouns and fewer null forms for referent maintenance in majority Dutch compared to Dutch MSs, which can be seen as greater explicitness of HSs than MSs in the majority language. This result cannot be attributed to cross-linguistic influence from heritage Turkish, since Turkish, being a pro-drop language, has more null forms than Dutch, and not fewer. The authors explain the explicitness effect by potential differences in Dutch input to Turkish HSs and Dutch MSs: HSs may communicate more frequently with L2 speakers of

Dutch (e.g., their parents and other family members) than Dutch MSs do. The L2 speakers might be more explicit in their referential choices, opting for fewer null forms and more pronouns than Dutch MSs. Thus, Turkish HSs receive more explicit input than Dutch MSs, which is reflected in their referential choices.

In contrast, Contemori and colleagues (Contemori et al., 2023; Contemori & Ivanova, 2021) reported an opposite pattern – that Spanish HSs often produce pronouns for referent tracking in majority English in reintroduction and maintenance contexts, in which English MSs tend to produce full NPs. This points to HSs' lower explicitness compared to English MSs. The authors attributed this result to cross-linguistic influence from the heritage language, since pronouns would have been appropriate in these contexts in Spanish (see Contemori et al., 2023 for maintenance and Contemori & Ivanova, 2021 for reintroduction). This account seems reasonable for referent reintroduction, since overt pronouns signal a topic shift in Spanish (a pro-drop language), so HSs might have transferred this strategy to English. However, cross-linguistic influence appears less applicable in referent maintenance: while the authors point out that Spanish does allow pronouns in maintenance contexts (Contemori et al., 2023, p. 17), they occur more rarely in Spanish than in English (see Contemori & Di Domenico, 2021 for Spanish and Arnold & Griffin, 2007 for English). Consequently, it is not immediately clear how cross-linguistic influence from Spanish would lead to more pronouns in maintenance contexts in English. An alternative explanation put forward in Contemori and Ivanova (2021) is that Spanish HSs have had less exposure to English than English MSs.

2.2.4 Morphosyntax and Syntax

In *morphosyntax and syntax*, several studies documented multiple differences between HSs and MSs in the majority language. An experiment by Felser and Arslan (2019) showed that Turkish HSs speaking majority German use unexpected articles in definite and indefinite contexts significantly more frequently than German MSs. The difference was especially large in the production of definite articles in indefinite contexts. The authors argued that Turkish

HSs might see definite forms in Turkish as a default due to the weakening of uniqueness or familiarity constraints. The weakening of the constraints might have spread into the majority language as well, leading to an unexpectedly frequent use of definite forms in German. An alternative reason might be that Turkish HSs have not fully acquired definiteness constraints in German due to their "inherent difficulty for learners of German as a second or additional languages" (Felser & Arslan, 2019, p. 38).

Article use in the majority language was also explored by Montrul and Ionin (2010). Their first experiment tested general conditions of article use in discourse in majority English and heritage Spanish – the use of a definite article on the second mention of a referent and the impossibility of bare singular countable nouns. Despite English and Spanish having the same discourse-syntactic distribution of articles in these conditions, Spanish HSs accepted unexpected articles more frequently than English MSs. This is quite surprising, given that there was no evidence of difference between Spanish HSs and English MSs in further experiments that tested the conditions of article use that actually differ in Spanish and English – the use of articles in generic vs. specific contexts and for alienable for inalienable possession. The authors did not extensively comment on this result, mentioning only the high variability in the HS group in the first experiment.

Subject-verb agreement in majority English of HSs with various heritage languages was investigated in an experiment reported by Paradis (2019). She tested the agreement attraction effect, where the verb agrees not with the subject NP head but with another noun that is linearly closer to the verb than the head (e.g., **The problems with the computer was fixed by a technician*). The results indicated that all HSs taken together were less likely to detect such agreement errors and had longer reaction times than English MSs. Additionally, HSs with isolating heritage languages showed lower accuracy than HSs with inflecting heritage languages. The author suggested that these findings are due to the L2 status of English and to cross-linguistic influence of heritage languages.

Lee-Ellis (2012, pp. 128-162) explored locative alternation of verbs in majority English of Korean HSs. Locative verbs can be used in two types of structures: Ground frame and Figure frame. The Ground frame follows the pattern V – DO (location object) – PP (moving object), for instance, *pile the table (location object) with books (moving object).* The Figure frame follows the pattern V – DO (moving object) – PP (location object), for example, *pile the books (moving object) on the table (location object).* Lee-Ellis singled out four types of verbs: (1) Ground-only in English, but both Ground and Figure in Korean, (2) both Ground and Figure in English, but Figure-only in Korean, (3) Figure-only in English and Korean, and (4) both Ground and Figure in English and Korean. In the acceptability judgement task in majority English, Korean HSs over-accepted the verbs of Type 1 in Figure frames compared to English MSs. There was no evidence of difference between HSs and MSs in the other three verb types. The author concluded that Korean HSs might face "a learnability problem" due to a lack of exposure to English before age four. This means that it may be easier for HSs to accept a structure that exists in the majority language but does not exist in the heritage language since it involves learning based on positive evidence. On the other hand, it is harder to reject a structure in the majority language that is allowed in the heritage language, since it requires learning based on negative evidence. We would like to note that this reasoning seems to be in contrast with the account of the unification of the scope-calculation system suggested by Scontras et al. (2017) – in this account, it is hypothesized that bilinguals are likely to converge on a system that contains the least options in both of their languages. In the case of scope interpretation, this system included only the surface scope in both English and Mandarin. However, if this logic applied to the Figure vs. Ground frame verbs, we would expect convergence on the Ground frame for Type 1 verbs for English and Korean, since this option is shared in both the two languages. However, we observed an opposite result – an over-acceptance of the option that is present only in one language (the Figure frame in Korean).

A variety of morphosyntactic and other phenomena in majority Swedish of Spanish HSs was explored in a series of tests conducted by Bylund et al. (2012). The tests focused on subject-verb inversion, reflexive possessive pronouns, placement of sentence adverbs in relative clauses and gender agreement (a grammaticality judgement task), as well as grammatical, lexical, contextual, and pragmatic knowledge (a cloze test). Spanish HSs scored significantly lower on these tests than Swedish MSs; however, this effect was modulated by HSs' language aptitude: HSs with higher aptitude were closer to MSs than the ones with lower aptitude. These results point to an important role of language aptitude in ultimate attainment in the majority language, a factor that is rarely addressed in majority language research.

The same population of Spanish HSs with majority Swedish was studied again by Bylund et al. (2021), now focusing on the age of acquisition of Swedish. The authors explored the same phenomena as in Bylund (2012) and showed that Spanish HSs who were simultaneous bilinguals did not significantly differ from Swedish MSs, while Spanish HSs who were sequential bilinguals scored lower on the grammaticality judgement task than Swedish MSs. The same pattern was observed in the response latencies in the grammaticality judgement task and in the accuracy of the cloze test. These results imply that HSs' age of acquisition of the majority language influences their perception and use of various linguistic structures.

In the domain of syntax, van Lieburg et al. (2023) examined the production of passives in majority Dutch by Arab/Berber and Turkish HSs compared to Dutch MSs. The authors conducted a pre-experimental picture description task, where both active and passive sentences were allowed, and a syntactic priming experiment, where only passive responses were accepted. In the picture-description task, Turkish and Arab/Berber HSs did not statistically differ from Dutch MSs in their production preferences: all groups were most likely to produce an active sentence, followed by the passive with the by-phrase in the final

position and followed by an agentless passive without a by-phrase. In the priming experiment, all three speaker groups showed similar priming effects suggesting that HSs and MSs have similar syntactic representations of passive constructions. However, two differences were discovered in the production preferences during the priming experiment. First, Arabic/Berber HSs produced significantly more agentless passives than Dutch MSs, thus exhibiting cross-linguistic influence from the heritage language, since both Arabic and Berber allow only agentless passives. Second, Turkish HSs produced significantly fewer passives with a by-phrase in the sentence-medial position than Dutch MSs, which is a particularly interesting result since it constitutes a case of cross-linguistic overcorrection. Passives with a medial by-phrase are frequent in Turkish but rare in Dutch, so it appears that Turkish HSs avoided the option that is prominent in their heritage language when speaking their majority language to the extent that this option was even less frequent in HSs' productions than in those of MSs. To our knowledge, van Lieburg et al. (2023) is the first study that documents cross-linguistic overcorrection in the majority language – previously it has only been demonstrated in heritage languages (Anderssen et al., 2018; Kupisch, 2014).

2.2.5 Formulaic Language

Finally, in the use of *formulaic language*, Bylund et al. (2021) provided evidence that HSs might use pre-fabricated linguistic chunks less accurately than MSs, irrespective of HSs' age of acquisition of the majority language. It was found that Spanish HSs speaking majority Swedish scored lower on the idiom and proverb completion tests than Swedish MSs, including the HSs who were simultaneous bilinguals. This result is particularly noteworthy because the use of formulaic language is the only area where a difference was discovered between Swedish MSs and Spanish HSs who were simultaneous bilinguals. The researchers concluded that the tests of formulaic language tap into the effects of bilingualism per se, as opposed to the effects of age of acquisition. However, the authors did not elaborate why it was the formulaic language that brought out differences between simultaneous bilingual HSs

and MSs – our assumption is that the tested idioms and proverbs have rather low frequency (as opposed to other collocations), so they can be acquired with the maximal amount of input, which is received only by MSs since their input is not split between two languages.

2.2.6 Summary of Differences between HSs and MSs

Summing up, differences between HSs and MSs in the majority language have been observed in multiple language areas, including phonetics and phonology (perception and production of individual sounds and prosody), semantics (scope interpretation), reference (form of referring expressions), morphosyntax (use of definite and indefinite articles, subject-verb agreement, use of reflexive possessive pronouns, gender agreement), syntax (placement of sentence adverbs in relative clauses, production of passives), combination of grammatical, lexical, contextual, and pragmatic knowledge (as probed in a cloze test), and formulaic language (production of idioms and proverbs). Based on these findings, we can conclude that the majority language of HSs is often dissimilar to the language of MSs, despite HSs' dominance in this language. What remains unclear is the exact scope of the differences: Do the observed differences apply to all HSs or only to the tested groups of HSs? Are there any other differences that have not been documented yet?

As to the reasons for the observed differences, the most commonly cited one is cross-linguistic influence of the heritage language on the majority language – nine out of 18 reviewed studies mention it either as the single cause of the differences or as one of several possible causes. A great number of other reasons are named sporadically, in one or two studies: age of acquisition of the majority language, less exposure to the majority language, difficulty of certain structures for L2 learners, weakening of certain majority language constraints due to weakened heritage language constraints, cross-linguistic overcorrection, communication with L2 speakers or input received from L2 speakers, simplification of language systems that include multiple options, internal dynamics of language change, language aptitude, and speaker bilingualism. This suggests that while cross-linguistic

influence is the most commonly cited cause of differences between the majority language as used by HSs and by MSs, other sources of variability are also possible and need further investigation since they have not been systematically analyzed yet.

2.3 Identifying the gaps

Summing up our review of the existing majority language studies, we can say that most of these studies outline various differences between HSs and MSs speaking the majority language. However, several studies provide no evidence of differences between HSs and MSs. The varied outcomes may stem from differences in linguistic areas and languages analyzed, different methods applied, and different participants tested. Our work reduces this variation to different linguistic areas only, while keeping the language pairs (majority English in contact with heritage German, Greek, Russian, and Turkish), the method (analysis of elicited narratives), and the participants constant. This approach will help us understand whether a more consistent pattern of difference/similarity between HSs and MSs exists in the majority language.

The vast majority of the reviewed studies are experimental (19 out of 23), and only four studies use more ecologically-valid elicited narratives as their empirical basis (Azar et al., 2020; Böttcher & Zellers, 2023; Labrenz, 2023; Queen, 2012)[1]. This points to a lack of research on the majority language in more naturalistic set ups that more accurately represent HSs' everyday language use. This is especially relevant for language education policy, since the practical goal of educators is to facilitate HSs' seamless everyday communication in the majority language in a variety of contexts, rather than to ensure that HSs reach the same experimental performance levels as MSs.

[1] Note that there are several studies on the language of heritage speakers that are based on sociolinguistic interviews which are one of the most naturalistic types of data (Hoffman & Walker, 2010; Marr, 2011; Nagy et al., 2014, 2020). These studies focus on Canadian English as spoken by various ethnic groups in Toronto. Despite the ecological validity of the data, we decided not to include these studies in the overview here since the speakers featured in the sociolinguistic interviews are both bilingual (in a heritage language and majority English) and monolingual (in English) and thus are qualitatively different to the HS samples in this overview.

Related to everyday communication, none of the studies (except for Labrenz, 2023) have considered the role or register in the majority language. Registers, being an integral part of everyday language use, profoundly influence speakers' linguistic choices in systematic ways, with some linguistic features being more common in some registers as opposed to others (Biber et al., 2020; Goulart et al., 2020). Despite this, the reviewed narrative studies (Azar et al., 2020; Queen, 2012) did not specify the register of the elicited narratives, which means that speakers could assume any register within the spoken mode that they deemed appropriate, thus introducing a potential source of variation that is not accounted for. Given the substantial role of register in language in general use and its confirmed impact on the heritage language (e.g., Alexiadou et al., 2022; Tsehaye, 2023), it is intriguing to examine its role in the majority language. Moreover, some of the causes of differences between HSs and MSs might be modulated by register. For instance, frequent communication with L2 speakers or input by L2 speakers could play a larger role in informal registers since HSs' communication with L2 speakers occurs mostly in familiar settings within family or local community.

Finally, only a handful of the reviewed studies examined more than one HS group (Böttcher & Zellers, 2023; Labrenz, 2023; Paradis, 2019; Polinsky, 2018; van Lieburg et al., 2023). While examining HSs with one heritage language background is an understandable and most feasible starting point for majority language research, it is crucial to compare the majority language of several HS groups using the same method and the same language phenomenon to understand if the effects found in one group are generalizable to other HS groups.

2.4 Present Study

In order to fill the outlined gaps in the literature, we conducted a series of four studies examining majority English of German, Greek, Russian and Turkish HSs in the US. These speakers were compared with English MSs who grew up in monolingual English households,

were not exposed to foreign languages before age 6, and did not actively use any foreign languages at the time of our study. We used semi-spontaneous elicited narratives, which reflected speakers' everyday language use more accurately than strict experimental set ups, while keeping the content of the productions comparable across speakers.

The narratives were elicited in four registers that were contrasted in terms of formality and mode. Formality was operationalized as spoken or written communication with public institutions, and informality as spoken or written communication with friends and family. Mode contrasted unscripted spoken narratives and written narratives. Combining these two parameters, we arrived at four registers – an oral witness report to the police (formal spoken), a written report to the police (formal written), a voice message to a friend (informal spoken), and a text message to a friend (informal written). This manipulation allowed us to explore register variation in the majority language, while also keeping the situational characteristics of the productions similar across speakers and thus avoiding potential hidden sources of variation[2]. Lastly, two of the four studies presented in this dissertation individually compare German, Greek, Russian and Turkish HSs to English MSs, aiming to see if there are significant differences between the HS groups with respect to the selected language phenomena.

As mentioned in Chapter 1, the four studies in this dissertation are united by the three overarching research questions, for which we now lay out the following hypotheses:

RQ1. What differences and similarities can we observe in the use of majority English by HSs and MSs in an ecologically valid setup of elicited narratives?

H1. Based on the previous research that used elicited narratives and reported similarities between HSs and MSs (Azar et al., 2020; Böttcher & Zellers, 2023; Labrenz, 2023; Queen, 2012), we expect to find a substantial number of similarities between the two

[2] Note that even within one register there still exists a certain amount of linguistic variation, which is unavoidable (Biber et al., 2020).

groups. However, since several differences were also pointed out in these studies (in null forms by Azar et al., 2020, and in intonation by Böttcher & Zellers, 2023 and Queen, 2012), we also expect to find some differences between the two groups.

RQ2. What differences and similarities can we find in the way HSs and MSs differentiate registers?

H2. Based on the only previous study that systematically compared registers in the majority language produced by HSs and MSs and found no evidence of difference between the groups (Labrenz, 2023), we expect our HSs and MSs to differentiate registers in a similar way.

RQ3. Do different HS groups perform similarly or differently regarding selected structures in elicited narratives?

H3. Since several previous studies that compared at least two groups of HSs to MSs discovered differences between HS groups (Böttcher & Zellers, 2023; Paradis, 2019; van Lieburg et al., 2023), we also expect HS groups to perform differently regarding selected structures.

To answer the research questions outlined above, we identified three linguistic phenomena expected to display variation in narratives produced by HSs and MSs. These included forms of referring expressions (1a and 1b), types of finite clauses (2a and 2b) and left dislocations (3).

(1) a. Basic forms of referring expressions:

- Noun-headed NP – *the driver who stopped the car, the driver*
- Pronoun – *he, someone*
- Null anaphor – *the driver stopped the car and Ø called the police*

b. Modification of referring expressions:

- Modified referring expression – *the young man with the soccer ball, a family walking across the walkway*

- Non-modified referring expression – *the man, a family*

(2) a. Types of finite clauses in general:

- Independent main clauses (IMCs) – *[I was walking down the street.]*$_{\text{IMC}}$ *[I saw a couple.]*$_{\text{IMC}}$

- Coordinate main clauses (CMCs) – *[I was walking down the street,]*$_{\text{IMC}}$ *[and I saw a couple.]*$_{\text{CMC}}$

- Subordinate clauses (SCs) – *[While I was walking down the street,]*$_{\text{SC}}$ *[I saw a couple.]*$_{\text{IMC}}$

b. Types of finite subordinate clauses:

Adverbial clauses – *I witnessed a car crash [as I was walking along the parking lot]*$_{\text{adverbial}}$

Complement clauses – *I don't know [how the accident happened.]*$_{\text{complement}}$

Relative clauses – *I saw two cars [that were turning into the parking lot.]*$_{\text{relative}}$

(3) Left dislocation:

[The two drivers, they]$_{\text{left dislocation}}$ *were turning into the parking lot.*

We hypothesized that these structures are likely to exhibit variation in bilingual speakers due to their location at the interface of a core language area (syntax/semantics) and a non-core language area (information structure/discourse). This is based on the Interface Hypothesis (Sorace, 2011; Tsimpli, 2014), which predicts that phenomena at the interface are particularly open to dynamicity in bilinguals since they impose a greater cognitive demand than structures involving only one area of language. More specifically, the choice of referring expressions requires the combination of core lexicosemantic knowledge with the calculation of the referent's status in discourse, which involves consideration of many contextual factors including the clausal information structure. The use of clause types in various registers calls for combining core syntactic knowledge (e.g., word order) with register/discourse knowledge,

that is, how typical this clause type is for the produced register (see the register discussion below). A similar logic applies to the production of left dislocations – to use left dislocations felicitously in appropriate text types, the speaker needs core syntactic knowledge of the left dislocation structure combined with knowledge of the clausal information structure and with register awareness.

In addition, the three selected language phenomena exhibit register variation (i.e., different frequencies in different registers), thus lending themselves to a register analysis. Concerning the types of referring expressions, register research has shown that noun-headed NPs are used more frequently in academic writing than in conversation, while pronouns are used more frequently in conversation than in academic writing (Biber et al., 2021, p. 239). Modified NPs are more frequent in written registers than spoken ones (Biber et al., 2024) and in formal writing than in informal (Brato, 2020; Schilk & Schaub, 2016).

As to the finite clause types, coordinate main clauses are more typical for spontaneous speech than for writing (Miller & Fernandez-Vest, 2006, p. 13), and for informal communication between familiar speakers compared to formal communication between strangers in the public sphere (Koch & Oesterreicher, 2012). Subordinate clause types exhibit register variation as well – adverbial and complement clauses are more common in conversation than in academic writing, while wh-relative clauses are more frequent in academic writing than in conversation (Biber & Gray, 2016, pp. 87–100). Finally, left dislocation has been reported to occur more frequently in conversations than in spontaneous/prepared speeches or in any type of writing (Geluykens, 1992).

The three selected language phenomena were investigated in the elicited narratives produced by German, Greek, Russian, and Turkish HSs as well as English MSs. The following chapter provides a detailed description of our participant pool and the methodology employed for data collection.

Chapter 3. Methodology

The studies presented in this dissertation are based on the data from the English subcorpus of the RUEG corpus (Wiese et al., 2021). The subcorpus contains the English data of 223 HSs who speak English as their majority language and 64 English MSs. All participants were raised in the USA and permanently resided there at the time of the data collection. The HS group comprises 34 German, 65 Greek, 65 Russian, and 59 Turkish HSs. The vast majority of HSs (91%) had the first contact with English at the age of 5 or earlier, including 46% of HSs who were exposed to English from birth. All speakers in the English subcorpus, bilingual and monolingual, comprise two age groups, adolescents (13-18 years old) and adults (20-37 years old; see Table 1).

Overall, the HS groups had comparable (but not identical) socioeconomic status to English MSs, as evaluated by the level of maternal education, one of the most important contributors to child development outcomes (Pace et al., 2017). As can be seen in Figure 1, German and Russian HSs had a higher proportion of mothers with a degree beyond high school (80% and 89% respectively) than English MSs (67%), while Greek and Turkish HSs had a lower proportion of mothers with this education level (61% and 43% respectively).

All speakers were interviewed in large cities in the United States, or in their surrounding areas. The locations of data collection included New York City; Washington, D.C.; Chicago, Illinois; Boston, Massachusetts; Madison, Wisconsin; St. Paul and Minneapolis, Minnesota; Long Island, New York; Fort Lee and Bloomfield, New Jersey; and New Haven, Connecticut.

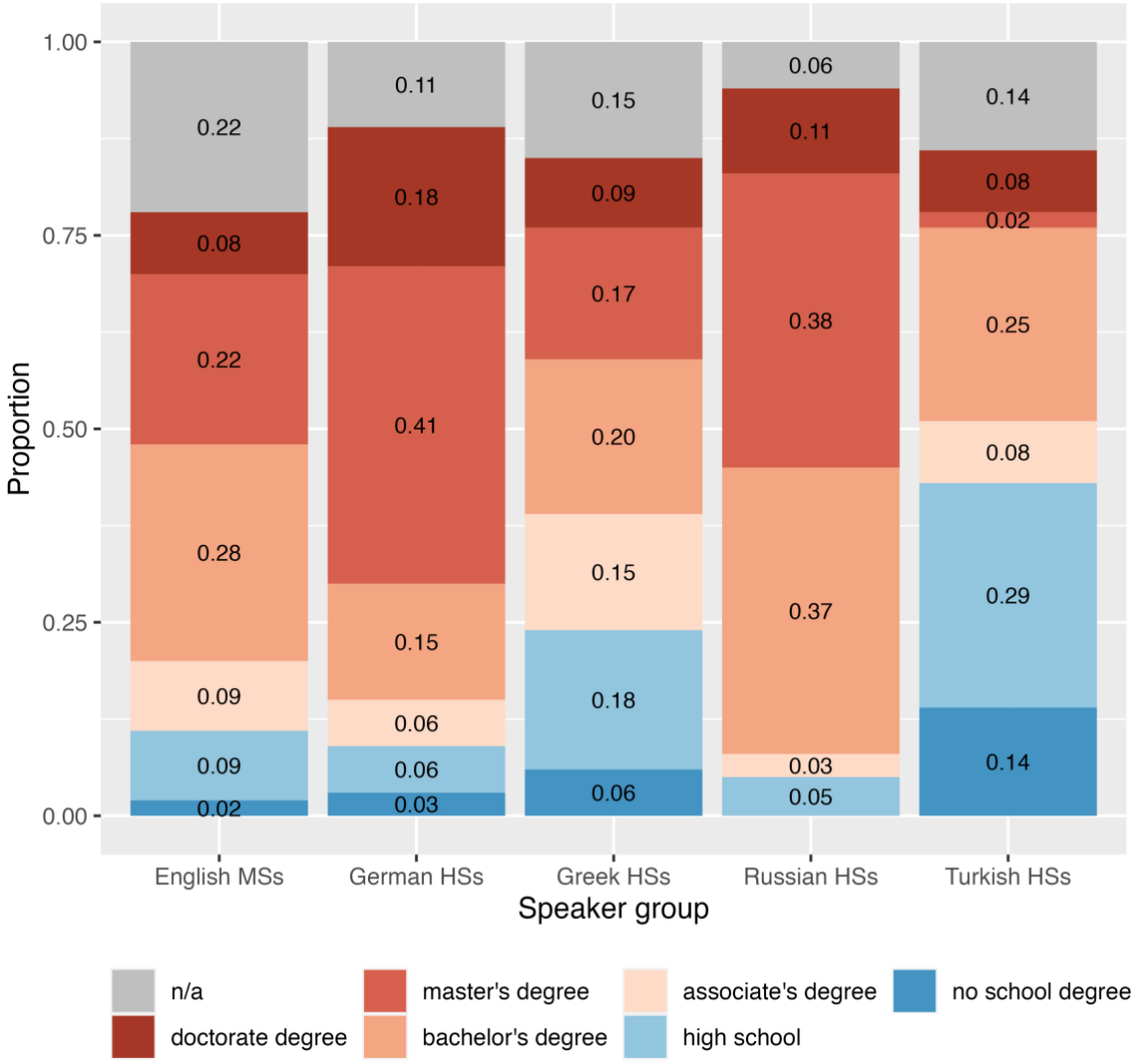
Table 1

Characteristics of Speakers from the English Subcorpus of the RUEG Corpus

	Adolescents			Adults		
Group	N (Male)	Age Mean (sd)	Eng. AoO Mean (sd)	N (Male)	Age Mean (sd)	Eng. AoO Mean (sd)
English MSs	32 (13)	16.1 (1.4)	-	32 (13)	28.5 (3.9)	-
German HSs	27 (15)	15.5 (1.5)	0.3 (0.7)	7 (2)	25.3 (4.1)	0.9 (1.5)
Greek HSs	33 (16)	16.3 (1.4)	1.1 (1.8)	32 (13)	29.1 (3.4)	1.0 (1.8)
Russian HSs	32 (13)	15.8 (1.4)	2.5 (2.0)	33 (11)	27.5 (3.3)	3.7 (2.0)
Turkish HSs	32 (10)	16.0 (1.6)	2.6 (2.1)	27 (9)	26.2 (4.1)	2.2 (2.2)
Total	156 (67)	15.9 (1.5)	-	131 (48)	27.7 (3.8)	-

Figure 1

Maternal Education of Speakers from the English Subcorpus of the RUEG Corpus



The data were collected with the help of the Language Situations methodology (Wiese, 2020), which allows eliciting comparable semi-naturalistic productions in various communicative situations. Participants were shown a short non-verbal video of a minor car accident and were asked to recount what they saw. The elicitation procedure was split into two formality settings, with each formality having its own section within the elicitation and its own elicitor. In the formal setting, the participants were interviewed by an elicitor who behaved formally and was dressed in formal business clothes. The elicitation took place in an office-like room. In the informal setting, the elicitor wore casual clothes and interviewed the participant in a less official room, offering snacks and drinks. Prior to the informal data elicitation, the elicitor and the participant engaged in 10-15 minutes of small talk to create an

easy-going and friendly atmosphere. The participant watched the video three times in total, twice in the first setting (formal or informal, whichever came first), once in the second setting, and recounted the car accident in spoken and written modes. The order of settings (formal and informal) and modes (spoken and written) was balanced among participants.

In the formal setting, participants were asked to leave a voice message to a fictional police hotline devoted to collecting witness testimonials (spoken mode) and to type a written witness report to the police (written mode). In the informal setting, participants were asked to record a WhatsApp voice message to a friend describing the accident (spoken mode) and to type a WhatsApp text message to a friend (written mode). Overall, each participant produced four narratives in four registers during one elicitation session. English MSs completed all the tasks during one session. HSs took part in two sessions, one in English, their majority language, and one in their heritage language. The two language sessions were conducted with a 3-to-5-day interval between sessions, and their order was counterbalanced among HSs. After completing the narrative tasks, all participants filled out a questionnaire that included various questions about their language background and a self-assessment of their language skills. The self-assessments demonstrated that HSs and English MSs rated their English skills comparably high. Moreover, HSs assessed their skills higher in their majority English than in their heritage language (Table 2).

The spoken data were transcribed in Praat (Boersma & Weenink, 2023) or EXMARaLDA (Schmidt & Wörner, 2014). Subsequently, spoken and written data were annotated in EXMARaLDA for the linguistic phenomena of interest. The annotated data were accessed through the corpus tool ANNIS (Krause & Zeldes, 2014).

To evaluate speakers' fluency and proficiency in English, we calculated their speech rate and lexical diversity (see Azar et al., 2020 and Nagy & Brook, 2020 for the connection between speech rate and proficiency in HSs; Kyle et al., 2023 for the association of lexical diversity and proficiency scores in L2 speakers). Speech rate (syllables/second) was

calculated with the help of a Praat script (de Jong et al., 2021) based on all spoken narratives in the English subcorpus. A linear regression analysis showed no difference in speech rate between the speaker groups in our sample. Lexical diversity was assessed by using two measures – the moving average type-token ratio (MATTR) and measure of textual lexical diversity (MTLD) – with the help of the lexical diversity package in Python (Kyle, 2020). As MATTR and MTLD are recommended for use with texts containing 50 tokens or more (Zenker & Kyle, 2021), we calculated MATTR and MLTD only on narratives with at least 50 tokens – 1065 out of a total 1148. In contrast to the speech rate findings, a linear regression analysis demonstrated a difference between English MSs and Turkish HSs in both lexical diversity measures, with Turkish HSs having lower lexical diversity. The other groups of HSs did not significantly differ from English MSs. Table 3 includes the three proficiency measures for each speaker group (group values and SEs predicted by linear models; for the models and data see our complementary OSF repository)[3]. The four studies in this dissertation examined either the full English subcorpus or subsets of it. The exact data sets are specified in the short summaries and in the complete versions of the studies.

Table 2

Language Skill Self-Ratings of Speakers from the English Subcorpus of the RUEG Corpus

Group	Spoken understanding Mean (sd)	Spoken production Mean (sd)	Written understanding Mean (sd)	Written production Mean (sd)
In majority English				
English MSs	4.92 (0.27)	4.81 (0.47)	4.8 (0.48)	4.77 (0.46)
German HSs	5.00 (0)	5.00 (0)	5.00 (0)	4.97 (0.17)

[3] The OSF repository can be accessed at https://osf.io/bd9x5/.

Greek HSs	4.97 (0.18)	4.95 (0.21)	4.88 (0.33)	4.89 (0.31)
Russian HSs	4.92 (0.32)	4.92 (0.27)	4.91 (0.29)	4.89 (0.36)
Turkish HSs	4.97 (0.18)	4.93 (0.25)	4.92 (0.38)	4.92 (0.34)
In heritage languages				
German HSs	4.47 (0.56)	3.65 (0.85)	3.71 (1.06)	2.88 (1.27)
Greek HSs	4.16 (0.78)	3.72 (1.05)	3.46 (1.2)	3.13 (1.29)
Russian HSs	4.38 (0.75)	3.87 (0.85)	3.25 (1.05)	2.83 (1.22)
Turkish HSs	4.28 (0.83)	3.9 (0.95)	3.37 (1.05)	3.3 (1.16)

Table 3

Speech Rate (syll/sec), MATTR and MTLD of Speakers from the English Subcorpus of the RUEG Corpus (in majority English)

Group	Speech rate	MATTR	MTLD
	Pred. value (SE)	Pred. value (SE)	Pred. value (SE)
English MSs	3.26 (0.052)	0.68 (0.005)	38.84 (0.93)
German HSs	3.34 (0.071)	0.68 (0.006)	40.31 (1.26)
Greek HSs	3.23 (0.051)	0.67 (0.005)	37.85 (0.91)
Russian HSs	3.20 (0.051)	0.67 (0.005)	38.73 (0.92)
Turkish HSs	3.22 (0.054)	0.66 (0.005)	36.07 (0.94)

Chapter 4. The Present Collection

The main goal of this dissertation was to identify similarities and differences in majority English produced by German, Greek, Russian and Turkish HSs and by English MSs in an ecologically-valid set of elicited narratives across registers. This chapter provides short focused summaries of the articles that contributed to this goal, followed by the full versions of the articles[4].

4.1 Article Summaries

Study 1:

Pashkova, T., & Allen, S. E. M. (submitted). Explicitness of referring expressions in heritage speakers' majority English.

Study 1 examined the choice of referring expressions (noun-headed NPs vs. pronouns and pronouns vs. null anaphora) and their modification (modified vs. non-modified full NPs) by German, Greek, Russian, and Turkish HSs compared to English MSs. The speaker sample included 34 German, 65 Greek, 65 Russian, and 59 Turkish HSs, as well as 64 English MSs, both adults and adolescents[5]. The results revealed that in the noun-headed NP vs. pronoun comparison, Russian and Turkish HSs produced more NPs than English MSs in several informal discourse contexts (both Russian and Turkish HSs produced more NPs in informal written reintroduction, and additionally, Turkish HSs produced more NPs in informal written maintenance and informal spoken reintroduction). The same comparison demonstrated that all speaker groups used more noun-headed NPs in the formal written register than in the remaining three registers. The other comparisons – pronouns vs. null anaphora and modified vs. non-modified full NPs – did not show evidence of significant differences between HSs and English MSs, with all speakers using more null anaphora and more modified referring

[4] Please note that the pages in the full versions of the articles are numbered separately from the pages in the frame text.

[5] One analysis in this study, the comparison of pronouns and null anaphora, included a reduced speaker sample – 40 Russian HSs, 42 Turkish HSs and 40 English MSs, due to the need for an additional annotation.

expressions in the formal written register. This study highlights that the use of referring expressions by HSs and MSs in the majority language shows more similarities than differences between the two speaker groups. If the differences do occur, they point to a higher explicitness of some HS groups compared to MSs in informal registers, that is, use of more informative referring expressions. This might be connected to HSs' frequent communication with L2 speakers of the majority language, for instance, their parents or grandparents. These L2 speakers are likely to interact with HSs in informal contexts, and they might benefit from absence of contracted material (Polinsky, 2018, p. 144) or be themselves more explicit in their L2 (Azar et al., 2020).

Study 2:

Pashkova, T., Tsehaye, W., Allen, S.E.M, & Tracy, R. (2022). Syntactic optionality in heritage language use: Effects of register on clause type preferences of German heritage speakers in a majority English context. *Heritage Language Journal 19*(1), 1-41. doi: https://doi.org/10.1163/15507076-12340022

Study 2 investigated the distribution of three finite clause types – independent main, coordinate main and subordinate clauses – by 20 adolescent German HSs and 20 adolescent English MSs. We observed no differences between HSs and MSs in any of the clause types in any register – both speaker groups produced more independent main clauses in written narratives than spoken ones, more coordinate main clauses in informal written narratives than informal spoken ones, and more subordinate clauses in formal written narratives than informal written ones. This demonstrated that the HSs in this sample were similar to the MSs in how they distributed the three clause types across four registers. Based on this result, we can conclude that the German HSs in our sample had access to the same syntactic options as English MSs and had the same register awareness, which associated certain clause types with certain registers.

Study 3:

Tsehaye, W., Pashkova, T., Tracy, R., & Allen, S.E. M. (2021). Deconstructing the native speaker: Further evidence from heritage speakers for why this horse should be dead! *Frontiers in Psychology, 12*, 717352. doi: 10.3389/fpsyg.2021.717352

Study 3 took an in-depth look into the subordinate clauses and their types (adverbial, complement, and relative) produced by a larger sample of 27 adolescent German HSs and 32 adolescent English MSs. The results indicated that German HSs used more subordinate clauses in the formal registers than the informal ones both in the spoken and written mode, while English MSs used more subordinates in the formal register only in the written mode, but not in the spoken one[6]. No differences between HSs and MSs were discovered in the use of subordinate clause types – both groups produced fewer complement clauses in the formal registers than in the informal ones, while making no formality distinction in the use of adverbial and relative clauses (i.e., similar proportions of these two clause types out of all subordinate clauses in the formal and informal registers). These findings suggest that German HSs and English MSs in our sample had similar register awareness concerning the association of complement clauses with informal registers, and the lack of the association between adverbial and relative clauses with formality. At the same time, we observed an important difference – at least one group of HSs differentiated formalities more strictly (by using more subordinate clauses in formal settings in both speech and writing) than English MSs (by using more subordinate clauses in formal settings only in writing). We suggest that this effect might be due to HSs' eagerness to perform well in a language-related experiment since they were

[6] Please note that the results concerning subordinate clauses seem different in Study 2 and Study 3. This discrepancy is due to different sample sizes in the two studies: Study 2 analyzed 20 German HSs and 20 English MSs, while Study 3 included 27 German HSs and 32 English MSs. The result reported in Study 3 was already visible in Study 2; however, the three-way interaction of speaker group, formality and mode that was significant in Study 3, did not reach significance in Study 2. In the discussion, we will take into account the result from Study 3.

well aware that their language competence in both languages was under scrutiny. English MSs, on the other hand, might have not experienced the same pressure.

Study 4:

Pashkova, T., Lee, H., Murphy, M., & Allen, S. E. M. (submitted). Left dislocations across discourse types in monolinguals and bilinguals' English.

Study 4 explored the use of left dislocations, or subject doubling, by German, Greek, Russian, and Turkish HSs and English MSs. The speaker sample consisted of 34 German, 65 Greek, 65 Russian, and 59 Turkish HSs, as well as 64 English MSs, both adults and adolescents. Both HSs and MSs produced left dislocations almost exclusively in the spoken narratives. However, we also observed a significant difference between the groups in the frequency of left dislocations in informal vs. formal registers. Greek and Turkish HSs produced more left dislocations in the informal registers than the formal ones, as expected based on previous literature (Geluykens, 1992). In contrast, English MSs and German and Russian HSs showed no evidence of a formality effect, using similar proportions of left dislocations in formal and informal registers. These findings, while showing an important similarity between HSs and MSs in the use of left dislocations almost exclusively in the spoken mode, align with the results of Study 3, suggesting that some groups of HSs differentiate formalities more strictly than English MSs. Note that German HSs, who differentiated the formalities in the use of subordinate clauses in Study 3, also numerically trended towards differentiating them in the use of left dislocations, but most likely did not reach significance due to a lower number of speakers in this group.

4.2 Complete Articles

Explicitness of referring expressions in heritage speakers' majority English

Tatiana Pashkova, Shanley E. M. Allen

Abstract

Several studies on heritage speakers' (HSs) majority language (ML) indicated that HSs might be more explicit than monolingually-raised speakers (MSs) of this language. A reason for this might be HSs' frequent communication with L2 speakers of the ML (e.g., HSs' parents), which is an under-explored source of influence on the ML. However, explicitness in the ML has not been systematically addressed yet, and studies pointing to HSs' higher explicitness are scarce.

Filling this gap, we conducted two studies analyzing referring expressions produced by German, Greek, Russian, and Turkish HSs in majority English as well as English MSs in formal and informal narratives. Results indicated that Russian and Turkish HSs were more explicit in informal narratives: they used more noun-headed NPs than English MSs (Study 1). This aligns with the reasoning that HSs' explicitness stems from frequent communication with L2 speakers since HSs and L2 speakers usually interact in informal settings. However, we found no evidence of HSs' higher explicitness in the use of pronouns and null anaphora (Study 1) or modified referring expressions (Study 2). Overall, our findings confirm HSs' higher explicitness in some ML areas compared to MSs, although the effect appears limited to certain phenomena and speaker groups.

Keywords: heritage speakers, majority English, explicitness, referring expressions

1. Introduction

Heritage speakers (HSs) are bilinguals who typically speak one language within the family and cultural or religious settings – the heritage language (HL) – and another language that is the language of the larger society in which they live – the majority language (ML) (Montrul, 2016; Montrul & Polinsky, 2021; Pascual Y Cabo & Rothman, 2012). They usually begin acquiring the HL at birth or in early childhood, and begin acquiring the ML sometime between birth and the onset of schooling. They often shift in dominance from the HL to the ML through formal schooling, such that they become dominant in the ML by adulthood.

Although most research on heritage speakers focuses on the heritage language, the use of the ML in this population is also very interesting both theoretically and practically. A substantial amount of research has already investigated various linguistic aspects of the ML in both child and adult HSs (e.g., Bylund et al., 2021 on grammatical, lexical, contextual and pragmatic knowledge; Komeili et al., 2023 on vocabulary, morphosyntax, and narrative microstructure skills; Labrenz, 2023 on discourse pragmatics; Marinis & Chondrogianni, 2010 and Paradis & Jia, 2017 on the lexicon and morphology). Crucially, many of these ML studies show differences between the ML as produced or comprehended by the bilingual HSs as compared to monolingually-raised speakers of the language (MSs). In the current study, we concentrate on one notable trend that has been identified in the ML research – greater explicitness of HSs compared to MSs.

We define explicitness as providing more detailed information on some level of linguistic structure, often by choosing not to omit or contract material. While several studies have documented greater explicitness of HSs or bilinguals in different language aspects (concept lexicalization in narratives, pronunciation and use of null subjects in a non-pro-drop language; detailed below), the number of these studies remains quite low – to date, we have come across four such studies. In addition, none of the previous works has posed a direct

research question about explicitness – the findings relevant to explicitness have resulted from investigation of other topics. To our knowledge, no connection has been drawn so far between these studies – they do not cite each other, and we have not come across a comprehensive overview of the explicitness topic that would bring these studies together. Furthermore, the state of existing research is far from unanimous since there are contradicting findings (also detailed below) that claim lower explicitness of HSs' productions.

This topic definitely merits further investigation since it is theoretically promising for ML research. It allows us to see a different source of influence on ML – the general bilingual experience of HSs – in addition to the widely-explored phenomena of cross-linguistic influence from the HL (e.g., Chang, 2016; Scontras et al., 2017; van Rijswijk et al., 2017) and the lack of exposure to ML in the earliest years of life (e.g., Bylund et al., 2021). At least two previous studies have claimed that greater explicitness of HSs in the ML stems from their experience of communicating with L2 speakers of the ML in their families and communities. This angle of ML examination could be an interesting new avenue in ML research, which, to our knowledge, has not been thoroughly addressed yet.

To fill the outlined gaps in the literature, we conducted two studies with an overarching research question of whether HSs are more explicit than MSs in the use of their ML. To answer this question, we compared the explicitness of referring expressions in elicited narratives by HSs speaking majority English and English MSs. Study 1 concentrated on the type of referring expressions (noun-headed NP, pronoun and null anaphor), while Study 2 analyzed the presence of modifiers in referring expressions. In the following subsections, we first lay out the existing literature on explicitness, and then explain the data elicitation method used for the two studies. Next, we present the theoretical background and results for each of Studies 1 and 2. We conclude with a general discussion of our findings and their implications for our understanding of majority language use by heritage speakers.

Explicitness

In this subsection, we review the few studies that have shown greater explicitness in HSs in particular and in bilinguals more broadly. We start with a study on child bilinguals, and continue to studies on adult HSs.

In child research, greater explicitness by bilinguals has been demonstrated in concept lexicalizations in narratives. Barbosa et al. (2017) tested English-French simultaneous bilinguals aged 7-10 growing up in an English-speaking city in Canada and their age-matched monolingual English and French peers. In a video-based narrative task, bilingual children lexicalized a higher percentage of the concepts that are central to the story compared to their monolingual counterparts. This explicitness trend was present both in English and French: in English, 65.6% of concepts were lexicalized by bilinguals vs. 49.6% by monolinguals; in French – 71.3% vs. 56% respectively. In addition, in French bilinguals used a significantly higher number of word types than monolinguals. The authors note that this result is surprising given that bilingual children commonly score lower than monolingual children on standardized vocabulary tests. They conclude that in a narrative task, where there is no single correct response, bilingual children seem to have compensated for their lexical access difficulties.

What is interesting about this child study is that bilinguals seem not only to compensate for potential language difficulties but also to over-compensate for them, producing narratives that are more detailed and explicit than the ones by MSs. It is not fully clear what drives this over-compensation: it might be true that bilingual children in Barbosa et al. (2017) found a way to compensate for their lexical access difficulties, but it is not immediately clear why they would produce more detailed (i.e., with more central concepts) and lexically richer stories than monolinguals.

In adult HSs, the explicitness tendency has been shown in phonetics and in referring expressions. Polinsky (2018, pp. 142–144) reports an experimental study of released final

stops /p/ and /t/ produced by adult HSs of Russian, Korean, Spanish, and Cantonese in their majority English. These HSs were compared to English MSs. The results indicated that HSs, irrespective of their heritage language background, produced more released stops than their monolingual counterparts (around 80% of released stops for HSs, and around 60% for MSs). The author explains this finding by HSs' "more general tendency to enunciate" (Polinsky, 2018, p. 144), which she suggests they develop in communication with L2 English speakers, who might benefit from clear boundaries and absence of omitted material. Note that Polinsky's explanation does not directly imply that L2 English speakers are more explicit themselves, even though this is not excluded. She further suggests that the tendency for HSs to enunciate the material in a clear manner, or be more explicit in pronunciation, might be boosted by a formal test setting. Finally, Polinsky hypothesizes that other properties in the majority language that are subject to variation may be approached differently by HSs and monolinguals, with HSs choosing a less contracted and clearer option.

In the domain of reference, Azar et al. (2020) demonstrated that adult HSs of Turkish use more overt pronouns in elicited narratives in their majority Dutch compared to Dutch monolinguals. In referent maintenance contexts, HSs used 87% overt pronouns and MSs used 74% in a comparison of overt vs. null pronouns. Assuming potential cross-linguistic influence from Turkish, this finding is quite surprising because Turkish is a pro-drop language (e.g., Uygun, 2022), where pronouns are dispreferred in maintenance contexts. If HSs experienced cross-linguistic influence from the heritage language, they would have used fewer overt pronouns than MSs, not more. The authors attribute the discovered difference between HSs and MSs to the Dutch input that the HSs received from L2 speakers of Dutch, who are present in their families and communities, and who might be more explicit than Dutch L1 speakers. Indeed, a trend towards explicitness of adult later L2 speakers has been shown in several studies. Adult late L2 speakers tend to use noun-headed NPs instead of pronouns, compared to their own L1 (Gullberg, 2006; Hendriks, 2003) and compared to L1 speakers of their L2 (Hendriks, 2003; Yoshioka, 2008). In addition, adult near-native late L2 speakers were reported to exhibit redundant overt pronouns in pro-drop languages, compared to L1speakers (Sorace & Filiaci, 2006).

A similar finding of overt subject use in HSs is reported by Marr (2011): Cantonese HSs in Toronto speaking in their ML English produced significantly fewer instances of null anaphora and, consequently, more overt subject referring expressions than English MSs. In casual interviews, Cantonese HSs had on average 5 null subjects per 10,000 words, while their English MS counterparts had 15 null subjects per 10,000 words (Marr, 2011, p. 15). However, this tendency towards higher explicitness was not evident among Italian HSs, who produced 11 null subjects per 10,000 words, which was not significantly different from English MSs. The author explains the findings by the "non-transfer of the topic-drop configuration" from Cantonese to English (p. 35) and an increased linguistic assimilation of Italians that is linked to their longer immigration history that than of Cantonese speakers (p. 34). It is intriguing, however, that the absence of the topic-drop transfer from heritage Cantonese results in HSs' lower frequency of null subjects in English compared to English MSs, and not in a similar frequency. Irrespective of the status of transfer from Cantonese, we believe that the higher explicitness of HSs is likely to be connected with the language use patterns of the first-generation speakers from the same community, who moved to Canada after the age of 18 and speak L2 English. These L2 speakers also have a significantly lower rate of null subjects compared to English MSs of the same age (6 null subjects per 10,000 words by Cantonese L1 English L2 speakers vs. 11 null subjects by English MSs). Overall, Marr's (2011) results are consistent with the account by Azar et al. (2020) suggesting that HSs' explicitness in the majority language might be linked to the input they receive from L2 speakers in their community.

However, not all previous findings support the greater explicitness trend. Contemori and Ivanova (2021) and Contemori et al. (2023) found that Spanish HSs supplied under-informative referential forms in their majority English compared to English MSs. These studies examined experimental contexts where two characters are present in the discourse and visual scene. Contemori and Ivanova (2021) examined elicited sentences in contexts with characters of different genders, where a pronoun would not be ambiguous, but a noun-headed NP is still preferred due to character competition (Arnold & Griffin, 2007). Half of the elicited target sentences involved a topic shift, and half did not (1):

(1) Context: *A man*$_{TOP}$ *sat at breakfast with a woman. The man*$_{TOP}$ *was quite full.*
Elicited topic shift: *Subsequently, the woman*$_{TOP}$ *cleared away the dishes.*
Elicited absence of topic shift: *Subsequently, the man*$_{TOP}$ *cleared away the dishes*.

Irrespective of topic shift, Spanish HSs with various levels of English proficiency produced more pronouns and fewer noun-headed NPs in the elicited sentences than English MSs.

Contemori et al. (2023) examined elicited narratives based on a series of pictures with two characters of the same gender (e.g., a priest and a homeless man), in which a pronoun could be ambiguous. The authors examined three contexts which we illustrate with a sample narrative: first, the maintenance of the first character, the priest, in the absence of other characters (2); second, the maintenance of the second character, the homeless man, in the presence of the first character in the previous discourse (3); and third, the re-introduction of the first character in the presence of the second character in the previous discourse (4).

(2) One day a priest went to the store. He$_{MAINT}$ bought some bread. On the way home, he saw a homeless man.
(3) The homeless man asked the priest for some bread. Then he$_{MAINT}$ ate it.
(4) The priest$_{RE\text{-}INTRO}$ went back to the store to buy more bread.

The results indicated that Spanish HSs produced more pronouns and fewer noun-headed NPs than English MSs in the maintenance of the second character (3): 80% of references in this context were noun-headed NPs for HSs, compared to 90% noun-headed NPs for MSs. No differences were found in the other two contexts.

In addition, it was observed that Spanish-dominant HSs used more pronouns than English-dominant HSs, and thus were further away from English MSs (Contemori et al. 2023). It is worth noting that English monolinguals were not separately compared to English-dominant and Spanish-dominant HSs, only to all HSs together as one group. However, judging by the raw percentages of NPs in the context of the second character maintenance, English-dominant HSs are actually very close to English monolinguals: English MSs produced 90% NPs in this context, English-dominant HSs produced 87% NPs, and Spanish-dominant HSs produced 73% NPs. This might mean that the overall difference between HSs and monolinguals was driven by Spanish-dominant HSs.

Overall, both studies pointed in the same direction: Spanish HSs were less explicit than English MSs because they used fewer noun-headed NPs than MSs. In topic shift contexts, the authors attribute this to potential cross-linguistic influence from the HL: in Spanish, overt pronouns signal a topic shift, and this assumption could have been carried over to the ML English (Contemori & Ivanova 2021, p. 94). In the referent maintenance contexts featured in Contemori et al. (2023), the authors also suggest that cross-linguistic influence from Spanish could explain the results:

> We interpret the pattern of results in English as potential interference from Spanish, where overt pronouns can be used for topic maintenance (e.g., Contemori & Di Domenico, 2021), representing a more explicit option than null pronouns. Bilingual speakers may assume that overt pronouns are explicit enough in English, when in fact they represent an under-specific option. (Contemori et al. 2023, p. 17)

However, Contemori and Di Domenico (2021) report 6-10% pronoun use in referent maintenance contexts in presence of another character for Mexican Spanish (p. 1015), while Arnold and Griffin (2007) report a value slightly under 20% for pronoun use in the same contexts for English (p. 22). Hence, it is not immediately clear how the cross-linguistic influence from heritage Spanish could lead to an increased pronoun use in referent maintenance in majority English.

To sum up, previous research has shown that adult HSs might be more explicit than MSs in their ML either due to their frequent communication with L2 speakers, who might benefit from extra detail (Polinsky, 2018, p. 144) or due to more frequent input from L2 speakers, who themselves might be more explicit (Azar et al., 2020). An additional reason that has not been demonstrated in adult HSs' ML but has been mentioned in child bilingual research, is over-compensation of language deficits, a phenomenon which can occur more easily in narratives as opposed to strict tests with pre-defined correct answers (Barbosa et al. 2017). For certain phenomena, such as referential form in topic shift contexts, the explicitness effect in the majority language can be modulated by cross-linguistic influence from the HL (Contemori and Ivanova, 2021), which is most likely to occur in HSs dominant in the heritage language (Contemori et al. 2023).

As can be seen from our overview, the number of studies that have documented the greater explicitness of HSs/bilinguals remains quite low, with none of the studies actually posing a research question about explicitness per se. Moreover, some studies report the opposite trend, that is, lower explicitness in HSs compared to MSs. This leads to the necessity of further research, whose theoretical value lies in determining whether certain aspects of ML use could be influenced by the overall bilingual experience of HSs, rather than cross-linguistic influence from their HLs or their comparatively late exposure to the ML.

The two studies reported below aim to address this gap by providing an in-depth investigation of explicitness of referring expressions in the majority English of German, Greek, Russian, and Turkish HSs in the US. Referring expressions are a suitable phenomenon for studying explicitness since speakers have a choice of how much information to provide about the referent. First, speakers choose between the basic types of referring expression – noun-headed NP, pronoun, or null anaphor – which supply different amount of detail about the referent. Second, speakers opt for absence or presence of modification in the referring expression (such as a relative clause or a PP), which also modulates the amount of information about the referent. Furthermore, previous research has already documented dissimilar levels of explicitness in referring expressions produced by HSs in the majority language and MSs: Azar et al. (2020) pointed to higher explicitness, while Contemori and Ivanova (2021) and Contemori et al. (2023) reported lower explicitness. These contradicting findings merit further research on the phenomenon of referential form.

In Study 1, we examined types of referring expressions (noun-headed NPs vs. pronouns and pronouns vs. null anaphora), hypothesizing that HSs would use more explicit referring expressions than English MSs – noun-headed NPs in the noun-headed NP vs. pronoun comparison and pronouns in the pronoun vs. null anaphor comparison. In Study 2, we analyzed modifiers of referring expressions (modifiers present vs. absent), hypothesizing that HSs would produce more modified referring expressions than English MSs. Both studies had the same elicited narratives as their empirical basis. The participant population and method for eliciting the narratives is discussed in detail in the following section.

2. General method

The analyses reported in this article are based on the data from the English subcorpus of the RUEG corpus (Wiese et al., 2021). The subcorpus includes the English data of 223 HSs with English as their majority language and 64 English MSs, all of whom were raised and resided in the USA at the time of testing. The bilingual group contains 34 German, 65 Greek,

65 Russian, and 59 Turkish HSs. A total of 92% of HSs were first exposed to English at the age of 5 or earlier, with 46% having the first contact with English from birth. All speakers – HSs and MSs - comprise two age groups, adolescents (13-18 years old) and adults (20-37 years old; see Table 1).

Speakers were interviewed in large cities and their surrounding areas in the eastern and central United States. These included New York City; Washington, D.C.; Chicago, Illinois; Boston, Massachusetts; Madison, Wisconsin; St. Paul and Minneapolis, Minnesota; Long Island, New York; Fort Lee and Bloomfield, New Jersey; and New Haven, Connecticut.

Table 1

Characteristics of Speakers from the English Subcorpus of the RUEG Corpus

	Adolescents			Adults		
Group	N (Male)	Mean age (sd)	Mean Eng. AoO (sd)	N (Male)	Mean age (sd)	Mean Eng. AoO (sd)
English MSs	32 (13)	16.1 (1.4)	-	32 (13)	28.5 (3.9)	-
German HSs	27 (15)	15.5 (1.5)	0.3 (0.7)	7 (2)	25.3 (4.1)	0.9 (1.5)
Greek HSs	33 (16)	16.3 (1.4)	1.1 (1.8)	32 (13)	29.1 (3.4)	1 (1.8)
Russian HSs	32 (13)	15.8 (1.4)	2.5 (2)	33 (11)	27.5 (3.3)	3.7 (2)
Turkish HSs	32 (10)	16 (1.6)	2.6 (2.1)	27 (9)	26.2 (4.1)	2.2 (2.2)
Total	156 (67)	15.9 (1.5)	-	131 (48)	27.7 (3.8)	-

The data was collected using the Language Situations methodology (Wiese, 2020), which allows eliciting comparable quasi-naturalistic productions across registers. Participants were shown a brief non-verbal video of a minor car accident and were asked to recount what they saw. The procedure consisted of two formality settings. In the formal setting, the participants were met by a formally dressed elicitor in an office-like room, whereas in the informal setting, the elicitor dressed casually and met the participant in a more relaxed environment, offering snacks and drinks. Prior to the informal session, the participant and the elicitor engaged in 10-15 minutes of casual conversation to create an easy-going atmosphere. The participant watched the video three times in total, twice in the first setting, once in the second setting, and recounted the event in both spoken and written modes in each setting. The order of settings (formal and informal) and modes (spoken and written) was balanced among participants.

In the formal setting, participants left a voice message to a police hotline (spoken mode) and provided a written witness report to the police (written mode). In the informal setting, participants recorded a WhatsApp voice message to a friend (spoken mode) and typed a WhatsApp text message to a friend (written mode). English MSs accomplished all the tasks during one session. HSs completed the tasks in two sessions, one in English, their majority language, and one in their heritage language, with three to five days between the sessions. The order of the language sessions was counterbalanced among HSs. After completing the narrative tasks, all participants filled out a language background questionnaire, which included a self-assessment of their language skills. The self-assessments indicated that HSs and English MSs rated their English skills comparably high. In addition, HSs assessed their skills higher in their majority English than in their heritage language (Table 2).

The spoken data were transcribed in Praat (Boersma & Weenink, 2023). Subsequently, spoken and written data were annotated in EXMARaLDA (Schmidt & Wörner, 2014; see sections *Annotation* for more details) (Schmidt & Wörner, 2014, see sections *Annotation* for more details). The annotated data were accessed through the corpus tool ANNIS (Krause & Zeldes, 2014).

To assess speakers' fluency and proficiency in English, we calculated their speech rate and lexical diversity (see Azar et al., 2020 and Nagy & Brook, 2020 for the association of speech rate with proficiency in HSs; Kyle et al., 2023 for the connection of lexical diversity and proficiency scores in L2 speakers). Speech rate (syllables/second) was calculated using a Praat script (de Jong et al., 2021) based on all spoken narratives in the English subcorpus. We found no difference in speech rate between the speaker groups. Lexical diversity was evaluated with two measures – the moving average type-token ratio (MATTR) and measure of textual lexical diversity (MTLD) – using the lexical diversity package in Python (Kyle, 2020). As these were recommended for use with texts of 50 tokens or more (Zenker & Kyle, 2021), we calculated MATTR and MLTD only on narratives with at least 50 tokens – 1065 out of a total 1148. Contrary to the speech rate findings, there is a difference between English monolinguals and Turkish HSs in both lexical diversity measures, with Turkish HSs having lower lexical diversity. The other HSs groups do not differ from the monolingual speakers. Table 3 includes the three proficiency measures for each speaker group (group values and SEs predicted by linear models); for the models and data see our complementary OSF repository[1].

Table 2

Language Skill Self-Ratings of Speakers from the English Subcorpus of the RUEG Corpus

Group	Spoken understanding Mean (sd)	Spoken production Mean (sd)	Written understanding Mean (sd)	Written production Mean (sd)
In majority English				
English MSs	4.92 (0.27)	4.81 (0.47)	4.8 (0.48)	4.77 (0.46)
German HSs	5.00 (0)	5.00 (0)	5.00 (0)	4.97 (0.17)
Greek HSs	4.97 (0.18)	4.95 (0.21)	4.88 (0.33)	4.89 (0.31)
Russian HSs	4.92 (0.32)	4.92 (0.27)	4.91 (0.29)	4.89 (0.36)
Turkish HSs	4.97 (0.18)	4.93 (0.25)	4.92 (0.38)	4.92 (0.34)
In heritage languages				
German HSs	4.47 (0.56)	3.65 (0.85)	3.71 (1.06)	2.88 (1.27)
Greek HSs	4.16 (0.78)	3.72 (1.05)	3.46 (1.2)	3.13 (1.29)
Russian HSs	4.38 (0.75)	3.87 (0.85)	3.25 (1.05)	2.83 (1.22)
Turkish HSs	4.28 (0.83)	3.9 (0.95)	3.37 (1.05)	3.3 (1.16)

Table 3

Speech Rate (syll/sec), MATTR and MTLD of Speakers from the English Subcorpus of the RUEG Corpus

Group	Speech rate Pred. value (SE)	MATTR Pred. value (SE)	MTLD Pred. value (SE)
English MSs	3.26 (0.052)	0.68 (0.005)	38.84 (0.93)
German HSs	3.34 (0.071)	0.68 (0.006)	40.31 (1.26)
Greek HSs	3.23 (0.051)	0.67 (0.005)	37.85 (0.91)
Russian HSs	3.20 (0.051)	0.67 (0.005)	38.73 (0.92)
Turkish HSs	3.22 (0.054)	0.66 (0.005)	36.07 (0.94)

[1] The OSF repository can be accessed through the link https://osf.io/6khju/?view_only=bc701fbe140546e7abb87c000ac93c9e

3. Study 1 – Types of referring expressions

The main goal of the current work is to investigate whether HSs speaking their majority language are more explicit than MSs of this language. In the first study, we explore explicitness in three basic types of referring expressions – noun-headed NPs, pronouns and null anaphora – since these types provide various amounts of information about the referent and are subject to speaker choice. We examine this phenomenon in elicited narratives, making our study comparable to the previous research on referring expressions in the majority language by Azar et al. (2020). The following subsection lays out main factors that impact the choice of referring expressions in discourse, which will be taken into account in our comparison of HSs and MSs.

3.1 Theoretical background

A referring expression is a linguistic form that is used by the speaker to make a link to some discourse entity and bring it to the addressee's mind, while the entity itself is termed a referent. For successful communication, speakers should choose an appropriate form of the referring expression that provides enough information for the addressee to pick out the intended referent. The available options of referring expressions include semantically rich ones, that is, noun-headed NPs with various degrees of NP-internal modification (*the driver who stopped the car, the driver*), and less rich ones, that is, pronouns (*he*) and null elements, which often occur in coordination (*the driver stopped the car and Ø called the police*) (Arnold, 2010).

Choosing an appropriate referring expression involves considering the referent's conceptual accessibility and register of the discourse. Accessibility is defined as the degree of activation of mental representations of referents in speakers' and hearers' memory (Allen et al., 2008; Arnold, 2010; Vogels et al., 2019). More accessible referents are active in the interlocutors' minds and thus can be referred to with more attenuated referring expressions, such as pronouns. Less accessible referents, on the other hand, are less active and therefore require richer referring expressions, such as a noun-headed NPs. The accessibility scale in (5) presents a range of possible referring expressions, with the ones on the left used for the most accessible referents and the ones on the right for the least accessible referents (Vogels et al., 2014, p. 105).

(5) Accessibility scale (simplified version of the scale presented in Ariel, 1990)
Zero > Reduced pronoun > Full pronoun > Proximate demonstrative > Distal demonstrative > Full NP

The degree of referent accessibility is associated with multiple discourse factors including the referent's giveness/newness, the syntactic function of the referring expression in the clause (subject vs. non-subject), the topicality of the referent, the recency of prior mention of the referent, the number of utterances the referent persists after the initial mention, the thematic role of the referent (e.g., source vs. goal and experiencer vs. stimulus), and the protagonisthood of the referent. Additionally, several non-linguistic factors, which do not depend on discourse and are inherent to the referent, play a role – animacy of the referent, its imageability, its competition with other referents, its presence in the physical context, and its presence in the focus of joint attention (Allen et al., 2008; Arnold, 2001, 2010; Arnold & Griffin, 2007; Morrow, 1985; Vogels et al., 2019).

Moreover, the choice of referring expressions is influenced by register, which, to our knowledge, has not been investigated in previous research on referring expressions in bilinguals. For example, register research has demonstrated that noun-headed NPs occur more frequently in academic writing than in conversation, whereas pronouns occur more frequently in conversation than in academic writing, and news and fiction fall in between (Biber et al., 2021, p. 239). The effect of register on null anaphora is less clear. Biber and colleagues (2021, p. 160) note that ellipsis in coordinated clauses, including subject ellipsis, is common

both in spoken and written registers. At the same time, numerous researchers who study null anaphora focus on selected registers only: for example, Schröter (2019) and Oh (2005, 2006) investigate informal conversations, Marr (2011) informal interviews, Nariyama (2004) informal conversations, scripted TV conversations and casual letters, Newman and Teddiman (2010) online diaries, Haegeman and Ihsane (1999) published diaries. This might mean that register has an influence on the use of null anaphora. However, we have not come across a systematic comparison of null anaphora across multiple registers.

In the current study, we aim to see if referring expressions used by German, Greek, Russian and Turkish HSs in their majority English narratives are more explicit than those used by English MSs. To answer this research question, we selected several key factors from the above-mentioned list that suit our data and ensure the comparability of our study with Azar et al. (2020), the only previous study on referential choice in majority language narratives of HSs. First, we took into account syntactic function and topicality of referring expressions by including the variable of discourse status with two levels, maintenance and reintroduction (following Azar et al., 2020). We did not examine the discourse status of introduction since referents that appear for the first time and do not have any anchors in previous discourse are predominantly introduced by noun-headed NPs, and consequently do not exhibit much variation in referring expressions. In our corpus, 98% of new referents were introduced with a noun-headed NP[2].

We defined reintroduction as a context in which a referring expression that is a subject/object/oblique was not mentioned in the immediately preceding clause or in which a referring expression that is a subject was a non-subject in the immediately preceding clause. All other contexts apart from new introductions were defined as maintenance. This included contexts in which a referring expression that is an object/oblique was mentioned in any role in the immediately preceding clause, and in which a referring expression that is a subject was mentioned as a subject in the immediately preceding clause. These definitions slightly expand the definition in Serratrice (2007), which only covered subject and objects, since it also includes obliques. Examples of maintenance and reintroduction are presented in Table 4[3]. Maintained referents are expected to be more accessible than reintroduced ones and, consequently, to be more often referred to with attenuated referring expressions.

Table 4

Definitions and Examples of Maintenance and Reintroduction

Previous clause	Current clause	Discourse status
Subject *The dog ran.*	Any syntactic role *The driver saw it.*	Maintenance: Referent "dog" in current clause is maintained

[2] The variation in referent form is present more strongly in bridging referents, i.e. those that are mentioned for the first time but do have an anchor in the previous discourse (e.g., in the utterance *The car stopped. The driver stepped out, the car* would be an anchor for *the driver*). In our corpus, 73.6% of bridging referents were introduced with a noun-headed NP. While the variation in this type of referents is definitely interesting, it most probably is guided by other principles than the variation in given referents, for example, the type of bridging relationship must play a role. For this reason, we excluded bridging referents from the analysis.

[3] Note that we aligned our definitions as much as possible with those of Azar et al. (2020) for comparability. However, it was not possible in one aspect. Azar et al. annotated only subjects and had the following system: "We coded subject referents as maintained if they referred to the same entity as the subject of the immediately preceding clause. Referents that were mentioned in the discourse previously but not in the immediately preceding clause, either as the subject or object argument, were coded as re-introduced" (p. 387). This leaves open the question what was done with the subject referents that were non-subjects in the immediately preceding clause.

Non-subject *The driver saw the dog.*	Non-subject *He didn't want to hit it.*	Maintenance Referent "dog" in current clause is maintained
Non-subject *The driver saw the dog.*	Subject *The dog ran.*	Reintroduction: Referent "dog" in current clause is reintroduced
Absent *The driver turned right.*	Any syntactic role *He saw the dog.*	Reintroduction Referent "dog" in current clause is reintroduced

Furthermore, we included the factor of perceptual animacy of the referent, which takes into consideration the referent's type of movement. This is different from a more common classification of animacy based on biological properties of the referent, where humans and animals are animate, while not living entities are inanimate (Allen et al., 2008; Fukumura & van Gompel, 2011; Vogels et al., 2014). In perceptual animacy classification, a seemingly meaningful self-propelled movement with changes of speed and direction makes a referent perceptually animate, even though it is biologically inanimate (for example, moving up a slope with a pause before the top). On the other hand, involuntarily motions caused by an external force (e.g., gravity) make a referent perceptually inanimate (for example, bouncing several times with loss of energy or rolling down a slope). Perceptually animate referents have been reported to be more accessible and thus be referred to with pronouns more often than perceptually inanimate referents, at least when the referents are non-salient, that is, not mentioned in the directly preceding clause (Vogels et al., 2013). We selected perceptual animacy since two biologically inanimate referents in the stimulus video, two cars, exhibited highly animate movements (goal-oriented, changing direction, stopping because of the dog), so they were likely to be perceived as animate.

Finally, we include the variable of register. Register does not directly influence the accessibility of referents, but it does contribute to the choice of referring expression and is highly relevant for our data that contains four registers.

Several factors that have an impact on referential choice are kept constant in our study, and thus are not included as variables. These are newness/giveness of referents (since we only examine given, or already introduced, referents), their imageability (all referents are concrete and easy to imagine) and their competition with other referents (all given referents have other referents in the preceding discourse and in the visual context, so there is always some level of competition as discussed in Arnold & Griffin, 2007). Moreover, the Language Situations method ensures that the referents are not present in the physical context or in the focus of joint attention (since the participants' interlocutors are not present at the elicitation).

Finally, several factors mentioned in the literature are beyond the scope of the current study because they require a detailed qualitative analysis of each referent mention. These are recency of prior mention and number of utterances the referent persists after the initial mention, as well as referent's protagonisthood and its thematic role (source vs. goal and experiencer vs. stimulus).

3.2 Research question, hypotheses and predictions

In Study 1, we asked if German, Greek, Russian, and Turkish HSs are more explicit in their referring expressions in majority English compared to English monolinguals. To answer this research question, we conducted two comparisons: (1) noun-headed NPs vs. pronouns and (2) pronouns vs. null anaphora, following Azar et al. (2020).

Based on Polinsky (2018) and Azar et al. (2020), we hypothesized that HSs would be more explicit than English MSs in their use of referring expressions for given referents. More specifically, we predicted that HSs would use more noun-headed NPs than monolinguals in the first comparison and more pronouns in the second comparison. We extended the hypothesis beyond the findings of Azar et al. (2020), who only found more pronouns in the second comparison but not more noun-headed NPs in the first one, to test the hypothesis of overall greater explicitness of HSs. We did not base our hypothesis on the findings by Contemori et al. (2023), who found that English-dominant HSs of Spanish used similar, not larger, proportions of noun-headed NPs compared to English monolinguals because our narrative task more closely resembled the task of Azar et al. (2020) than that of Contemori et al. (2023).

We did not hypothesize cross-linguistic influence for the HSs in our study – speakers of the heritage languages German, Greek, Russian and Turkish. Influence from these languages could theoretically lead to more null anaphora in majority English because they all allow more dropped subjects than English: German is a topic-drop language (Schäfer, 2021), Greek and Turkish are strict pro-drop languages (Alexiadou & Carvalho, 2018; Uygun, 2022), and Russian is a partial pro-drop language (Madariaga, 2022). However, we did not expect this because of the participants' self-rated dominance in English (see Table 2) and high level of English proficiency – at or close to that of our MSs (see Table 3). This follows from the findings of Azar et al. (2020), who saw no cross-linguistic influence from Turkish in the majority Dutch of Turkish HSs, even though Turkish is a pro-drop language; the HSs in that study had a similar speech rate to Dutch monolinguals, and thus were taken to have similar Dutch proficiency. Contemori et al. (2023) also found more monolingual-like performance by HSs who are dominant in the ML than by HSs who are dominant in the HL.

In addition to the research question and hypothesis stated above, we explored potential differences between individual groups of HSs (German, Greek, Russian, and Turkish) and English MSs. We did not have specific hypotheses for these HS groups since there are no previous findings regarding their explicitness. However, we were interested in exploring their individual performance differentiated from the collective performance of all HSs together.

As discussed in the previous section, we included several variables in the analysis to investigate potential effects of accessibility and register: referent discourse status (maintenance vs. reintroduction), perceptual animacy (animate vs. inanimate), and register (formal written, formal spoken, informal written, informal spoken). Note that the variable of discourse status was only included in the noun-headed NP vs. pronoun comparison since we examined use of null anaphora and pronouns only in a specific maintenance context - coordinated subjects of main clauses, which is a typical context for null anaphora in English (Schröter, 2019, p. 47). We had the following predictions for these variables in Comparison 1 (noun-headed NPs vs. pronouns) and Comparison 2 (pronouns vs. null anaphora):

Discourse status

Comparison 1: A higher proportion of noun-headed NPs in reintroduction than in maintenance

Comparison 2: Variable not included

Animacy

Comparison 1: A higher proportion of noun-headed NPs for inanimate referents than for animate ones, stronger effect in reintroduction than in maintenance

Comparison 2: A higher proportion of pronouns for inanimate referents than for animate ones

Register

Comparison 1: A higher proportion of noun-headed NPs in the formal written register than other registers, and a higher proportion of pronouns in the informal spoken register than other registers.

Comparison 2: Significant impact of register but no directional predictions.

3.3 Annotation

The annotation for this study included five characteristics of referring expressions – referent, information status, type of referring expressions, discourse status, and type of clause. Each annotation is briefly explained below and illustrated with an example; detailed annotation guidelines can be found in the OSF repository.

Referent

We annotated each narrative for the presence of 19 frequently used referents (6): MAN, WOMAN1, COUPLE, FAMILY, BALL, STROLLER, BABY, WOMAN2, DOG, LEASH, GROCERIES, TRUNK, CAR1, CAR2, CAR3, CARS, DRIVER1, DRIVER2, DRIVERS.

(6) On one side of the street there was [this couple]$_{\text{COUPLE}}$ walking down, [the guy]$_{\text{MAN}}$ had [a ball]$_{\text{BALL}}$ (USbi07MR_isE)[4]

Perceptual animacy

Each referring expression was annotated for the perceptual animacy of its referent (7). BALL, STROLLER, LEASH, GROCERIES, TRUNK, CAR3 were tagged as inanimate since they did not move in a meaningful self-propelled way. The remaining 13 referents, including CAR1 and CAR2, were tagged as animate because they moved in a meaningful self-propelled way.

(7) [This woman]$_{\text{ANIM}}$ was taking [groceries]$_{\text{INANIM}}$ out of [the trunk]$_{\text{INANIM}}$ of [her car]$_{\text{INANIM}}$ but [she]$_{\text{ANIM}}$ also had a [dog]$_{\text{ANIM}}$ (USmo64FE_iwE)

Information status

Each referring expression was annotated for its information status (8) using the RefLex annotation scheme (Riester & Baumann, 2017). Broadly speaking, the information status reflects whether a referent presents given or new information, and if the information is new, whether the description of the referent is unique or not. The goal of this annotation was to subset given referring expressions – the ones that have a co-referential antecedent in the previous discourse (Riester & Baumann, 2017, p. 3).

(8) <There was this guy walking next to I think his mother who was pushing a stroller.> [He]$_{\text{GIVEN}}$ was playing with [a soccer ball]$_{\text{NEW}}$ and as [they]$_{\text{GIVEN}}$ were entering the parking lot there were [two cars]$_{\text{NEW}}$ approaching and [he]$_{\text{GIVEN}}$ dropped [his soccer ball]$_{\text{GIVEN}}$ (USbi55MT_isE)

Type of referring expression

Each referring expression was annotated for its type: noun-headed NP, pronoun, or null anaphor (9). Noun-headed NPs could be with or without modifiers. Pronouns included personal non-genitive pronouns (e.g., *she, they, her, them*); indefinite pronouns (e.g., *someone, somebody*), quantifiers combined with definite NPs (e.g., *all of the groceries*); universal quantifier *both* on its own (e.g., *both were speeding*), and pro-nominal *one* (e.g., *the one with the ball*). Even though pro-nominal *one* is syntactically a common noun, in terms of reference its interpretation can only be determined anaphorically, so it is a reduced NP (Stirling & Huddleston, 2002, p. 1511), similar to other pronouns. Null anaphora included only null subjects of coordinated finite verbs; other null elements, such as PRO or gaps in relative clauses, were not tagged as referring expressions at all and consequently were not considered null anaphora. Fused heads, such as *the second <car>* or *the blue <car>* were tagged as ellipsis and were not included in the analyses.

[4] Speaker codes in the examples include the following information: US - country of elicitation (United States); bi/mo - bilingual/monolingual speaker; 01 - speaker number (>50 for adolescents, <50 for adults); M/F - speaker's sex; D/G/R/T/E - HS's heritage language (D for German, G for Greek, R for Russian, T for Turkish) or monolinguals' only L1 (English); f/i - formal/informal setting; s/w - spoken/written mode; E - language of elicitation (English).

(9) [The man]$_{NP}$ had [a volleyball]$_{NP}$ that [he]$_{PRO}$ dropped and [the lady]$_{NP}$[’s dog]$_{NP}$ went after [it]$_{PRO}$ and [Ø]$_{NULL}$ caused an accident. (USmo53FE_iwE)

Discourse status

Given referents were annotated for their discourse status – maintenance or reintroduction (10)[5]. We annotated three components: the syntactic function of the referring expression in the previous finite clause (S = subject, O = object, D = “different”, neither subject nor object, X = absent), the syntactic function of the referring expression in the current finite clause (S = subject, O = object, D = neither), and whether the referring expression was maintained (M) or reintroduced (R). As an illustration, a discourse status tag XOR means that the referring expression was absent in the previous finite clause (X), is a direct object of a finite verb in the current finite clause (O), and hence is reintroduced (R).

(10) (There was [this couple] with [their baby])$_{CLAUSE}$ ([they]$_{SSM}$ were walking on the sidewalk)$_{CLAUSE}$ (and I guess [they]$_{SSM}$ were blocked by this van truck thing (that was parked)$_{CLAUSE}$)$_{CLAUSE}$. (So [these two cars] (that were coming into the lot at a high speed)$_{CLAUSE}$ didn’t see [them]$_{XOR}$)$_{CLAUSE}$ (and [they]$_{SSM}$ were driving really fast)$_{CLAUSE}$ (USbi07FT_isE)

Type of clause

Finally, each referring expression was annotated for whether it occurred in a matrix or an embedded clause (11). This annotation was performed only on a subset of the English subcorpus – 40 English monolinguals, 42 Turkish and 40 Russian HSs – due to time constraints. This annotation was necessary for the comparison of pronouns and null anaphora, since null anaphora in English are mostly possible in coordinated matrix clauses, not in matrix or embedded clauses (Quirk et al., 1985, pp. 923–924), despite rare cases of embedded null subjects in diary data and conversation (Haegeman & Ihsane, 1999; Schröter, 2019, p. 65). Hence, for the pronoun vs. null anaphor comparison, we had to subset maintained referring expressions that are a subject in the previous clause and in the current clause (SSM discourse status tag), with both clauses being exclusively matrix clauses.

(11) [The dog]$_{MAT}$ was startled and [Ø]$_{MAT}$ leapt out in front of the blue car at the same time that [the soccer ball]$_{EMB}$ rolled in front of [it]$_{EMB}$ (USbi01FD_fsE)

3.4 Data analysis

As mentioned above, in Study 1 we performed two comparisons: (1) noun-headed NPs vs. pronouns and (2) pronouns vs. null anaphora. The first comparison was conducted on the full English subcorpus (64 English MSs, 34 German, 65 Greek, 65 Russian, and 59 Turkish HSs). The second one was done on a subset of 40 English MSs, 42 Turkish and 40 Russian HSs, due to the additional *Clause type* annotation (see *Annotation* section).

We fit binomial generalized linear mixed effects models using the lme4 package (version 1.1.30, Bates et al., 2015) in R studio (version 2023.09.1+494, Posit team, 2023) in R (version 4.3.2, R Core Team, 2023). Within each comparison, we performed confirmatory and exploratory data analyses. In all analyses, the outcome was the type of referring expression, with the more explicit option coded as 1 and the less explicit option coded as 0.

In the confirmatory analyses, the main predictor of interest was speakers’ bilingualism since we wanted to see if the HSs’ bilingual experience increased their explicitness, irrespective of their heritage language background. Discourse status was used as an additional fixed effect in the noun-headed NP vs. pronoun comparison but not in the pronoun vs. null anaphor comparison since the latter contained only maintained referring expressions (the ones

[5] This example shows referents in square brackets and finite clauses in round brackets. Note that finite clauses can be embedded into each other.

that are subject in the previous matrix clause and subject in the current matrix clause – i.e., SSM discourse status tag). Referent perceptual animacy and register were also included, since previous research indicated that these factors influence the choice of referring expression. Additionally, we included an interaction of animacy and discourse status into the confirmatory noun-headed NP vs. pronoun comparison. In the exploratory analyses, we mostly kept the predictors the same, only replacing speakers' bilingualism with individual speaker groups (English MSs, German HSs, Greek HSs, Russian HSs, and Turkish HSs) and adding all possible interactions between the predictors. In both comparisons, the fixed effects were treatment contrast-coded, with English monolinguals, inanimate referents, maintenance discourse status and formal setting being the reference levels.

In the confirmatory analysis, we built the most complex random effect structure allowed by the design and performed simplification of random effects if the maximal model did not converge. The simplification of random effects was done until convergence was reached. We left the random effects untouched if the maximal model converged. We did not perform model selection for fixed effects.

In the exploratory analysis, we performed selection of maximally-specified random effects in case of non-convergence until convergence was reached, similarly to the confirmatory analysis. In contrast to the confirmatory analysis, for fixed effects we performed model selection using the drop1() function as described in Gries (2021). We removed fixed effects until the reduced model had a significantly worse fit than the previous model, judged by the p-value from the ANOVA test.

For each final model, we calculated a marginal R squared value using the r.squaredGLMM() function from MuMIn package (Bartoń, 2023) to assess how much variance in the outcome variable was described by the model. Additionally, we checked the models for multicollinearity (using the vif() function from the car package; Fox & Weisberg, 2019) and overdispersion (using a custom function overdisp.mer() from Gries, 2021, p. 439).

Table 5 outlines main details of the final models in the two comparisons; the data and the R code to reproduce all analyses can be accessed through the OSF repository. Due to space constraints, the following Results section will only report the estimates, SEs, z and p-values for significant results; the remaining model outputs can be found in the OSF repository.

Table 5

Data Analyses in Study 1

Analysis	N obs.	Outcome	Fixed effects	Random effects
Comparison 1: Noun-headed NP vs. pronoun				
Confirmatory	13241	noun-h. NP – 1, pronoun – 0	bilingualism + disc. status + animacy + register + disc. status : animacy	(1 | speaker) + (1 | referent)
Exploratory	13241	noun-h. NP – 1, pronoun – 0	speaker group + disc. status + register + speaker group : disc. status + speaker group : register	(1 | speaker) + (1 | referent)
Comparison 2: Pronoun vs. null anaphor				

Confirmatory	654	pronoun – 1, null anaphora – 0	bilingualism + animacy + register	(1 + animacy | speaker) + (1 | referent)
Exploratory	654	pronoun – 1, null anaphora – 0	register	(1 | speaker) + (1 + register | referent)

3.5 Results

3.5.1 Noun-headed NPs vs. pronouns

In the first part of Study 1, we examined the use of noun-headed NPs vs. pronouns by English MSs and HSs, while also taking into account register, discourse status, referent animacy and the interaction of discourse status and animacy. Table 6 shows raw proportions of noun-headed NPs by bilingualism (MSs and HSs), register, discourse status and animacy.

Table 6

Raw Proportions of Noun-Headed NPs out of the Combination of Noun-Headed NPs and Pronouns by Bilingualism, Register, Discourse Status and Animacy

Register	Discourse status and animacy				Total
	Maintenance		Reintroduction		
	Inanimate	Animate	Inanimate	Animate	
English MSs					
Formal written	0.66 (41/62)	0.53 (112/212)	0.85 (119/140)	0.87 (308/356)	0.75 (580/770)
Formal spoken	0.53 (29/55)	0.39 (93/236)	0.81 (104/129)	0.81 (306/377)	0.67 (532/797)
Informal written	0.20 (8/41)	0.16 (15/91)	0.58 (23/40)	0.77 (94/122)	0.48 (140/294)
Informal spoken	0.32 (13/41)	0.22 (40/178)	0.67 (45/67)	0.72 (187/360)	0.52 (285/546)
HSs combined					
Formal written	0.55 (140/253)	0.44 (397/895)	0.86 (474/551)	0.89 (1321/1476)	0.73 (2332/3175)
Formal spoken	0.49 (132/267)	0.30 (341/1130)	0.86 (512/597)	0.83 (1302/1569)	0.64 (2287/3563)
Informal written	0.42 (68/162)	0.25 (116/467)	0.77 (196/254)	0.83 (494/597)	0.59 (874/1480)
Informal spoken	0.45 (93/208)	0.24 (212/901)	0.80 (323/405)	0.74 (815/1102)	0.55 (1443/2616)
Total	0.48 (524/1089)	0.32 (1326/4110)	0.82 (1796/2183)	0.82 (4827/5859)	0.64 (8473/13421)

The confirmatory model with these predictors (bilingualism, narrative, animacy, discourse status and an interaction of animacy and discourse status) did not arrive at adequate predicted probabilities that were comparable with the observed proportions of noun-headed NPs in the raw data (with the maximal difference of 0.36 between the predicted probabilities and the observed proportions, see the OSF repository for the predictions). Moreover, the CIs around predicted probabilities were quite large (e.g., from 0.31 to 0.80 for the NP probability for inanimate referents in maintenance in informal spoken narratives by English MSs).

The reason for the misaligned and unreliable predictions was the relatively low number of inanimate referents and their heterogeneity: the referent BALL was much more frequent than all other inanimate referents (GROCERIES, STROLLER, CAR3, TRUNK, LEASH). Hence, the observed proportion was dominated by BALL, while the predicted probabilities were also influenced by the infrequent inanimate referents, which lead to a disconnect between the observed raw proportions and the predicted probabilities. Since the other inanimate referents had extremely low counts in some combinations of bilingualism, discourse status and register (e.g., CAR3 was used two times in maintenance in the formal written narratives by English MSs and one time in the formal spoken ones), the model could not reliably estimate their effect, which led to the wide CIs.

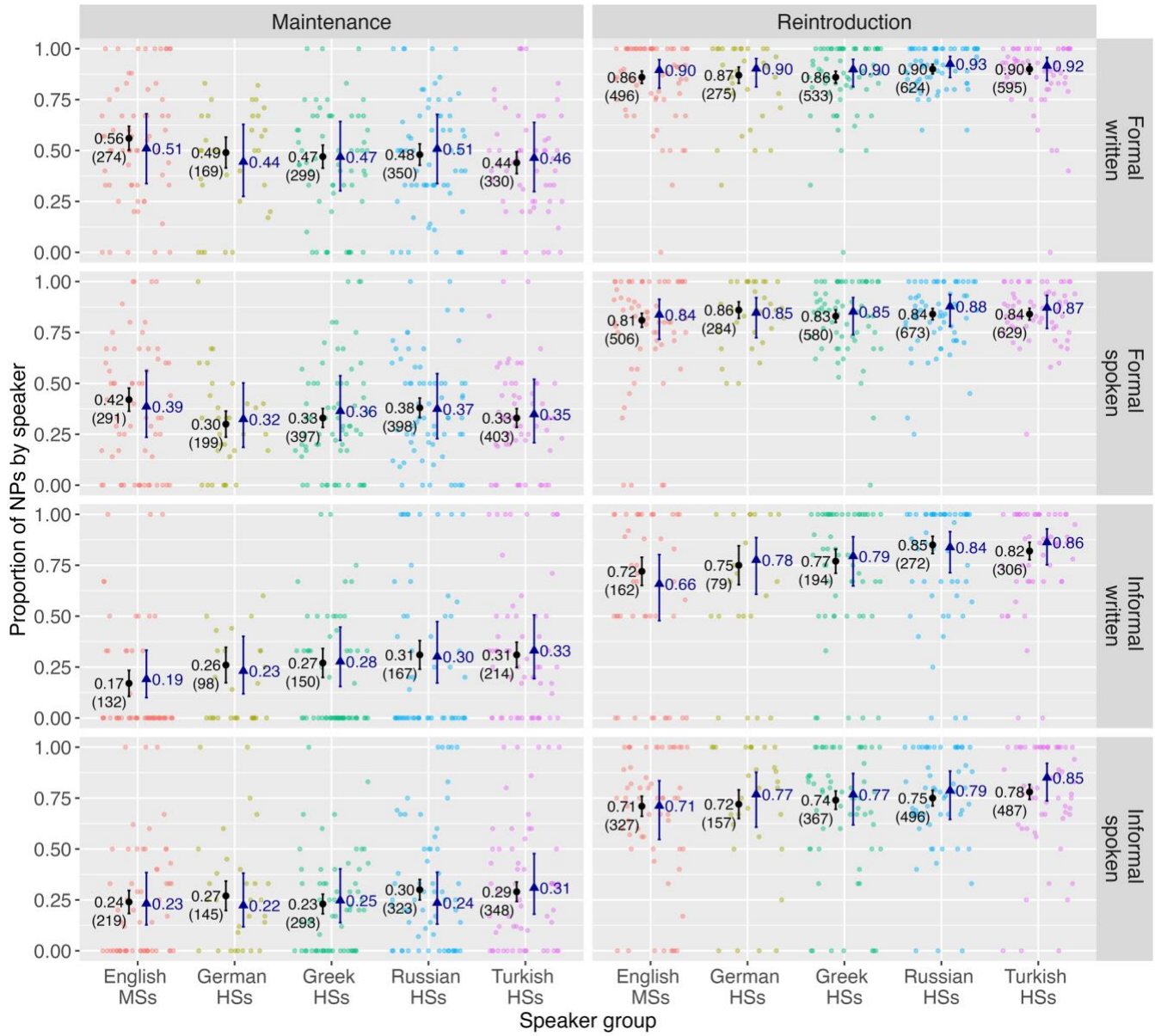
The inclusion of all significant interactions between the predictors into the model did not improve the prediction accuracy. The removal of the infrequent inanimate referents was not considered sensible since it would have left only one inanimate referent BALL for the comparison with 13 animate referents. The results of such a comparison would not allow us to disentangle the effect of inanimacy and other characteristics of the referent BALL, for example, its central role in causing the accident. Based on this, we concluded that our data is not suitable for the estimation of an effect of animacy on referential choice, and we continued to the exploratory analyses without animacy.

The exploratory analysis, which included individual speaker groups (English MSs, German HSs, Greek HSs, Russian HSs and Turkish HSs), register, discourse status and their interactions, revealed an interaction of speaker group and narrative and an interaction of speaker group and discourse status (Figure 1). To interpret these two interactions, we compared each HS group to English MSs in each combination of discourse status and register using the emmeans() function and custom contrasts from the emmeans package (version 1.8.9, Lenth, 2023). The resulting comparisons (Table 7) indicated that Turkish HSs had significantly more noun-headed NPs than English MSs in informal written narratives (both in maintenance and reintroduction) and in informal spoken narratives (in reintroduction). In addition, Russian HSs had more noun-headed NPs in the informal written narratives (in reintroduction).

Furthermore, all speaker groups had more noun-headed NPs in reintroduction than in maintenance and in formal written narratives than in any other register (see the OSF repository for the statistical output). The fixed effects in the final model accounted for 22% of variance in the outcome; no multicollinearity or overdispersion was detected.

Figure 1

Predicted Probabilities, Raw Group Proportions and Raw By-Speaker Proportions of Noun-headed NPs by Discourse Status, Register, and Speaker Group



Note. Predicted probabilities are represented by blue triangles, raw group proportions by black circles, and raw by-speaker proportions by colored dots. The total numbers of observations per group (noun-headed NPs and pronouns combined) are in parentheses.

Table 7

Significant Contrasts from a Binomial Generalized Linear Mixed Effects Model Fit for Noun-headed NP vs. Pronoun Analysis

Contrast	Estimate	*SE*	*z* value	*p* value
Turkish HSs → English MSs in informal written maintenance	-0.742	0.226	-3.291	.029
Turkish HSs → English MSs in informal written reintroduction	-1.182	0.222	-5.324	<.001
Turkish HSs → English MSs in informal spoken reintroduction	-0.833	0.183	-4.549	<.001
Russian HSs → English MSs in informal written reintroduction	0.988	0.226	-4.371	<.001

Note. These contrasts were evaluated post-hoc with the emmeans() function, the *p* values are Holm-adjusted.

These findings suggest that HSs were not more explicit than English MSs across all contexts. However, Turkish and Russian HSs do show signs of higher explicitness in informal narratives, although not to the same extent in maintenance and reintroduction. Reintroduction seems to be a more probable discourse status for higher explicitness in informal narratives: both Russian and Turkish HSs have more NPs than English MSs in informal written reintroduction, and Turkish HSs also have more NPs in informal spoken reintroduction. Maintenance, on the other hand, contained more NPs only in the case of Turkish HSs in informal written narratives.

3.5.2 Pronouns vs. null anaphora

In the second part of Study 1, we examined the use of pronouns vs. null anaphora by Russian and Turkish HSs and English MSs in maintained subjects of coordinated main clauses, while taking into account the animacy of referents and register. Similar to the noun-headed NP vs. pronoun comparison, the confirmatory model with animacy did not produce adequate predictions comparable to the observed raw proportions: the predictions were quite different from the raw proportions and the CIs were exceedingly wide (e.g., from 0.02 to 0.76 for the predicted probability of a pronoun for inanimate referents in informal spoken narratives by English). The unstable predictions were due to extremely low frequencies of inanimate referents in several combinations of bilingualism and register (see Table 6).

Similarly to the noun-headed NP vs. pronoun comparison, we concluded that our data is not suitable for the evaluation of the animacy effect. We continued to the exploratory analysis, which originally included speaker group (English MSs, Russian and Turkish HSs), register and their interaction as fixed effects. During model selection, speaker group as well as the interaction of speaker group and register were removed, indicating that these were not useful variables for predicting pronoun use. On the other hand, register had an effect (Figure 2): formal written narratives had significantly fewer pronouns than any other register (Table 8). Formal spoken narratives were not different from the informal spoken or informal written ones. Informal spoken narratives had significantly more pronouns than the informal written ones (Table 8). The fixed effects in the final model accounted for 9% of variance in the outcome; no overdispersion was detected.

Table 8

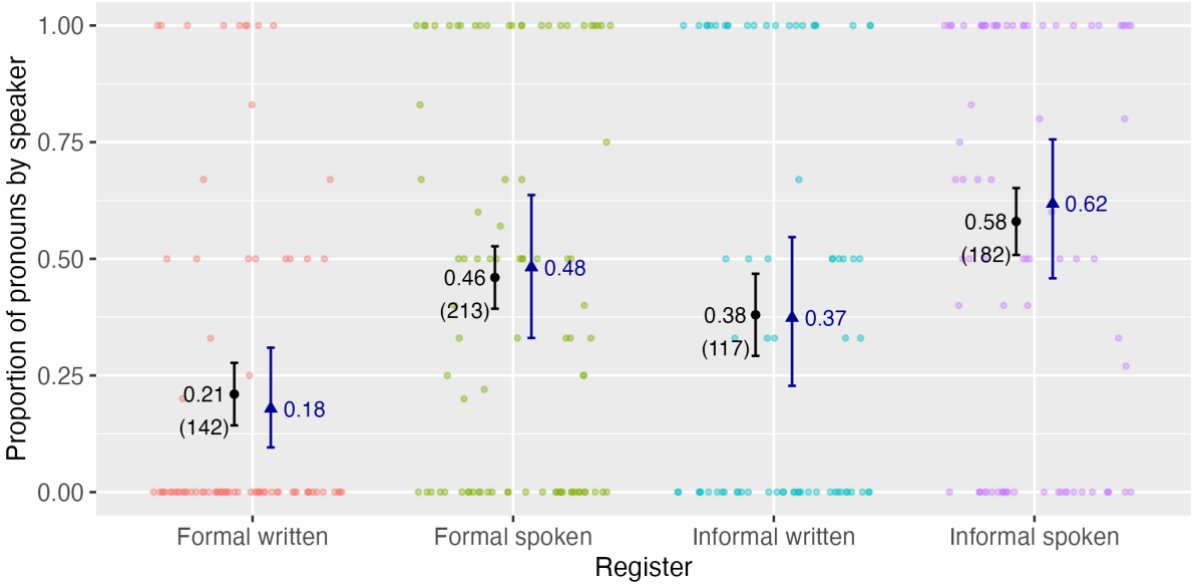
Raw Proportions of Pronouns out of the Combination of Pronouns and Null Anaphora by Bilingualism, Register, and Animacy

Register	Animacy		Total
	Inanimate	Animate	
English MSs			
Formal written	0 (0/2)	0.19 (7/36)	0. 18 (7/38)
Formal spoken	0.67 (4/6)	0.35 (18/52)	0.38 (22/58)
Informal written	0	0.39 (16/41)	0.39 (16/41)
Informal spoken	1 (1/1)	0.52 (28/54)	0.53 (29/55)
HSs combined			
Formal written	0.40 (2/5)	0.21 (21/99)	0.22 (23/104)
Formal spoken	0.18 (2/11)	0.51 (74/144)	0.49 (76/155)
Informal written	0 (0/2)	0.39 (29/74)	0.38 (29/76)

Informal spoken	0.40 (2/5)	0.61 (74/122)	0.60 (76/127)
Total	0.34 (11/32)	0.43 (267/622)	0.43 (278/654)

Figure 2

Predicted Probabilities, Raw Group Proportions and Raw By-Speaker Proportions of Pronouns by Register



Note. Predicted probabilities are represented blue triangles, observed group proportions by black circles, and observed by-speaker proportions by colored dots. The total numbers of observations per group (pronouns and null anaphora combined) are in parentheses.

Table 9

Significant Contrasts from a Binomial Generalized Linear Mixed Effects Model Fit for Pronoun vs. Null Anaphor Analysis

Contrast	Estimate	*SE*	*z* value	*p* value
Formal written → formal spoken	1.450	0.295	4.911	<.001
Formal written → informal written	1.006	0.333	3.021	.003
Formal written → informal spoken	2.005	0.308	6.512	<.001
Informal written → informal spoken	0.999	0.284	3.518	.001

Note. The last contrast was evaluated post-hoc with the emmeans() function, the *p* value is Holm-adjusted.

These results suggest that HSs did not show evidence of higher explicitness than English MSs. Register played a significant role in the use of pronouns vs. null anaphora: formal written narratives have fewer pronouns than all other registers. Within each formality, the written mode has fewer pronouns than the spoken one (formal written < formal spoken, informal written < informal spoken). The formal setting is different from the informal one only in the written mode (formal written < informal written), but not in the spoken mode (no evidence of difference between formal spoken and informal spoken).

4. Study 2 – Modification of referring expressions

Our second study contributes to the main goal of investigating HSs' explicitness in their majority language by examining modification of noun-headed referring expressions. This is the second area that we explore in relation to explicitness since use of modifiers within referring expressions is optional and allows speakers to vary the amount of information they provide about the referent. In Study 2, we analyze modification of noun-headed referring expressions that are used in elicited narratives by German, Greek, Russian, and Turkish HSs and English MSs in majority English. The following section presents several key factors that influence NP modification in English, which will be taken into account in the comparison of HSs and MSs.

4.1 Theoretical background

Noun modifiers specify the reference of their head noun or provide "elaborating information about that head" (Biber et al., 2024, p. 10). Consequently, we can assume that a modified referring expression is more explicit than an unmodified one. Noun phrases in English can have various pre- and postmodifiers. Premodifiers commonly include adjectives (*a special project*), participial premodifiers (*hidden variables*), and nouns (*the bus strike*). Postmodifiers usually contain relative clauses (*that job I was doing last night*), ing-clauses (*the imperious man standing under the lamppost*), ed-clauses (*a stationary element held in position by the outer casing*), to-infinitive clauses (*enough money to buy proper food*), prepositional phrases (*compensation for emotional damage*), and noun phrases in apposition (*the Indian captain, Mohammed Azharuddin*). Occasionally, adverbs can serve as pre- and postmodifiers (*the nearby guards, a block behind*), and adjectives can serve as postmodifiers (*the only details available*) (Biber et al., 2021, pp. 568-569; see Section 4.2 for the types of modifications examined in this study).

Three main factors that influence the use of NP modifiers have been investigated: speaker bilingualism, register, and syntactic function of the NP. The use of NP modifiers by bilingual and monolingual speakers of English has been mainly explored in the research on academic writing by L2 English speakers and in the research on World Englishes. Both strands usually associate extensive use of NP modifiers with higher proficiency of individual speakers and more advanced nativisation of a language variety.

In L2 research, for instance, Lan and Sun (2019) compared NP modification in academic writing by L2 English students and in published scientific articles. L2 writers of various proficiency levels were additionally compared to each other. The results indicated that L2 writers produced fewer NP modifiers than authors of journal articles, and students with higher L2 proficiency used more NP modifiers than students with lower proficiency. Kyle and Crossley (2018) found that richer NP modification (objects of prepositions with more adjective and PP modifiers, direct objects with more modifiers, and subjects and direct objects with a wider range of modifiers) was associated with higher essay scores in an EFL exam, and consequently, with higher English L2 proficiency. Similarly, Casal and Lee (2019) reported an association between use of adjectives, PP and participle NP modifiers and higher college grades for academic writing. Further, teaching efforts in university-level ESL instruction are directed towards increasing the number of modifiers in L2 academic writing (e.g., Bychkovska, 2021).

Another strand of research on the use of NP modifications by monolingual and bilingual English speakers focuses on World Englishes (e.g., Akinlotan & Housen, 2017; Brato, 2020; Brunner, 2014; Schilk & Schaub, 2016). This research tends to see the presence of NP modification and long, elaborate modifiers as a sign of textual complexity, which in turn can be interpreted as evidence for the variety's progress towards nativisation and growing English proficiency among its speakers. For instance, Brato (2020) found that Ghanaian English increased the overall number of modifiers in press reportages in the early

2000s compared to the period 1966-1975. The author interprets these findings as a "result of increasing proficiency levels <…>, possibly paired with developments in the media and communication sectors" (Brato 2020, p. 391). As another example, Brunner (2014) showed that NPs in Kenyan and Singaporean English have fewer modifiers than NPs in British English, which serves as evidence of structural simplification in post-colonial Englishes compared to native varieties. At the same time, he shows that Kenyan English exhibits higher levels of NP simplification than Singaporean English, which confirms that Kenyan English is at a less advanced stage in Schneider's (2007) Dynamic Model than Singaporean English.

The second factor influencing use of NP modifiers is register: written registers contain a higher proportion of modified NPs than spoken ones, with formal written registers having higher levels of modification than informal written ones. A recent study by Biber et al. (2024, p. 18) reported substantially higher frequencies of phrasal NP modifiers, such as adjectives, pre-modifying nouns, and PPs, in written registers (opinion blogs, fiction, newspaper articles, university textbooks, and research articles) compared to spoken ones (conversation, classroom teaching, and formal lectures). At the same time, finite relative clauses and *ing* and *ed* clauses were found to have similar frequencies in the written and spoken registers. From these results, it logically follows that written registers should contain more NP modifiers than spoken ones due to a higher frequency of phrasal modifiers.

Schilk and Shaub (2016) examined NP modification in four registers in the International Corpus of English, finding that the informational written register of academic humanities contained more NP modifications than the other three examined registers, namely unscripted speeches (informational spoken), social letters (interactional written) and conversations (interactional spoken). Similarly, Brato (2020) highlights an important role of register in NP modification in Ghanaian English. He reports that two formal written registers, press reportages and administrative writing, contain more NP modifications than more informal creative writing and writing about skills and hobbies. These studies emphasize the variation within written registers: formal writing is more likely to contain modified NPs than informal writing.

The third factor that has an effect on the use of NP modifiers is the syntactic function of the NP, with a general trend towards more frequent modification of non-subjects than subjects, which might be modulated by register. For example, Schilk and Schaub (2016) report that the binary division between subject and non-subject is the most powerful predictor of modifier use: in their data, non-subjects were modified consistently more than subjects, in four registers (academic humanities, social letters, unscripted speeches, conversation) and five varieties of English (Canadian, Hong Kong, Indian, Jamaican, Singaporean).

Akinlotan & Housen (2017) examined eight syntactic functions (subject, subject complement, apposition, direct object, indirect object, object complement, preposition complement, adverbial) in Nigerian English. The authors found a similar effect of syntactic function: subjects tended to be simple (74%), and subject complements, object complements and indirect objects tended to be complex (73%, 75% and 89% respectively). No interactions with register were reported, which suggests that the trend applied to all examined registers to the same extent (student essays, press reportage, popular humanities, novels and social letters).

However, Brato (2020) shows that the role of syntactic function can be modulated by register, rather than applying universally to all discourse types. In his examination of Ghanaian English, he demonstrated that the binary subject vs. non-subject division influenced the presence of NP modifiers only in creative writing (with non-subjects modified more and subjects modified less), but not in writing about skills and hobbies, press reportages or administrative writing.

In sum, previous research has indicated that the presence of NP modifiers is influenced by the proficiency of bilingual speakers and their variety of English: the higher the

proficiency and the more advanced the variety, the more NP modifiers we can expect. In addition, register and syntactic function of the NP play a role: written registers (especially formal) tend to contain more modified NPs than other registers, and non-subjects are more likely to be modified than subjects. The syntactic function effect, however, might be present only within certain registers, at least in some varieties of English.

4.2 Research question, hypotheses and predictions

Similar to Study 1, we asked if German, Greek, Russian, and Turkish HSs were more explicit in their referring expressions in majority English compared to English MSs. To approach this research question from the NP modification angle, we compared the proportions of modified referring expressions (with any type of modification) produced by HSs and MSs. We hypothesized that HSs would be more explicit than MSs, and hence, show a higher proportion of modified referring expressions because modifications would provide more information about the referent of the NP. Since the HSs and MSs in our study have very similar English proficiency and speak the same variety of English, we did not expect any other speaker-related effects. In addition, we predicted a higher proportion of modified NPs with non-subjects than subjects, and in the formal written register than in other registers.

4.3 Annotation

The annotation for Study 2 included four characteristics of referring expressions that were used in Study 1 – *referent, information status, type of referring expression,* and *discourse status* (see Section 3.2). In addition, we annotated *type of modification of referring expression* (12-17): cardinal or ordinal numeral, adjective, noun, prepositional phrase, *ing* participle/clause, *ed* participle/clause, finite relative clause, supplements.

(12) <…> and then went to go speak to the [two]$_{\text{CARD\_NUM}}$ drivers [of the cars]$_{\text{PP}}$ [who then called the police]$_{\text{REL}}$ (USbi03FD_fsE)

(13) The [ball]$_{\text{NOUN}}$ owner also went to examine the damage (USbi64FT_iwE)

(14) I saw the [young]$_{\text{ADJ}}$ man [with the soccer ball] $_{\text{PP}}$ (USbi01MR_fsE)

(15) <…> causing a spillage in front of [now stopped] $_{\text{ED}}$ cars (USbi20MT_fsE)

(16) i seen a family [walking across the walkway]$_{\text{ING}}$ (USbi03MT_iwE)

(17) The [first]$_{\text{ORD\_NUM}}$ car [(blue, small, license plate 24665)] $_{\text{SUPPL}}$ abruptly stopped (USbi64FR_fwE)

We encountered no to-infinitives and only three adjectives as post-modifiers (cf. Biber et al. 2021, p. 569) in our data, so these tags were not included in the annotation scheme[6]. Occasional pre-modifying adverbs were collapsed with pre-modifying adjectives, and post-modifying adverbs were collapsed with post-modifying prepositional phrases. Possessor NPs or possessive pronouns (e.g., *the woman's dog, his car*) were not tagged as modifications since they are determiners.

A challenging decision was how one should classify prepositional phrases, *ing* participles/clauses, and *ed* participles/clauses that are ambiguous between an NP modifier and a VP modifier. For example, in (18) it is unclear if "not seeing the dog" modifies the noun "driver" (rephrased as *The second driver, who was not seeing the dog, didn't have time to press the brakes*) or the verb "didn't have" (rephrased as *The second driver, because he was not seeing the dog, didn't have time to press the brakes*). In such cases, we tagged an

[6] A list of to-infinitives directly following referring expressions but not modifying them can be found at https://shorturl.at/adkIU. An example of such a case is *Both drivers left [their vehicles] to exchange insurance numbers* (USmo70ME_fwE).
A list of adjectives directly following referents can be found at https://shorturl.at/ACF08. The three post-modifying adjectives are: *a female standing behind her car with [her trunk open]* (USbi90MG_fwE); *a couple with a dog and some groceries and the trunk of [their car open]* (USmo62ME_fwE); *their neighbor was unloading [her car full of groceries]* (USbi16FR_fwE).

ambiguous modifier as NP modification if such a reading was logically conceivable. To show the ambiguity of the modification, we added a sub-tag *-amb* to the main modification tag.

(18) the second driver [not seeing the dog]$_{\text{ING-AMB}}$ didn't have time to press the brakes (USbi55MR_fsE)

In existential *there* structures, we tagged all *-ing* and *-ed* clauses that followed the notional subject as ambiguous between being an extension of existential *there* and a modifier of the notional subject (Winkle, 2015, pp. 62–64). We used a sub-tag *-th* to show this type of ambiguity (19). As in Study 1, more detailed annotation guidelines can be found in the OSF repository.

(19) There were two cars [coming down the road]$_{\text{ING-TH}}$ (USmo82FE_fwE)

Finally, note that NPs in which modifiers were not linearly adjacent to the NP head were not included in the analysis due to the technical limitations of our search system. This means that discontinuous NPs (*the dog's attention who immediately barked*) were not part of the analysis, nor were coordinated NPs where the modifier is shared between two heads and is not adjacent to the first one (*a blue car and a white car that were entering the parking lot*).

4.4 Data analysis

We exported all noun-headed referring expressions and their modifiers from the corpus. Next, we ensured that referring expressions with multiple modifiers were counted only once by removing the search matches that stemmed from the second and subsequent modifiers that were part of the same NP.

The sub-tags *-amb* and *-th* were included in the analysis, even though some of the modifications with these sub-tags might not be modifiers of referring expressions. This was done because these phrases/clauses can in principle be NP modifiers, and we cannot exclude any of them with certainty without a careful item-by-item analysis. Moreover, all speaker groups had a similar proportion of *-amb* and *-th* sub-tags (ranging from 1.9% to 2.6% and from 0.4% to 0.7% of all noun-headed referring expressions respectively), so we do not expect the inclusion of these sub-tags to influence the results.

As in Study 1, we fit binomial generalized linear mixed effects models. We performed confirmatory and exploratory data analyses, in both of which the outcome was NP modification, with a present modifier coded as 1 and an absent modifier coded as 0.

Similar to Study 1, in the confirmatory analysis, the main predictor of interest was speakers' bilingualism. We additionally included register (formal written, formal spoken, informal written, and informal spoken) and syntactic function of the NP (subject and non-subject) since the previous research indicated their importance.

The model with these predictors did not provide predicted probabilities of NP modifiers comparable to the proportions of NP modifiers based on the raw data (with the maximal difference of 0.22 between the predicted probabilities and the raw data proportions). Hence, we moved on to the exploratory analysis attempting to identify another variable that would lead to more adequate predicted probabilities. In the first exploratory analysis, we added a new binary predictor "competitor", which reflected if a referent had another similar referent that it could be confused with. We considered the set of MAN, DRIVER1 and DRIVER2 as competitors to each other, as well as the pairing of WOMAN1 and WOMAN2 and the set of CAR1, CAR2 and CAR3. These referents were coded as 1 in the competitor predictor, while the remaining referents were coded as 0.

The inclusion of the competitor predictor led to predicted probabilities that are more aligned with the raw proportions (with the maximal differences of 0.12 between the two). Thus, we continued on to the second exploratory analysis including competitor, register, syntactic function, individual speaker group (German, Greek, Russian, Turkish HSs, and English MSs) and all three-way interactions of these predictors.

In both analyses, the fixed effects were treatment contrast-coded, with English monolinguals, formal written register, non-subjects and absent competitor as the reference levels. We followed the same model selection and evaluation procedure as in Study 1 (see Section 3.4).

Table 6 outlines main details of the final models; the two exploratory analyses led to the same final model, so they are presented once. The data and the R code with full model outputs can be found in the OSF repository. As in Study 1, the following Results section will only report the estimates, SEs, z and p-values for significant results.

Table 10

Data Analyses in Study 2

Analysis	N obs.	Outcome	Fixed effects	Random effects
Confirmatory	8491	mod. present – 1, mod. absent – 0	bilingualism + register + synt. function	(1 | speaker) + (1 + synt. function || referent)
Exploratory	8491	mod. present – 1, mod. absent – 0	register + competitor	(1 | speaker) + (1 | referent)

4.5 Results

As explained in Section 4.4, the confirmatory analysis led to predicted probabilities of modified NPs that were largely different from the proportions of modified NPs derived from the raw data. Due to this, we are not reporting the results of the confirmatory model (but see the OSF repository for its details).

The two exploratory analyses (one with the bilingualism predictor and one with the speaker group predictor) included an additional variable "competitor", which led to an improvement in the prediction accuracy (most of the differences between predictions and raw proportions ranged between 0.2 and 0.8, with the maximal difference of 0.12), lower AIC and BIC values (AIC 7049 in the confirmatory model and 7041 in the exploratory one; BIC 7126 and 7090 respectively) and a larger R squared value (0.01 for the confirmatory model and 0.29 for the exploratory one). Table 8 shows the raw proportions of modified NPs out of all noun-headed NPs by bilingualism, register, competitor and syntactic function (see the OSF repository for a similar overview table split by individual speaker group instead of bilingualism).

Table 11

Raw Proportions of Modified NPs out of All Noun-Headed NPs by Bilingualism, Register, Competitor and Syntactic Function

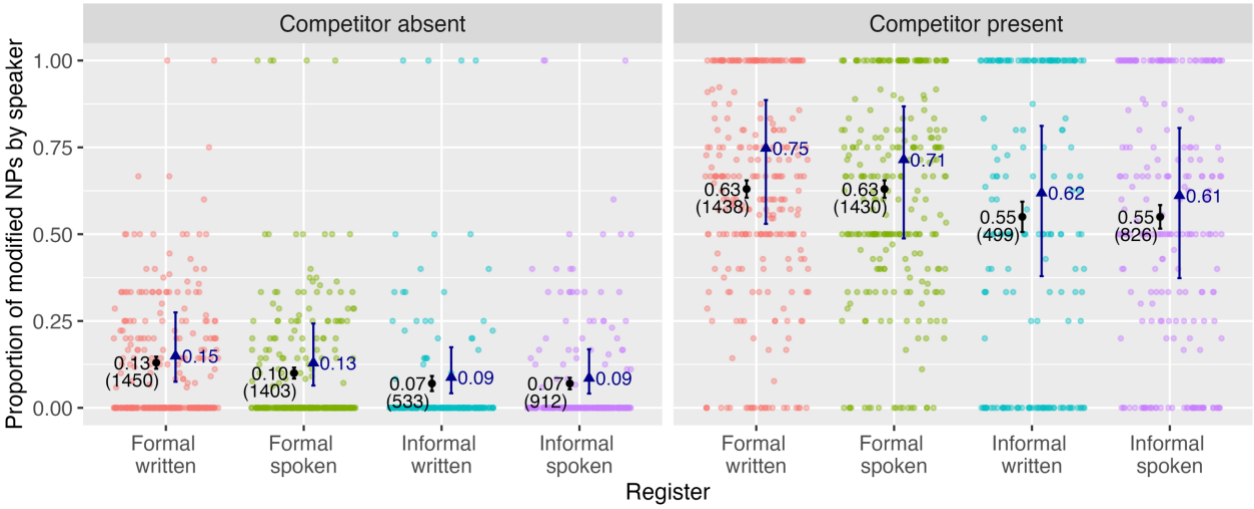
Register	Competitor and syntactic function				Total
	competitor absent		competitor present		
	non-subject	subject	non-subject	subject	
English MSs					
formal written	0.11 (23/203)	0.10 (8/79)	0.68 (90/132)	0.65 (99/153)	0.39 (220/567)
formal spoken	0.06 (10/171)	0.05 (4/74)	0.72 (83/116)	0.64 (112/175)	0.39 (209/536)
informal written	0.08 (4/49)	0.11 (2/19)	0.52 (14/27)	0.45 (21/47)	0.29 (41/142)

informal spoken	0.09 (7/80)	0 (0/51)	0.63 (37/59)	0.52 (52/100)	0.33 (96/290)
HSs combined					
formal written	0.14 (113/831)	0.13 (43/337)	0.63 (313/498)	0.62 (404/655)	0.38 (873/2321)
formal spoken	0.10 (83/793)	0.11 (40/365)	0.62 (293/470)	0.61 (407/669)	0.36 (823/2297)
informal written	0.07 (22/332)	0.06 (8/133)	0.56 (87/155)	0.57 (154/270)	0.30 (271/890)
informal spoken	0.07 (34/510)	0.08 (22/271)	0.53 (129/243)	0.56 (238/424)	0.29 (423/1448)
Total	0.10 (296/2969)	0.10 (127/1329)	0.62 (1046/1700)	0.60 (1487/2493)	0.35 (2956/8491)

Model selection in both exploratory analyses concluded with the same final model, which included the fixed effects of competitor and register (Figure 3, Table 12). Referring expressions without a competitor were less likely to be modified than those with a competitor. High CIs in the context of present competitors indicate, however, that speakers did not have a unified strategy in referring to such referents. As for the effect of register, formal written narratives contained significantly more modified NPs than all other registers. Formal spoken narratives contained more modified NPs than informal spoken and informal written ones, while informal spoken and written narratives were not different from each other. Bilingualism, speaker group and syntactic function as well as all the interactions between the predictors were removed during model selection, which means that they were not useful variables in predicting the presence of NP modifiers in our data. The fixed effects in the final model accounted for 29% of the variance in the outcome; no multicollinearity or overdispersion was detected.

Figure 3

Predicted Probabilities, Observed Group Proportions and Observed By-Speaker Proportions of Modified NPs by Competitor and Register



Note. Predicted probabilities are represented by blue triangles, observed group proportions by black circles, and observed by-speaker proportions by colored dots. The total numbers of observations per group (modified and non-modified NPs combined) are in parentheses.

Table 12
Significant Contrasts from a Binomial Generalized Linear Mixed Effects Model Fit for Modified NP Analysis

Contrast	Estimate	*SE*	*z* value	*p* value
competitor absent → competitor present	2.826	0.625	4.518	<.001
formal written → formal spoken	-0.168	0.073	-2.289	.022
formal written → informal written	-0.601	0.106	-5.659	<.001
formal written → informal spoken	-0.633	0.089	-7.096	<.001
formal spoken → informal written	-0.433	0.107	-4.060	<.001
formal spoken → informal spoken	-0.465	0.089	-5.192	<.001

Note. The last two contrasts were evaluated by re-leveling the narrative predictor to the reference level "formal spoken" and re-fitting the model.

Summing up, these results suggest that contrary to our hypothesis, in our sample HSs were not more explicit than English MSs, since HSs did not produce a higher proportion of modified referring expressions compared to English MSs. Also contrary to our expectations, syntactic function of the referring expressions did not have a significant association with NP modification. A newly-introduced competitor predictor proved to have an influence on the presence of NP modifiers, with more modifiers in referents that have competitors than those that do not. Finally, as predicted, register played an important role, with formal written narratives containing more modified NPs than other registers.

5. General discussion

The main objective of the two studies reported in this article was to test the hypothesis that HSs are more explicit in their majority language than MSs, irrespective of their HL background. This hypothesis had not been put forward before, despite the fact that several previous studies reported findings that pointed to higher explicitness of HSs. We defined explicitness as providing more detailed information on some level of linguistic structure, often by choosing not to omit or contract material. To evaluate the hypothesis, we conducted two studies on referring expressions employed by German, Greek, Russian and Turkish HSs and English MSs in majority English. Referring expressions are a convenient phenomenon to examine explicitness since in referential choice speakers can decide how much information to provide or to omit about the referent, thus varying the level of explicitness.

The first study compared the types of referring expressions (noun headed NPs, pronouns, and null anaphora) produced by HSs and English MSs. We hypothesized that HSs would be more explicit than English MSs, that is, produce a higher proportion of NPs in the noun-headed NP vs. pronoun comparison and a higher proportion of pronouns in the pronoun vs. null anaphor comparison. The second study examined presence of modifiers in referring expressions, hypothesizing that HSs would produce a higher proportion of modified referring expressions than English MSs, assuming that modifiers are associated with higher explicitness. The empirical basis of the two studies was elicited narratives in four registers (formal written, formal spoken, informal written, informal spoken), which also allowed us to explore the role of register in explicitness.

Explicitness and heritage speakers

Based on our results, we can conclude that HSs do show some indications of higher explicitness compared to English MSs. In Study 1, Russian and Turkish HSs from our sample produced more NPs, which are a more explicit option than pronouns, in comparison to English MSs in informal narratives, sometimes in reintroduction and sometimes in maintenance. This finding aligns well with the reasoning that HSs' higher explicitness can

stem from their frequent communication with L2 speakers of the majority language – their family and possibly other community members. These L2 speakers are likely to speak to HSs in informal contexts, and thus HSs exhibited the results of this communication in our informal elicitation setting. Not all HS groups used significantly more noun-headed NPs in the informal setting; however, all of them trended towards higher explicitness – the predicted probabilities of a noun-headed NP in the informal narratives are almost always higher for HSs than for English MSs (except for German HSs in informal spoken maintenance, see Figure 1).

The question of why communication with L2 speakers might lead to higher explicitness is open for future research. One reason, as argued by Azar et al. (2020), could be that L2 speakers are more explicit themselves, so they provide more explicit input to HSs in the majority language, compared to monolingual L1 caregivers. This reason is supported by the findings of Marr (2011), who discovered that both Cantonese HSs with majority language English and first-generation immigrants with Cantonese L1 and English L2 produced more explicit subjects in English than English MSs.

Another reason, put forward by Polinsky (2018), may be that L2 speakers benefit from more detail and disprefer contracted material, so HSs align their narrative style to these communicative needs of their L2 interlocutors. The most direct way to further disentangle the two potential explanations is to continue testing L2 speakers from HSs' families/communities to see if they are more explicit in various domains than MSs of the majority language.

However, the explicitness effect was not ubiquitous in our sample – we found no evidence of higher explicitness of HSs in the pronoun vs. null anaphor comparison in the referring expression study, as well as in the study on modifications of referring expressions. Our results do not confirm the findings of Azar et al. (2020) and Marr (2011), who observed a lower proportion of null anaphora produced by HSs in their majority language compared to MSs (Turkish HSs in majority Dutch in Azar et al., 2020, and Cantonese HSs in majority English in Marr, 2011). This discrepancy could be caused by a lower number of data points in our study (712 in Azar et al., 2020; 2424 in Marr, 2011; and 654 in ours) and quite high individual variability in our data, since our HSs also numerically trended towards higher explicitness in the raw proportions but did not reach significance (see Table 7). Alternatively, other factors that affect the use of null anaphora could have played a role, such as semantic verb type: it has been shown that verbs expressing actions (e.g., *come, take*, *make*) are more likely to be used with a null subject than modal and auxiliary verbs and verbs expressing perception or mental states (e.g., *see, think, mean*; Schröter, 2019, p. 81). Persistence is another significant factor: null subjects are more likely to appear after another null subject or after a noun-headed NP subject, and less likely after a pronoun (Schröter, 2019, p. 80). These factors were not explored either in Azar et al. (2020) or in the present study. Marr (2011) did examine the role of these and multiple other factors, but only in a subset of null subjects and the immediately preceding and following clauses, not on the whole distribution of overt and null subjects, and this analysis was not connected to the analysis of the null subject rates per 10,000 words. So there remains a chance that once all the factors are taken into consideration in a larger dataset, the differences between HSs and MSs in the proportion of null subjects would become unified across studies and speaker samples.

We did not observe lower explicitness in the referring expressions produced by HSs compared to English MSs. This runs counter to Contemori and Ivanova (2021) and Contemori et al. (2023), who found that Spanish HSs used more under-informative pronouns than MSs in reintroduction and maintenance. This difference could be due to the English dominance and high proficiency of our HSs, which led them to be closer to English MSs. It is quite likely that English dominance overrode potential effects of cross-linguistic influence that were observed by Contemori and colleagues, even though the effects were possible since our HSs were speakers of pro-drop languages (Greek and Turkish) and a partial pro-drop language (Russian). An alternative explanation for the difference between the studies could be the

employed methodologies – while the two studies by Contemori and colleagues involved constrained picture-description tasks where referents and their discourse statuses were pre-determined in each clause, our study gave speakers a comparatively free choice of referents and referring expressions. To tell apart these two explanations, future research can extend the picture-description paradigm to other HSs with high proficiency in English, or use the narrative method with the group of Spanish HSs tested in Contemori and Ivanova (2021) and Contemori et al. (2023).

To sum up this part of discussion, our study has identified a tendency of HSs to be more explicit in their majority language than MSs of this language, based on evidence from previous literature. We also contributed new evidence that supports this tendency: Russian and Turkish HSs in our first study used more explicit referring expressions in informal registers, which could be a result of frequent communication with L2 speakers of the majority language. However, greater explicitness was not as persistent in our studies as we initially hypothesized since it only appeared in the noun-headed NP vs. pronoun comparison and in two HS groups out of four. If this tendency is confirmed in further research, we can establish a new source of influence on the majority language of HSs – their HS experience and close communication with L2 speakers that is independent of the HL background.

Explicitness and register

Our results showed that the level of explicitness in referring expressions is impacted not only by speaker groups, but also by register – formal written narratives have more noun-headed NPs and more NP modifiers than informal ones. This corresponds to the communicative purpose of our formal narratives: in witness reports to the police, the cost of misidentifying a referent due to an under-specified referring expression can be quite high (for example, the wrong person can be fined). Additionally, there are fewer possibilities of communicative repair in a formal police report than in a chat with a friend since it is easier for a friend to ask for clarifications than for the police. Written narratives allow extensive planning and numerous revisions, unlike spoken ones, which has likely led to their higher explicitness.

However, formal narratives also have more null anaphora than informal ones, which might point into the opposite direction of less explicitness, and can be quite surprising given that "registers in which we find null subjects commonly also display other omissions" (Scott, 2019, p. 116). Our null anaphora are a case of textual ellipsis in coordinated clauses (Biber et al., 2021, pp.159-160), in which null elements are recovered from the previous linguistic context. Our results indicate that textual null anaphora can be a feature of official reports, possibly a way to condense information and highlight the continuity of successive actions (Oh, 2006). While null anaphora in itself provides the least amount of information about the referent, it can be used only in contexts where the referent is easily recoverable without presenting a risk of mis-identification. It is important to note that our null anaphora are different from the typical dropped subjects, whose reference can only be interpreted based on the situational context, and thus might lead to mis-identification (e.g., *went to the store* in a diary or *has to be edited* in meeting notes; see Scott 2019, Chapter 6).

Explicitness and other factors

Beyond the role of speakers' bilingualism and register, our results confirmed the importance of discourse status for the choice of referring expressions, with more noun-headed NPs in reintroduction contexts than in maintenance ones. However, we found no evidence of the effect of syntactic function (subject vs. non-subject) on NP modification, which was described in previous research. In this sense, our findings are close to those of Brato (2020), who reported an influence of syntactic subject only in one register (creative writing) out of the four examined. The key difference between the previous studies (Akinlotan and Housen,

2017; Brato, 2020; Schilk and Schaub, 2016) and the current study is that we examined only a certain subset of referential concrete NPs, while the other authors examined all NPs, including non-referential and abstract ones. It is an interesting question for future research whether the kind of NP modulated the syntactic function effect.

Our choice of NPs and manual annotation of referents allowed us to highlight the importance of another factor influencing NP modification – the presence of a competitor referent, which, to our knowledge, has not been thoroughly addressed in the previous literature. The impact of this factor is intuitively understandable: if the speaker needs to disambiguate two or more referents (e.g., two cars or three men), they are likely to resort to NP modifiers. Due to the time-consuming nature of referent annotation, it is not easy to assess the influence of the competitor factor in large corpora (e.g., ICE or sizeable learner corpora). However, it seems reasonable to check if the effect of some predictors can be partially accounted for by the presence of a competitor on a smaller data set (for instance, a certain group of L2 learners might choose to write an essay about two opposing entities – political parties or social movements – that would need disambiguation, leading to an increase of NP modification that is not associated with these learners' proficiency).

Unfortunately, our data did not allow us to investigate a significant factor in referential choice – referent animacy – due to low frequencies of several inanimate referents (e.g., GROCERIES, CAR3, LEASH) and the high frequency of the referent BALL, which was central to the story since it was one of reasons for the accident. The difference in frequencies can point to the low accessibility of non-central inanimate referents: they are not active in the speaker's mind so they are rarely incorporated in the narrative. For a study of animacy in a narrative set-up (rather than an experimental one), it seems sensible to carefully balance the number of animate and inanimate referents in the elicitation materials and the referents' degree of involvement in the main narrative arc, paying special attention to the presence of several central inanimate referents.

In several of our analyses we observed high speaker heterogeneity – in maintenance in the noun-headed NP vs. pronoun comparison, in subject-to-subject maintenance in the pronoun vs. null anaphor comparison, and in contexts of present competitor in the NP modification analysis. This suggests that speakers have different strategies in the choice of referring expressions in the above-mentioned contexts, which are not explained by the factors that we considered. This indicates that more variables should be introduced in further research with larger datasets, possibly after a qualitative examination of our corpus results.

Conclusion

This study set out to test the hypothesis that HSs are more explicit in their majority language than MSs of this language – a trend that has been indicated in previous research on ML but that has not been systematically addressed yet. We defined explicitness as providing more detailed information on some level of linguistic structure, often by choosing not to omit or contract material. At least two previous studies suggested that HSs' greater explicitness can be caused by their frequent communication with L2 speakers of the ML (e.g., HSs' parents), who might benefit from extra detail or be more explicit themselves. We selected referring expressions as a suitable phenomenon to study explicitness since referential choice allows speakers to modulate the amount of information they provide about the referent, thus being more or less explicit. We analyzed referring expressions produced by German, Greek, Russian, and Turkish HSs in majority English as well as English MSs in formal and informal elicited narratives. Our results showed that Russian and Turkish HSs in our sample were more explicit in informal narratives: they used more noun-headed NPs and fewer pronouns than English MSs. This finding is consistent with the reasoning that HSs' explicitness is caused from their frequent communication with L2 speakers, since L2 speakers from the family or local community usually interact with HSs in familiar settings. However, we found no

evidence of HSs' higher explicitness in the use of pronouns and null anaphora or in the use of modified referring expressions. Overall, our findings confirm HSs' higher explicitness in at least some areas of the ML compared to MSs, although the effect appears limited to certain phenomena and speaker groups. If this trend is further confirmed in future research, it can be a new source of influence on the ML in addition to the widely-explored phenomena of cross-linguistic influence from the HL and the lack of exposure to ML in the earliest years of life.

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Syntactic Optionality in Heritage Language Use: Clause Type Preferences of German Heritage Speakers in a Majority English Context

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Abstract
This study focuses on the syntactic and pragmatic resources heritage speakers (HSs) use to structure their discourse according to register. Drawing on a corpus of narratives produced by German HSs living in the United States, as well as by monolingually-raised speakers (MSs) of English and German, we investigated HSs' syntactic resources by analyzing how they approached clause type optionality across registers. Concerning overall clause type frequencies, HSs performed similarly to MSs in their majority English, but showed differences in their heritage German compared to German MSs. This can be attributed to the majority language dominance and different complexity of clause types in the heritage language. However, regarding the pattern of clause types across registers, HSs' productions are similar to those of German MSs, and across HSs' two languages. This suggests an underlying register awareness that HSs can draw upon in their heritage language.

Keywords: heritage speakers - heritage German - majority English - syntactic optionality – register - independent main clause - coordinate main clause - subordinate clause

1 Introduction

Heritage speakers (HSs) are an interesting population for various types of linguistic research. They are broadly defined as bilinguals who acquire a heritage language (HL) at home and, after the onset of formal education, shift towards the majority language (ML) of their country of residence (Pascual Y Cabo & Rothman, 2012). It is often pointed out that their ML is used in a wider range of communicative situations than their HL. Many studies have addressed HSs' morphosyntax (Montrul & Sánchez-Walker, 2013; Polinsky, 2008), lexicon (Hulsen, 2000; Montanari et al., 2020), semantics (Krause, 2020; Montrul & Ionin, 2010), and syntax (Brehmer & Usanova, 2015; Kim et al., 2009). Less attention has been paid to the syntactic resources HSs employ in structuring their discourse according to register, both in speech and writing. The current paper aims at filling this gap.

In monolingual L1 acquisition, learners acquire a broad repertoire of register varieties, and the more or less tacit awareness of the conditions of their use (Halliday, 1975, 1978). Since HSs might be exposed to a smaller range of communicative situations than monolingually-raised speakers of the same age and comparable socioeconomic background, it is an intriguing question of how they cope with the challenge of mapping grammatical form and communicative function in various situations (Schleppegrell & Colombi, 1997, p. 494).

Within the overall context of research on heritage languages and language variation, this paper explores the syntactic options used by HSs in narrative reports on the same event across registers.[1] We define syntactic optionality as "the possibility of realizing the same semantic content by means of several otherwise competing grammatical expressions" (Boyd, 2007, p. 1). Our analysis focuses on three grammatical alternatives: independent main clauses (IMCs), coordinate main clauses (CMCs), and subordinate clauses (SCs).

One theoretical framework for studying optionality has been developed within Systemic Functional Linguistics, with language perceived as a system from which speakers choose alternatives to convey their ideas in different situations (Halliday, 1976). Different situational parameters can be subsumed under the term register (Biber & Conrad, 2001, p. 175). According to Halliday (1978, pp. 31-32), the theory of register attempts to "uncover the general principles which govern this variation, so that we can begin to understand what situational factors determine what linguistic features." While the proponents of the model did not have HSs in mind, they were open to dialectal variation (e.g. Halliday, 1978, p. 34).

This study aims at a systematic analysis of clausal options across four registers: formal spoken (voicemail to the police), formal written (written testimony to the police), informal spoken (voice message to a friend), and informal written (text message to a friend), all based on the same event. To obtain a comprehensive picture of HSs' linguistic repertoires, we investigated both of their languages—majority English and heritage German—and compared them to monolingually-raised speakers of English and German tested on the same materials. We refer to the latter groups as "monolinguals" for ease of reference, although most of them had learned one or more foreign languages in school and report speaking them with varying degrees of proficiency.

[1] A video of the event may be accessed at https://osf.io/szfhd/.

In this paper, we tackle the following research questions:
RQ 1: With respect to the three clause types, do HSs make similar use of structural options in their ML (English) compared to English monolinguals and their HL (German) compared to German monolinguals?
RQ 2: Do HSs use comparable structural options in their ML (English) and their HL (German) in different registers?
RQ 3: Do certain registers reveal preferences for particular structural options?

2 Theoretical and conceptual background

2.1 *Heritage Speakers*

Heritage speakers are bilinguals—either early second language learners or, as in our case, simultaneous acquirers of two first languages (2L1). One of their languages is the ML of their country of residence, while the other language is mainly spoken within the family or even to just one parent. By early adulthood, speakers have typically become dominant in their ML (Pascual Y Cabo & Rothman, 2012). This shift in dominance happens because, after HSs start kindergarten/preschool, their ML repertoires gradually expand due to a widening spectrum of communicative situations, whereas their HL typically becomes increasingly restricted to interactions with family members. One relevant question, then, is what features of the HL grammar and its registers can develop despite this decrease of exposure to HL variants—a question we pursue with respect to the three clause types mentioned above—IMCs, CMCs, and SCs.

Our research contributes to current approaches to HSs' repertoires in several respects. First, we target a specific group of HSs—adolescent HSs of German, children of first-generation immigrants to the United States—thereby expanding previous research on heritage German, which mainly focused on senior HSs from established German "language islands" (e.g., Boas, 2009; Hopp & Putnam, 2015; Putnam & Salmons, 2013). Second, we consider syntactic phenomena reaching across clausal boundaries, namely selection of clause types. So far, the main focus of HL syntax research has been on intra-clausal structures, especially on word order variation (Brehmer & Usanova, 2015; Larsson & Johannessen, 2015), and on the comprehension as well as the production of subject and object relative clauses (Albirini & Benmamoun, 2014; Polinsky, 2011, 2018). In this study, we argue that the selection of clause types provides insight into HSs' repertoires because it lies at the interface of syntax and discourse, both of which are sources of variation in HSs' productions (Sorace, 2011).

2.2 *Syntax and discourse knowledge of heritage speakers*

Syntactic knowledge of HSs may result in variation for two reasons. The first one relates to the differences between the languages involved. Although German and English are closely related Germanic sisters, there are striking differences between them (e.g., Haider, 2010; Platzack, 1986; Weerman, 1989). First, German is head-final within the VP, with non-finite verbal elements (infinitives, participles, separable particles) following complements. In English, on the other hand, the verb, finite or non-finite, precedes its complements. Second, German, alongside all other Germanic languages except for English, is a Verb Second (V2) language. This means that in main clauses, the finite verb canonically raises to the second position, the head position of CP in generative terms, with maximally one constituent preceding it in SpecCP. English is typologically SVO and only shows "residual" V2 effects in subject-verb and subject-auxiliary inversion. Third, English maintains SVO across main and subordinate clauses. In German, on the other hand, word order is asymmetric: V2 in main clauses and V-final in clauses introduced by

complementizers or relative pronouns since verb raising is blocked by their presence. Despite this asymmetry in the placement of finite verbs in German, there remains an important parallel across main and subordinate clauses, as the non-finite verb always follows its complement. In the present study, we mainly focus on the third English-German contrast, positing that V-final word order in SCs may present additional difficulty to HSs and cause them to use fewer SCs than German monolinguals.

We argue that, although V2 word order requires additional movement compared to finite V-final constructions in generative approaches (Los & Starren, 2012; Platzack, 1986; Weerman, 1989), finite V-final in German might actually be more complex than V2 from a German-English bilingual perspective. This might be due to the parallel activation of two languages in a bilingual mind (Abutalebi & Green, 2016), which calls for a constant inhibition of one language. The structures that do not overlap in both languages, and thus require inhibition of one structure, can be more complex for a bilingual speaker. English and German do not overlap in the finite V-final in SCs, consequently, this structure might present additional cognitive load to bilingual speakers, causing them to use fewer SCs than German monolinguals do. On the other hand, English and German exhibit a structural overlap when the subject precedes a finite main verb of main clauses: in this case, the superficial clause structure is parallel in English and German, namely SVO. This may lead to a preference for such parallel structures (Heine, 2008; Hulk & Müller, 2000), and possibly, to a higher proportion of IMCs and CMCs in HSs' compared to German monolinguals' productions.

The second reason for potential variation in HSs' syntactic knowledge lies in SCs, since they have often been viewed as an indicator of syntactic complexity across languages (Housen et al., 2019; Neary-Sundquist, 2017; Peristeri et al., 2017; Sánchez Abchi & De Mier, 2017). Syntactic complexity is a multi-faceted construct, which has been defined, among other things, as the extent to which speakers use syntactic embedding and subordinate clauses (Housen et al., 2012).

However, the association of SCs with complexity has been called into question: several researchers found no correlation between the number of SCs and text complexity but did so for mean length of nominal phrases and clauses (Bulte & Housen, 2014; Lu, 2011; Wang & Tao, 2020). Overall, the evidence is conflicting. Nevertheless, if SCs indicate the complexity of a text to some extent, we would expect to find fewer SCs in HSs' productions in their HL compared to monolingual speakers of that language or even compared to HSs' ML due to language dominance shift.

In addition to the syntactic factors outlined above, discourse knowledge of registers is another locus of variation for HSs in their HL because they most likely have not been exposed to as wide a range of registers as encountered by monolingual speakers of the same language (Polinsky, 2018, pp. 323-324). Register is a variety definable in terms of situational parameters such as participants, channel, purpose and formality of communication (Biber & Conrad, 2001, p. 175). In this study, we operationalize formality as spoken or written communication with public institutions, and informality as spoken or written communication with friends and family. We expect HSs to be less familiar with formal registers of the HL, but to be more fluent in informal registers. At the same time, HSs' ML typically follows a different trajectory: HSs use it in a wider range of communicative situations and thus develop formal and informal register repertoires comparable to monolinguals.

The interaction of these two knowledge types (core grammatical features and register repertoire) is essential because registers systematically influence language choices, including clause type selection in accordance with the register norms of their social and cultural environment (Schleppegrell, 2013, p. 22; Schleppegrell & Colombi, 1997, p. 494). While the

relevance of social and cultural determinants of registers has been acknowledged, investigators have not always approached registers and their influence on structural choice from a comprehensive perspective. Some researchers have attributed specific linguistic features solely to mode differentiation (i.e. speech vs. writing) and have argued that written language is more complex than spoken language (Poole & Field, 1976). Alternatively, Halliday (1985) argues that spoken and written productions differ in type of complexity and that one should not be pitted against the other. Biber and Conrad (2001) stress the importance of distinguishing mode and setting, as not all written productions are expected to be similarly complex. For example, academic writing is a complex register that involves a lot of planning and syntactic condensation (Biber & Conrad, 2001; Schleppegrell & Colombi, 1997) while texting usually does not require much planning as further information can be added at any point.

Miller and Fernandes-Vest (2006) provided an overview of various studies addressing clause type selection in the context of spoken and written productions. Their focus was on one register in the spoken mode, namely spontaneous everyday conversations, and its comparison with written productions. Different written registers were not considered. The authors emphasize that spontaneous speech contains less subordination than coordination, as well as fragmented and unintegrated syntax with less complex phrases and clausal constructions (Miller & Fernandes-Vest, 2006, p. 13).

Similarly, Koch and Oesterreicher (2012) outlined syntactic features of the language of immediacy, defined as spontaneous face-to-face dialogues between familiar speakers, and the language of distance, defined as carefully planned interactions between strangers in the public sphere. The language of immediacy is characterized by errors in congruence, holophrastic utterances and parataxis. On the other hand, the language of distance is associated with compactness, complexity and density of information, and hypotaxis.

The above-mentioned studies suggest variation in the distribution of clause types among registers. However, to the best of our knowledge, there has not yet been a systematic study of clause types across written and spoken modes in formal and informal settings in descriptions of the same event, which is what we set out to do here.

2.3 *Optionality and Systemic Functional Linguistics*

We investigated the register-related choice of clause types on the basis of narratives where the same event could be expressed in various ways (with no or minimal changes in meaning). The alternatives considered here include (1) several independent main clauses (IMCs), (2) a compound sentence with several coordinate main clauses (CMCs), or (3) a complex sentence with a main and a subordinate clause (SC), as shown below:

(1) I was walking down the street. I saw a couple.

(2) I was walking down the street, and I saw a couple.

(3) While I was walking down the street, I saw a couple.

The existence of grammatical alternatives to express the same or similar meaning is termed optionality (Boyd, 2007). Two types can be identified (Dufter et al., 2009). We refer to the first type as optionality *A or 0,* defined in terms of presence or absence of a certain linguistic item, which does not change the construction it is embedded in (McGregor, 2013). For example, a speaker may use or omit the complementizer *that* in an English SC (Bakovic & Keer, 2001; Biber & Conrad, 2001). Our second type of optionality, *A or B*, includes two alternating variants of the same argument structure: their propositional meaning is identical, even though they may differ in information structure, and they use nearly identical lexical resources (Boyd, 2007; Sorace, 2000). For example, a speaker may alternate between two realizations of complements in ditransitive VPs (*gave John the book* vs. *gave the book to John*; e.g., Bresnan & Ford, 2010).

Compared to previous research (Alexiadou, 2014; Prentza & Tsimpli, 2013), which focused mostly on two alternatives and on clause-internal structures, such as argument realization or empty categories, we extend the pool of options to three and include structural alternatives crossing clausal boundaries.

Within Systemic Functional Linguistics theory, Halliday (1976) defines speech as a product of distinct choices that are simultaneously and successively carried out by any speaker of a language. He argues that there are three components in the process of choosing: "a specified condition under which the choice is available," "a specified realization of whichever of the options is selected," and "a specifiable likelihood that any one choice will be made" (Halliday, 2013, p. 19). For example, if speakers choose between an IMC and SC, they can consider to whom they are speaking and in what situation (specified conditions), they have to choose one of the syntactic forms (specified realization), and we can estimate how likely the speaker is to choose one clause type over the other in a given situation (specifiable likelihood).

2.4 *Syntactic optionality in heritage speakers*

In the following section, we discuss two studies addressing similar questions regarding clause type optionality in HSs' productions. The first study, by Sánchez Abchi and De Mier (2017), illustrates the influence of language typology on SC frequency in HSs' productions. They tested 118 child HSs of Spanish living in a French- and a German-speaking area of Switzerland and analyzed types and frequencies of SCs in their Spanish written narratives. The results demonstrate an important dissimilarity between SC frequency of HSs with German as the ML and HSs with French as the ML: HSs of Spanish with German ML produced significantly fewer SCs than those with French ML, who performed like Spanish monolinguals. The authors attribute this to the typological differences in SC word order between their majority German (V-final in SCs), and heritage Spanish (absence of V-final in SCs). Since the same typological difference applies to German (V-final in SCs) and English (absence of V-final in SCs), we expect differences in the frequencies of SCs in the German productions of HSs and German monolinguals. Since the researchers only investigated SCs in the written mode in the HL, more clause types as well as more strictly defined registers should be considered, in addition to the performance of HS in both their languages.

In the second study, Schleppegrell and Colombi (1997) analyzed three clause types (paratactic, hypotactic and embedded) produced in academic essays by two HSs of Spanish in the United States. The results show inter-individual variation concerning their clause chaining strategies: one participant used more hypotactic (adverbial) and non-restrictive relative clauses than the other. Interestingly, the two HSs adopted the same clause-combining strategies in academic essays in both majority English and heritage Spanish. This is particularly remarkable because they had received no formal education in Spanish and were not exposed to academic registers. Presumably, they had developed language-independent register awareness that they could draw from even in their less dominant HL (Schleppegrell & Colombi, 1997, p. 493). Since the authors only examined two speakers, additional quantitative research is called for. Furthermore, their study focused on just one mode and one setting, namely formal written. Broader registers including different modes and settings need to be investigated to account for register variation.

To address the gaps in the literature just discussed, the present study investigates three research questions (RQs) concerning syntactic optionality in HSs' productions. Based on findings from that literature, we also lay out hypotheses and predictions for each question:

RQ 1: With respect to the three clause types, do HSs make similar use of structural options in their ML (English) compared to English monolinguals and their HL (German) compared to German monolinguals?
Hypothesis 1: HSs will be similar to monolinguals in English, and dissimilar to monolinguals in German since HSs are normally more proficient in their dominant ML than in their HL.
Prediction 1: German SCs are more difficult for HSs due to the asymmetrical placement of finite verbs and the general complexity of SCs. Hence, we would expect fewer subordinations in the German productions of HSs compared to monolinguals.
RQ 2: Do HSs use comparable structural options in their ML (English) and their HL (German) in different registers?
Hypothesis 2a: We expect HSs to rely on their underlying register awareness in both of their languages.
Prediction 2a.1: Following Schleppegrell and Colombi (1997), we expect HSs to show similar clause type patterns across both languages.
Prediction 2a.2: The similarity in clause type patterns does not mean, however, that they show identical frequencies. Similar to Prediction 1, we expect fewer SCs in heritage German compared to majority English.
Hypothesis 2 competes with the claim that HSs have limited register awareness in their HL, which stems from using their HL mostly in informal conversations (Polinsky, 2018). Therefore, we suggest the following alternative hypothesis:
Hypothesis 2b: HSs apply their knowledge of informal registers in formal situations in their HL.
Prediction 2b: We expect register levelling in the German productions of HSs and differentiation between registers in their English productions.
RQ 3: Do certain registers reveal preferences for particular structural options?
Hypothesis 3: Following Systemic Functional Linguistics, we expect an association between the three clause types and the two settings and two modes, which we take to represent four registers.
Prediction 3.1: We expect more SCs in formal than in informal registers in all speaker groups because SCs are associated with higher syntactic complexity.
Prediction 3.2: For HSs, we expect more influence of formality in the spoken mode than in the written mode. We predict that HSs account more for formality variation in the spoken mode than in the written mode because they typically have better speaking than writing skills (Montrul, 2011).

3 Method

3.1 *Participants*

We tested 60 adolescent participants aged 14 to 18 years (mean age=16.16, SD =1.17, 33 females), with 20 in each of three language groups:

1. HSs of German with ML English (mean age=15.95, SD=1.28, 10 females)
2. Monolingual speakers of German (mean age=16.45, SD=0.83, 11 females)
3. Monolingual speakers of English (mean age=16.06, SD=1.35, 12 females)

The HSs of German grew up in the United States in a majority English environment, speaking German with at least one native German-speaking parent in the household (four HSs had two German-speaking parents, and 16 had one). All speakers were either born in the United States or moved there before age 2. They had not received bilingual education, but may have

participated in German "Saturday schools" or other German-speaking activities. Speakers of established German "language islands" (e.g., Moundridge Schweitzer German, Pennsylvania German) were excluded from the study. Monolinguals were defined as individuals whose native language was the only language spoken at home, but who might have acquired further languages through foreign language instruction.

German HSs were recruited in Boston, MA, Madison, WI, and St. Paul, MN by contacting German organizations and institutions as well as via social media platforms. German monolinguals were recruited via contacting German high schools in Berlin. English monolinguals were recruited in the same cities as German HSs (and in Long Island, NY) via social media platforms or through personal contacts. The socio-economic status of HSs' families was slightly higher than that of English and German monolinguals (see Appendix A[2] for detailed information on parental education) due to the nature of our HS participant pool, which mostly consisted of professionals whose move to the United States was work-related.

The German and English productions of the HSs as well as those of the English monolinguals were elicited in the United States and the productions of the German monolinguals were elicited in Germany. The data was retrieved from the openly accessible RUEG 0.4.0 corpus (Wiese et al., 2020). Both English and German productions of HSs were compared to the productions of monolingual speakers of each language.

3.2 *Materials and Procedure*

Data collection followed the Language Situations methodology (Wiese & Pohle, 2016), which elicits controlled, comparable, and quasi-naturalistic productions across registers. Participants watched a short non-verbal video depicting a minor car accident and recounted what they saw, imagining themselves witnesses to the accident. The procedure took place in two settings. In a formal setting, the elicitor was formally dressed and met with the participant in a room set up like an office. In the informal setting, the elicitor was casually dressed and met with the participant in a more relaxed setting, with snacks and beverages offered. In order to enhance an easy-going, comfortable atmosphere, the elicitor and the participant engaged in 10-15 minutes of task-unrelated conversation in the target language at the beginning of the informal session. The participant watched the video three times in total (twice in the first setting, once in the second setting) and was asked to recount it in two different modes: spoken and written.

The formal recounting was operationalized as a voice message to a police hotline (spoken) and a witness report to the police (written), while the informal recounting comprised a WhatsApp voice message (spoken) and a WhatsApp text message (written) to a friend. The order of settings (formal/informal) and modes (spoken/written) was balanced across participants. The monolingual participants completed all tasks in one session. The HSs completed the tasks in two sessions—one for their ML (English) and one for their HL (German)—with an interval of three to five days in between to minimize priming effects. The order of language sessions was counterbalanced across participants. Upon completion of all the narrative tasks, the participants filled out an online questionnaire[3] about their language background as well as a self-assessment of their abilities in each language on a 5-point Likert scale. Self-assessment showed that HSs rated their speaking and writing skills higher in their majority English (speaking mean = 5, SD = 0; writing mean = 4.95, SD = 0.22) than in heritage German (speaking mean = 3.65, SD = 0.88;

[2] All Appendices to which we refer in this study may be accessed at https://osf.io/h7uac/.

[3] Questionnaire for adolescent participants of *Research Unit Emerging Grammars* may be accessed at https://umfrage.hu-berlin.de/index.php/761648

writing mean =2.7, SD = 0.26). English monolinguals rated their skills comparably high (speaking mean = 4.7, SD = 0.57; writing mean = 4.4, SD = 0.6) to German monolinguals (speaking mean = 4.95, SD = 0.22; writing mean = 4.75, SD = 0.55).

3.3 *English Data Coding*

We investigated syntactic optionality on the basis of the three clause types: IMC, CMC, and SC. Each of these is described in detail below, in this section for English, and in the next section for German.

In both languages we examined only finite clauses (4a-b). Clauses were included in our analyses even when the subject was omitted (4c), since subject omission is a typical feature of informal registers. Supplement clauses, i.e. as syntactically unintegrated clauses inserted in others (4d), were also included in our analyses (Huddleston & Pullum, 2002, p. 1350). Each structure in square brackets in (4) was counted as one clause.

(4) a. [A man was walking with a soccer ball] [which bounced off of his foot] [when he was crossing the street] (USmo72ME_fsE)[4]
b. [There was like a ball] [that flew into the road] [and a dog jumped out] [and chased it] (USmo74ME_isE)
c. [Just saw a car crash] (USbi65MD_isE)
d. [He was walking with his wife]—[I'm assuming it was his wife$_{supplement}$], [but I'm not sure$_{supplement}$]—[and bouncing a ball] (USbi55FD_isE)

In both English and German, morphologically non-canonical clauses, i.e. deviations with respect to person and number agreement paradigms, were still included, since they do not interfere with the structural options relevant here. Subordinations missing complementizers or relative pronouns were included because a large proportion of the data stems from spoken productions and omitting complementizers or relative pronouns is common in spoken productions (Biber & Conrad, 2001). To constrain the nature of the question and emphasize a particular English-German word order difference, namely finite verb position as discussed in Section 2.2, we restricted our attention to finite clauses. Therefore, non-finite constructions, such as infinitives (5a), present participles (5b), and past participles (5c) were excluded.

(5) a. [They turned a corner on the sidewalk *to walk into the parking lot*] (USbi54FD_fwE)
b. [There was a blue car *driving across the parking lot*] (USbi50FD_fsE)
c. [A blue car drove down the road *followed by a white car*] (USbi52FD_fwE)

Table 1 shows the total number of English clause productions per speaker group and register.

TABLE 1. English clause productions by speaker group and register

Register	**Heritage Speakers**	**Monolinguals**
Formal Spoken	366 (32%)	314 (30%)
Formal Written	305 (27%)	292 (28%)

[4] The participant code in the examples includes the following information:
US/DE - country of elicitation, United States or Germany; bi/mo - bilingual/monolingual speaker; 01 - speaker number; M/F - speaker's sex; D/E - HS's HL (Deutsch for German) or monolinguals' L1 (English or German); f/i - formal/informal setting; s/w - spoken/written mode; D/E - language of elicitation, D for German or E for English

Informal Spoken	293 (25%)	268 (25%)
Informal Written	185 (16%)	174 (17%)
Total	**1149 (100%)**	**1048 (100%)**

3.3.1 English independent main clauses

Independent main clauses are not introduced by a coordinating conjunction, i.e. *and, or, but* (syndetic coordination), or by coordination without an overt linker (asyndetic coordination) (Haspelmath, 2007; Quirk et al., 1985). Typical examples are shown in (6a). We also considered clauses introduced by linking adverbs and conjuncts as IMCs, including *however*, *therefore*, *then*, *moreover*, resultative *so*, and *yet*. This is because these linkers do not pass Quirk et al.'s (1985) tests for coordination (Appendix B); either they can be moved within a clause, they can co-occur with a coordinator, or they do not allow subject ellipsis in the subsequent clause. An example of such a clause is (6b). Each clause in square brackets in (6) was counted as one IMC.

(6) a. [I saw a car accident today in the parking lot of an apartment building$_{IMC}$]. [A couple were walking with a stroller down the side of the road$_{IMC}$]. (USbi64MD_fwE)
b. [Then he goes over to the other drivers$_{IMC}$] (USbi57FD_iwE)

3.3.2 English coordinate main clauses

Coordinate main clauses are defined as IMCs with the exception of being introduced by a coordinating conjunction. We included three coordinating conjunctions—*and*, *or*, and *but*—because they pass all coordination tests by Quirk et al. (1985, Appendix B) and are classified as the most representative coordinators. As noted in 3.3.1, we did not consider linking adverbs and conjuncts as coordinators since they do not pass all coordination tests (Haspelmath, 2007, pp. 48-49; Quirk et al., 1985, p. 927). We differentiated three subtypes of CMCs. CMCs with overt subjects are composed of a subject and a predicate, and are independent of other clauses (7a). In contrast, CMCs with omitted subjects only contain a finite verb or predicate (7b). The subject, though omitted, can be retrieved from the previous clause. If the subject is dropped but not shared with the previous clause, the clause is classified as IMC. Finally, some CMCs with omitted subjects show asyndetic coordination, where the coordinate clause is not introduced by an overt linker but still shares the subject of the previous clause (7c). Each clause in square brackets in (7) was counted as one CMC.

(7) a. It was kinda crazy [but thankfully no one was hurt$_{CMC}$] (USbi55FD_isE)
b. Two cars were driving [and turned the corner into the parking lot$_{CMC}$] (USbi51FD_fwE)
c. The male whose soccer ball went into the road helped the woman with her dog and groceries [then called 911 to get the police at the scene$_{CMC}$] [then went to make sure$_{CMC}$] the passengers in the car were ok and unharmed (USmo56FE_fwE)

3.3.3 English subordinate clauses

Subordinate clauses are dependent on another clause. We divided subordinations into three subcategories: complement, relative, and adverbial clauses. Complement SCs function as arguments of a predicate (8a) (Biber et al., 1999, p. 658; Noonan, 2007) or as noun complements (Biber et al., 1999, pp. 645-656). Complement SCs should not be confused with what follows multi-word discourse markers (DMs) *I think, I guess, I mean*, which look like epistemic expressions. In order to differentiate a DM from an epistemic expression, a complementizer test was applied: if a complementizer/wh-pronoun was present or could be added after the expression

in question, it was not taken to be a DM and, hence, the following part was annotated as a complement SC (8b). If a complementizer was absent and could not be added, the expression was taken to be a DM with no complement SC (8c). Each clause in square brackets in (8), (9), and (10) was counted as one SC.

(8) a. They weren't looking and then realized [a car was coming$_{SC}$] (USbi52FE_fwE)
b. I don't know [what else happened$_{SC}$] (USbi50FD_isE)
c. And then these two cars came by and like *I dunno*$_{DM}$ they came to the intersection and the guy dropped his ball (USmo64FE_isE)

Relative SCs modify an NP (Andrews, 2007) (9a) or an entire proposition (Biber et al., 1999, p. 867) (9b), while adverbial SCs modify main clauses similarly to adverbs modifying a proposition (Thompson et al., 2007) (10a-b).

(9) a. it tried to like stop for this dog [that was running into the street$_{SC}$] (USmo65FE_isE)
b. The dog saw the ball and ran for it, [which caused the car in the front to stop$_{SC}$]. (USbi51FD_fwE)

(10) a. I witnessed the crash [as I was walking along the side of a street$_{SC}$] (USbi55FD_fwE)
b. The car stopped short [because there was a dog trying to get the ball$_{SC}$] (USmo59FE_iwE)

3.4 *German data coding*

Table 2 shows the total number of German clause productions per speaker group.

TABLE 2. German clause productions by speaker group and register

Register	**Heritage Speakers**	**Monolinguals**
Formal Spoken	346 (33%)	491 (31%)
Formal Written	271 (26%)	422 (26%)
Informal Spoken	277 (26%)	438 (27%)
Informal Written	160 (15%)	258 (16%)
Total	**1054 (100%)**	**1609 (100%)**

3.4.1 German independent main clauses (IMC)

Parallel to English, German IMCs are not introduced by a coordinating conjunction or by coordination without an overt linker (Haspelmath, 2007; Quirk et al., 1985). Canonical German has V2 word order in main clauses and V-final word order in SCs. Therefore, only clauses observing V2 were coded as IMCs (11a-b). V2 clauses beginning with the causal connective *weil* were also counted as IMCs (11c) since *weil* has lost its status of a subordinator in V2 clauses (Antomo & Steinbach, 2010; Reis, 2013). It also does not qualify as a prototypical coordinator because it does not allow subject ellipsis in the subsequent clause. We also considered clauses introduced by linking adverbs and conjuncts as IMCs, including *denn, ebenso, also* and *doch* (11d). This is because these linkers do not pass one or several of Quirk et al.'s (1985) tests for coordination (Appendix B): they can be moved within a clause, can co-occur with a coordinator, or they do not allow subject ellipsis in the subsequent clause. Other clauses that were conceptualized as SCs but that showed V2 instead of V-final word order were treated as SCs, as

will be discussed in section 3.4.3. We included two deviating instances in IMCs (11e-f). In these examples the SC precedes the main clause in preverbal position, which would call for the verb to immediately follow, i.e. surface as V2, but the verb non-canonically follows the subject. These two cases were still coded as IMCs, even though the verb is superficially in V3 position there (Alexiadou & Lohndal, 2018; Wiese & Müller, 2018). Each clause in square brackets in (11) was counted as one IMC.[5]

(11a) [Neben ihr stand an der Leine ihr Hund$_{IMC}$].
Next her stood on the leash her dog
'Her dog was on a leash next to her.' (DEmo53FD_fwD)

(11b) [es gab auch eine junge familie mit vater
it gave too a young family with father
mutter, und kleinkind auf der rechten seite vom
mother, and small child on the right side of the
parkplatz$_{IMC}$].
parking lot
'There was also a young family with a father, a mother, and a baby on the right side of the parking lot.' (USbi74MD_fwD)

(11c) [weil es hat auf einmal so richtig laut gekracht und so$_{IMC}$]
because it has suddenly so really loudly crashed and so
'Because there suddenly was a loud crashing noise and stuff.' (DEmo57FD_isD)

(11d) Und weil dort gerade zwei Autos langfuhren, kam es
and because there just two cars along-drove came it
zu einem Unfall, [denn das erste Auto musste stark
to an accident since the first car had-to strongly
einem Unfall, [denn das erste Auto musste stark bremsen$_{IMC}$]
an accident since the first car had-to strongly brake
'And because two cars were driving there, an accident happened, since the first car had to brake hard.' (DEmo59FD_iwD)

(11e) so wenn sie hat gehaltet [sie *hat* dien erste des erste auto geschlagt$_{IMC}$]
so when sie has stopped sie has the first the first car hit
'So when she stopped, she hit the first car.' (USbi77FD_fsD)

(11f) und alse die autos ge stopt van [ein hunt *is* veck gerant.$_{IMC}$]

[5] The original orthography of the written productions was preserved.

und when the cars stopped had a dog is away run
'And when the cars had stopped, a dog ran away.' (USbi73MD_fwD)

3.4.2 German coordinate main clauses

We considered three coordinating conjunctions in German: *und* (and), *oder* (or), and *aber* (but) because they pass all coordination tests (Appendix B). We differentiated three subtypes of CMCs. CMCs with overt subjects (12a-b), syndetic CMCs with omitted subjects (12c) and asyndetic CMCs with omitted subjects (12d). Each clause in square brackets in (12) was considered one CMC.[6]

(12a) da war ein man und eine frau [und der mann hatte einen fussball$_{CMC}$].
There was a man and a woman and the man had a soccer ball
'There was a man and a woman and the man had a soccer ball.' (USbi58FD_iwD)

(12b) ihr wisst ja nicht genau wo [aber ich bin grade halt da
you know prt not exactly where but I am just prt here
und da hingelaufen$_{CMC}$]
and here along-walked
'You don't really know where but I just like walked there and there.' (DEmo57FD_isD)

(12c) auf der anderen straßenseite war eine frau am auto [und hat
on the other street side was a woman at the car and has
ihren einkauf eingepackt$_{CMC}$]
her shopping in-packed
'On the other side of the road, a woman was at her car and loaded her shopping into her car.' (DEmo55FD_fsD)

(12d) der hund hat dann den ball gesehen [is dem ball hinterhergerannt$_{CMC}$]
the dog has then the ball seen is the ball after-run
'The dog then saw the ball, ran after it' (DEmo55FD_fsD)

3.4.3 German subordinate clauses

Subordinate clauses are dependent on another clause. In the German productions, most SCs showed V-final structures (13a-b). We also counted two types of V2 structures as SCs: canonical unintroduced complement clauses without a complementizer (13c), and non-canonical V2 clauses clearly conceptualized as SCs (14a-b, seven instances in total). Each clause in square brackets in (13-15) was counted as one SC.

[6] German particles lacking direct English translation are glossed as "prt" in (12b).

(13a)	und	konnte	daher	nicht	wissen	[ob	nach	der	Ball	ein
	and	could	therefore	not	know	whether	after	the	ball	a
	Mensch	kommen	würde$_{SC}$]							
	human	come	would							

‘And due to this (the driver) could not know if a person would come after the ball.’ (USbi64MD_fwD)

(13b)	Anschließend	ging	der	Mann,	[der	zuvor	der	Frau
	subsequently	went	the	man	who	before	the	woman
	geholfen	hatte$_{SC}$],	zu	ihnen.				
	helped	had	to	them				

‘Subsequently, the man who had previously helped the woman, went to them.’ (DEmo69MD_fwD)

(13c)	Ich	hoffe	[ich	konnte	ihnen	behilflich	sein$_{SC}$]!
	I	hope	I	could	you	helpful	be

‘I hope I could be of help to you!’ (DEmo54FD_fwD)

(14a)	und	der	mann	hat	ein	ball	[das	er	er	hat	gespielt	mit$_{SC}$]
	and	the	man	has	a	ball	that	he	he	has	played	with

‘And the man had a ball, with which he played.’ (USbi57FD_fsD)

(14b)	Die	hatten	beiden	rausgekommen	zu	sehen	[weder	des	auto
	they	had	both	out-come	to	see	whether	the	car
	hatt	ihrgenwehrmand	wegetahn$_{SC}$].						
	had	somebody	hurt						

‘They both got out to see whether the car had hurt anybody.’ (USbi53MD_fwD)

We subdivided SCs into three categories: complement (15a), relative (15b), and adverbial (15c):

(15a)	Es	begab	sich	so,	[dass	ein	Hund	auf	der	Straße	lief$_{SC}$]
	it	went	itself	so	that	a	dog	on	the	street	walked

‘It so happened that a dog walked on the street’ (DEmo63ME_fwD)

(15b)	Ein	Mann	[der	anscheinend	mit	seiner	Frau	spazieren	war$_{SC}$]	prellte
	a	man	who	apparently	with	his	wife	walk	was	bounced
	einen	Fußball.								
	a	soccer ball								

‘A man who was walking apparently with his wife bounced a soccer ball.’ (DEmo69MD_fwD)

(15c)	[Als	sie	die	straße	überqueren	wollten$_{SC}$],	ist	der	Mann	den	Ball	aus
	as	they	the	street	cross	wanted	is	the	man	the	ball	out
	dem	Hand	gefallen.									
	the	hand	fallen									

'As they wanted to cross the street, the ball dropped out of the man's hand.'
(USbi64MD_fwD)

3.5 *Data Analysis*

After the data was coded for each clause type, we recoded the dependent variable "Clause type" with three levels (IMC, CMC, and SC) into three separate dependent variables "IMC", "CMC", and "SC" with two levels (1 and 0). Then, each clause type was analyzed independently from the other two types using generalized binomial linear mixed effect models in R (R Core Team, 2019) and the lme4 package (Bates et al., 2015). We maximally specified the fixed effects by including all theoretically relevant independent variables and their interactions: speaker group (heritage/monolingual), setting (formal/informal), mode (spoken/written), and language status (heritage/majority). We contrast-coded the factors using sum contrast coding (-.5/.5). The random effect of participants was also maximally specified and included the random slopes for setting and mode (Barr et al., 2013). In the next section, we report the z- and p-values of the models, for full model summaries, see Appendix C.

4 Results

4.1 *Comparison of clause patterns in majority English vs. monolingual English*

4.1.1 English independent main clauses

For English IMCs, we observed a main effect of mode (z = -8.05, p < .001): speakers produced more IMCs in the written than in the spoken mode (Fig. 1).[7] German HSs and English monolinguals performed similarly in their production of IMCs in each of the four conditions, and both groups produced more IMCs in the written than in the spoken mode.

[7] Error bars represent bootstrapped CIs in all figures

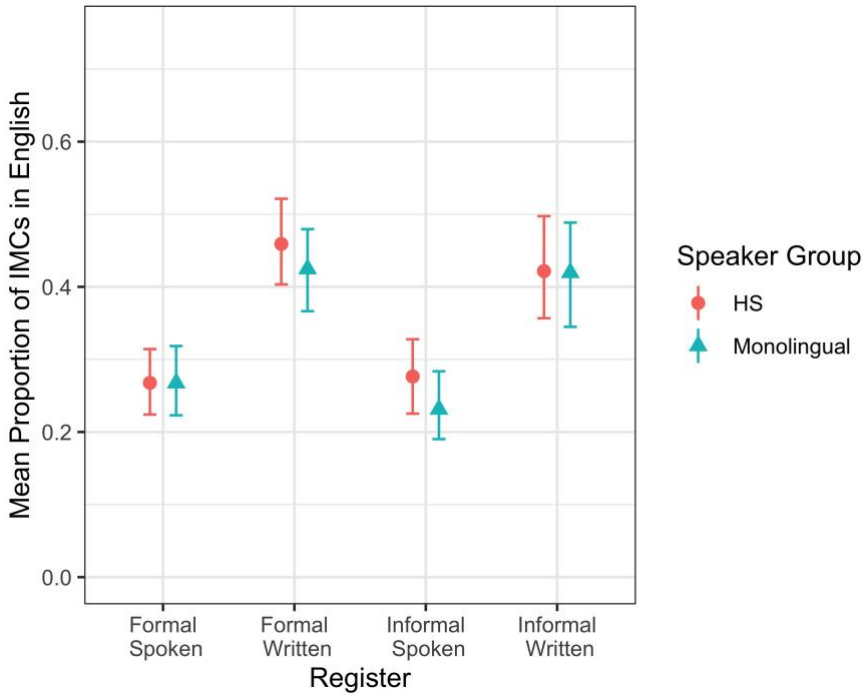

Figure 1: Mean proportion of IMCs in English by speaker group and register

4.1.2 English coordinate main clauses

For English CMCs, we observed two main effects and one interaction. First, there was a main effect of setting (z = -3.90, p < .001): speakers produced more CMCs in the informal than in the formal setting (Fig. 2). Second, there was a main effect of mode (z = 8.11, p < .001): speakers produced more CMCs in the spoken than in the written mode (Fig. 2). In addition, there was a significant two-way interaction between setting and mode (z = 2.45, p = .014). Tukey's multiple comparison test (MCT), run with the *emmeans* package (Lenth, 2020), revealed no difference between the formal and informal settings in the spoken mode ($mean_{fs}$ = 0.47, $mean_{is}$ = 0.51[8]; *estimate* = -0.17, *SE* = 0.12, z = -1.40, p = .498), but a significant difference between the two settings in the written mode, with more CMCs in the informal than in the formal written condition ($mean_{fw}$ = 0.24; $mean_{iw}$ = 0.38; *estimate* = -0.63, *SE* = 0.15, z = -4.14, p < .001). This indicates that German HSs and English monolinguals performed similarly regarding the production of CMCs overall, and that both groups were sensitive to the setting and mode, with a significant difference between the informal and formal settings in the written mode (more CMCs in informal), and no such difference in the spoken mode.

[8] fs – formal spoken, is – informal spoken, fw – formal written, iw – informal written

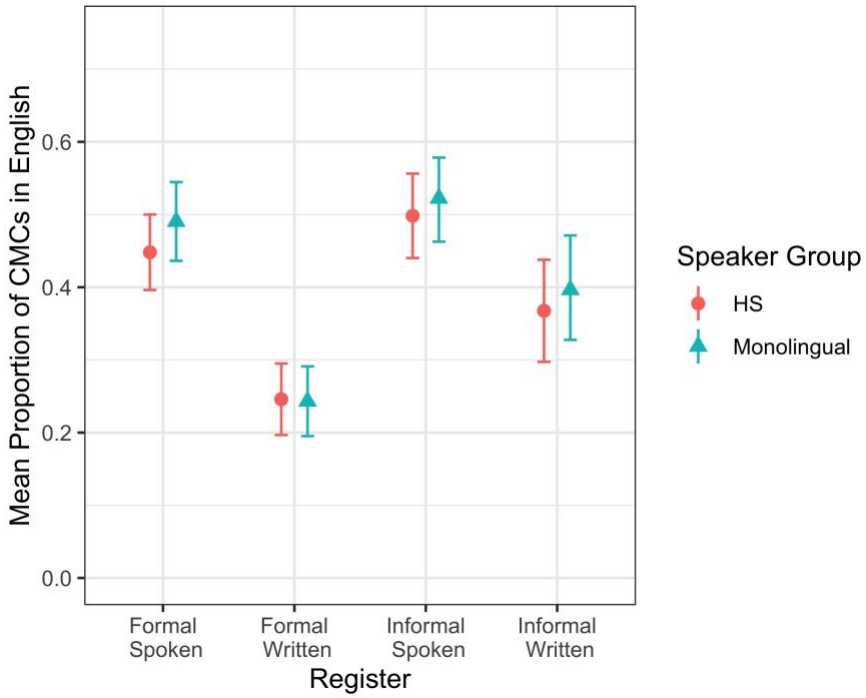

Figure 2: Mean proportion of CMCs in English by speaker group and register

4.1.3 English subordinate clauses

For English SCs, we observed a main effect of setting (z = 3.90, p < .001): speakers produced more SCs in the formal than in the informal setting (Fig. 3). There was also a significant two-way interaction between setting and mode (z = -1.96, p = .050). Similarly to CMCs, Tukey's MCT revealed no difference between the formal and informal settings in the spoken mode ($mean_{fs}$ = 0.26; $mean_{is}$ = 0.23; *estimate* = 0.21, *SE* = 0.14, z = 1.56, p = .401), but a significant difference between the two settings in the written mode, with more SCs in the formal than informal ($mean_{fw}$ = 0.31; $mean_{iw}$ = 0.20; *estimate* = 0.62, *SE* = 0.16, z = -4.14, p = .001). These results show that German HSs and English monolinguals performed similarly regarding the production of SCs, and both groups were sensitive to the setting and mode, with a significant difference between the informal and formal settings in the written mode (more SCs in formal), and no such difference in the spoken mode.

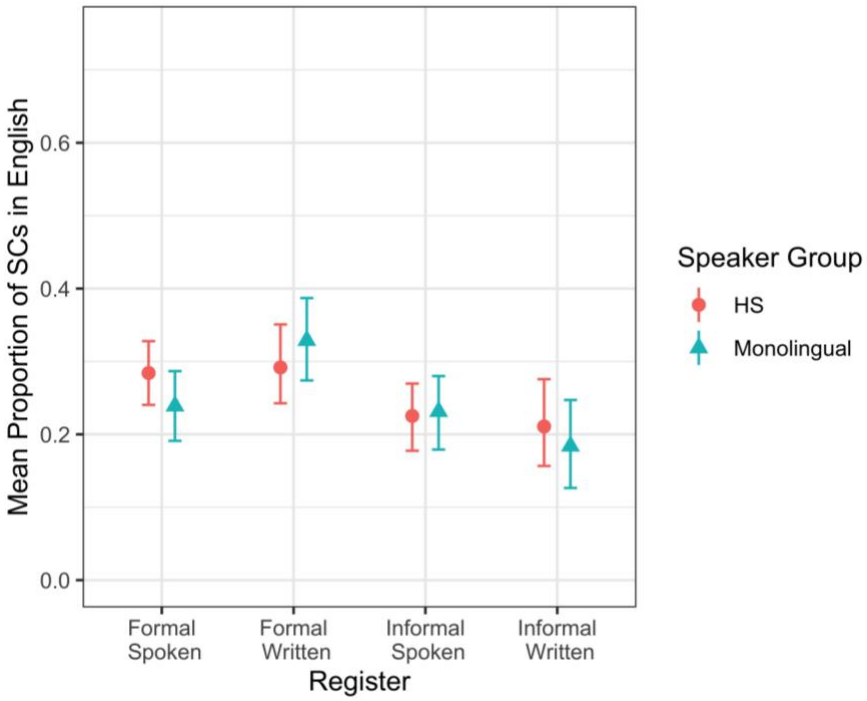

Figure 3: Mean proportion of SCs in English by speaker group and register

4.2 Comparison *of clause patterns in heritage German vs. monolingual German*

4.2.1 German independent main clauses

For German IMCs, we observed a main effect of mode (z = -8.61, p < .001): speakers produced more IMCs in the written than in the spoken mode (Fig. 4). This shows that German HSs and German monolinguals performed similarly in their production of IMCs in each of the four conditions, and both groups produced more IMCs in the written than in the spoken mode.

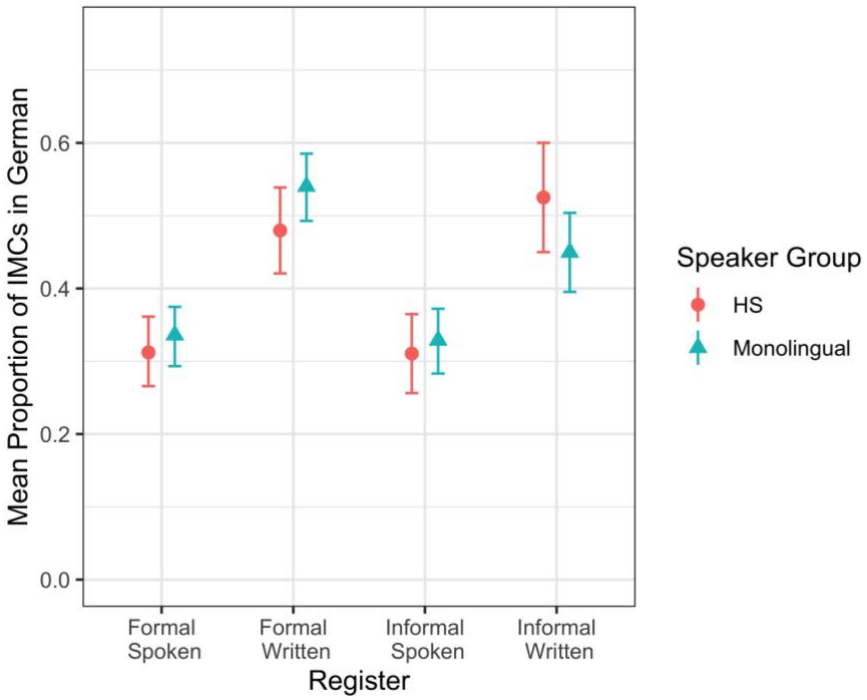

Figure 4: Mean proportion of IMCs in German by speaker group and register

4.2.2 German coordinate main clauses

For German CMCs, we observed three main effects and two interactions. First, there was a main effect of group (z = 3.11, p = .002): German HSs produced more CMCs than German monolinguals (Fig. 5). Second, there was a main effect of setting (z = -6.10, p < .001): both speaker groups produced more CMCs in the informal than in the formal setting (Fig. 5). Third, there was a main effect of mode (z = 9.27, p < .001): both speaker groups produced more CMCs in the spoken than in the written mode (Fig. 5).

In addition, there was a significant two-way interaction between group and setting (z = 1.97, p = .049). Tukey's MCT revealed a significant difference between German HSs and monolinguals in the formal setting, with HSs producing more CMCs than monolinguals (*estimate* = 0.60, *SE* = 0.17, z = 3.55, p = .002), but an absence of such a difference in the informal setting (*estimate* = 0.25, *SE* = 0.16, z = 1.59, p = .387; Fig. 5).

Finally, there was a significant two-way interaction between setting and mode (z = 2.84, p = .004). Tukey's MCT revealed a significant difference between the formal and informal settings in both spoken and written modes, with more CMCs in the informal than in the formal setting. However, the difference between the settings was greater in the written mode ($mean_{fw}$ = 0.22; $mean_{iw}$ = 0.39; *estimate* = -0.80, *SE* = 0.14, z = -5.63, p < .001) than in the spoken mode ($mean_{fs}$ = 0.44; $mean_{is}$ = 0.53; *estimate* = -0.30, *SE* = 0.11, z = -2.77, p = .029). This indicates that German HSs and German monolinguals performed differently regarding the production of CMCs, especially in the formal setting, where HSs produced more CMCs than monolinguals. At the same time, both groups were equally sensitive to the setting (informal always greater than formal) and mode, with a more pronounced difference between the settings in the written than in the spoken mode.

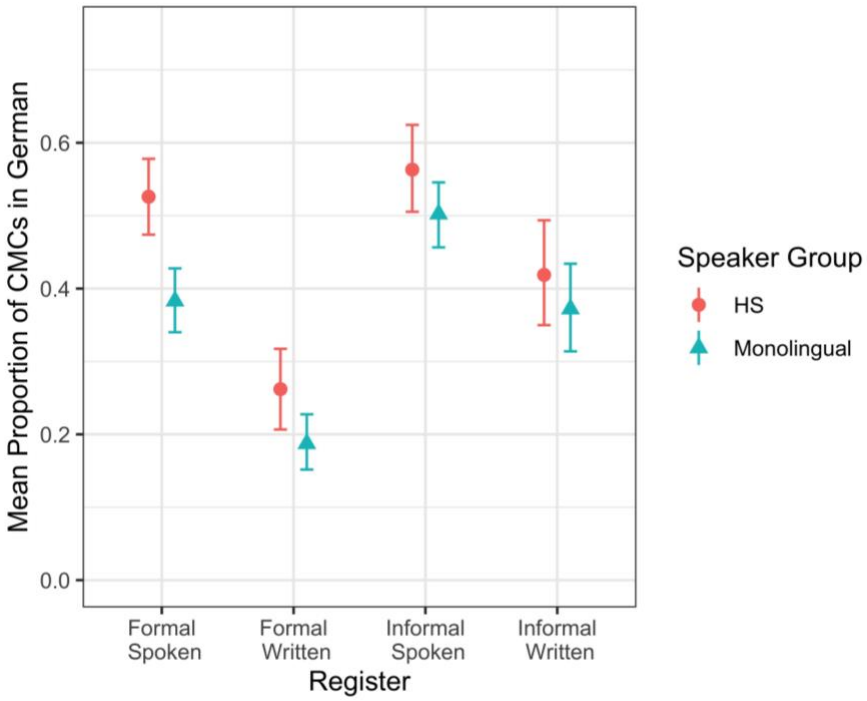

Figure 5: Mean proportion of CMCs in German by speaker group and register

4.2.3 German subordinate clauses

For German SCs, we observed two main effects and two interactions. First, there was a main effect of group (z = -3.10, p = .002): German monolinguals produced more SCs than HSs (Fig. 6). Second, there was a main effect of setting (z = 5.18, p < .001), with more SCs in the formal than in the informal setting (Fig. 6).

There was also a significant two-way interaction between setting and mode (z = -2.49, p = .013). Tukey's MCT revealed a significant difference between the formal and informal settings in both spoken and written modes, with more SCs in the formal than in the informal setting. However, the difference between the settings was greater in the written mode ($mean_{fw}$ = 0.27; $mean_{iw}$ = 0.13; *estimate* = 1.08, *SE* = 0.23, z = 4.77, p < .001) than in the spoken mode ($mean_{fs}$ = 0.23; $mean_{is}$ = 0.15; *estimate* = 0.43, *SE* = 0.16, z = 2.71, p = .034).

Finally, there was a significant three-way interaction between group, setting, and mode. To interpret it, we ran separate models for the HS and monolingual groups. In the HSs' productions, we observed a main effect of setting (z = 4.34, p < .001), with more SCs in the formal than in the informal setting. In addition, there was a two-way interaction between setting and mode (z = -3.17, p = .002). Tukey's MCT revealed a significant difference between the formal and informal settings in the written mode, with more SCs in the formal than in the informal setting (*estimate* = 1.71, *SE* = 0.38, z = 4.44, p < .001), and the absence of this difference in the spoken mode (*estimate* = 0.28, *SE* = 0.24, z = 1.16, p = .653). In the monolinguals' productions, we only observed a main effect of setting (z = 3.19, p = .001), with more SCs in the formal setting (Fig. 6).

These results show that German HSs and German monolinguals performed differently regarding the production of SCs, with HSs producing fewer SCs than monolinguals. HSs were sensitive to the interaction of setting and mode, with a significant difference between the informal and formal settings in the written mode (more SCs in formal), and no such difference in the spoken mode. At the same time, monolinguals were only sensitive to the setting (more SCs in the formal setting).

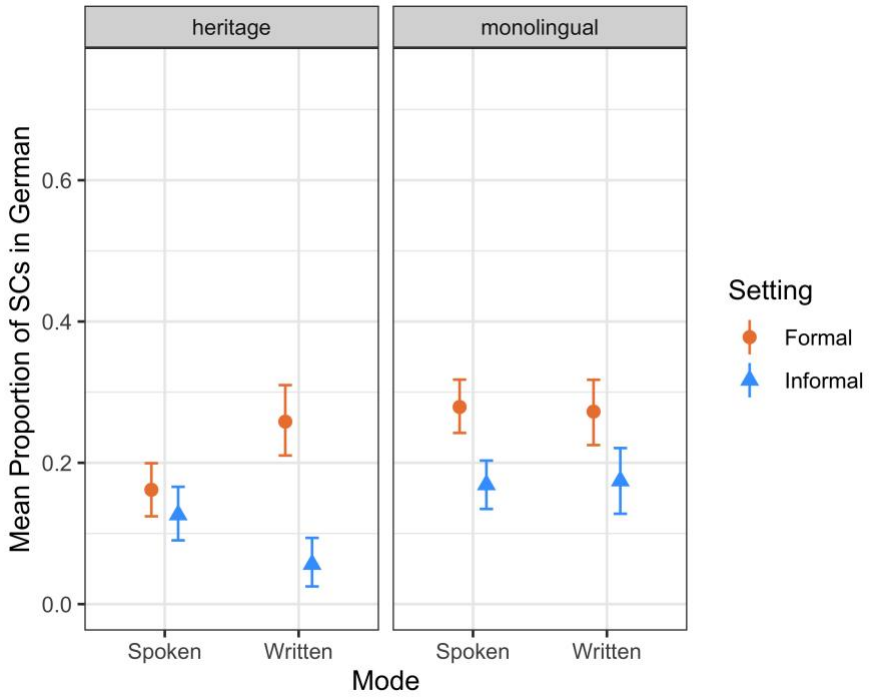

Figure 6: Mean proportion of SCs in German by mode and setting, faceted by speaker group

4.3 *Comparison of clause patterns in majority English and heritage German of HSs*

4.3.1 Independent main clauses in majority English and heritage German

For HSs' IMCs, we observed a main effect of language (z = -2.35, p = .019): HSs produced more IMCs in German than in English (Fig. 7). We also observed a main effect of mode (z = -8.27, p < .001): HSs produced more IMCs than in the written than in the spoken mode (Fig. 7). This shows that HSs performed differently in their majority English and heritage German, with overall more IMCs in German. At the same time, in both languages more IMC appeared in the written than in the spoken mode.

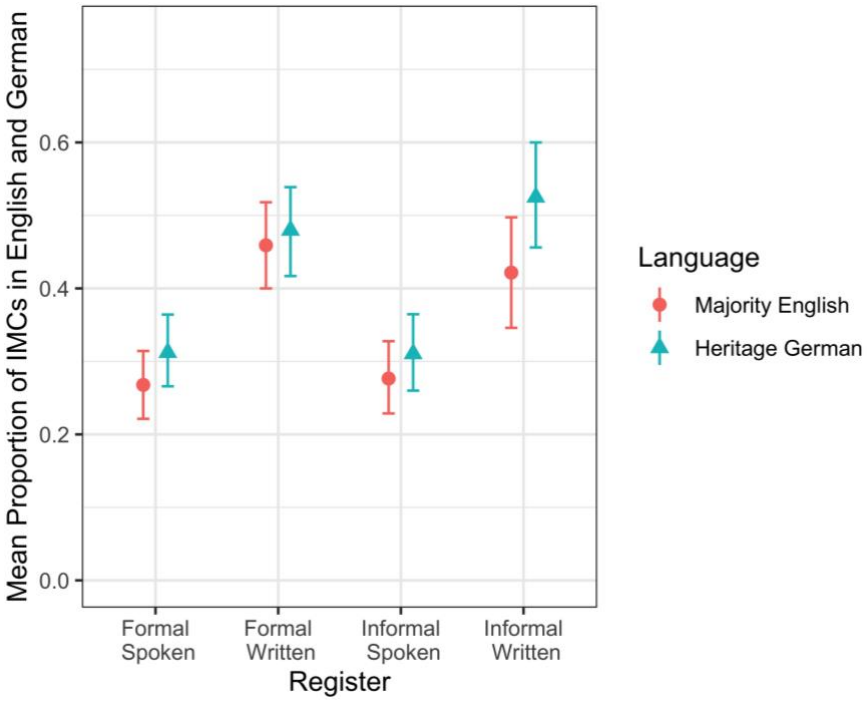

Figure 7: Mean proportion of IMCs in HSs' productions by language and register

4.3.2 Coordinate main clauses in majority English and heritage German

For HSs' CMCs, we observed a main effect of language (z = -2.58, p = .010): HSs produced more CMCs in German than in English (Fig. 8). We also observed a main effect of setting (z = -3.48, p = .001), with more CMCs in the informal than formal setting (Fig. 13). In addition, there was a main effect of mode (z = 8.20, p < .001): HSs produced more CMCs in the spoken than in the written mode (Fig. 8).

Finally, there was a significant two-way interaction of setting and mode (z = 2.51, p = .012). Tukey's MCT revealed a significant difference between the settings in the written mode, with more CMCs in the informal setting ($mean_{fw}$ = 0.25; $mean_{iw}$ = 0.39; *estimate* = -0.60, *SE* = 0.12, z = -3.85, p = .001), but an absence of such difference in the spoken mode ($mean_{fs}$ = 0.49; $mean_{is}$ = 0.53; *estimate* = -0.12, *SE* = 0.12, z = -1.01, p = .744). The same test also revealed a significant difference between the spoken and written modes in both formal and informal settings, with more CMCs in the spoken than written mode. However, the difference between the modes was greater in the formal setting ($mean_{fs}$ = 0.49; $mean_{fw}$ = 0.25; *estimate* = 1.07, *SE* = 0.13, z = 8.19, p < .001) than in the informal setting ($mean_{is}$ = 0.53; $mean_{iw}$ = 0.39; *estimate* = 0.60, *SE* = 0.15, z = 4.11, p < .001). This shows that HSs performed differently in their majority English and heritage German, with overall more CMCs in German. At the same time, both setting and mode played a role in CMC production, with a complex interplay between them.

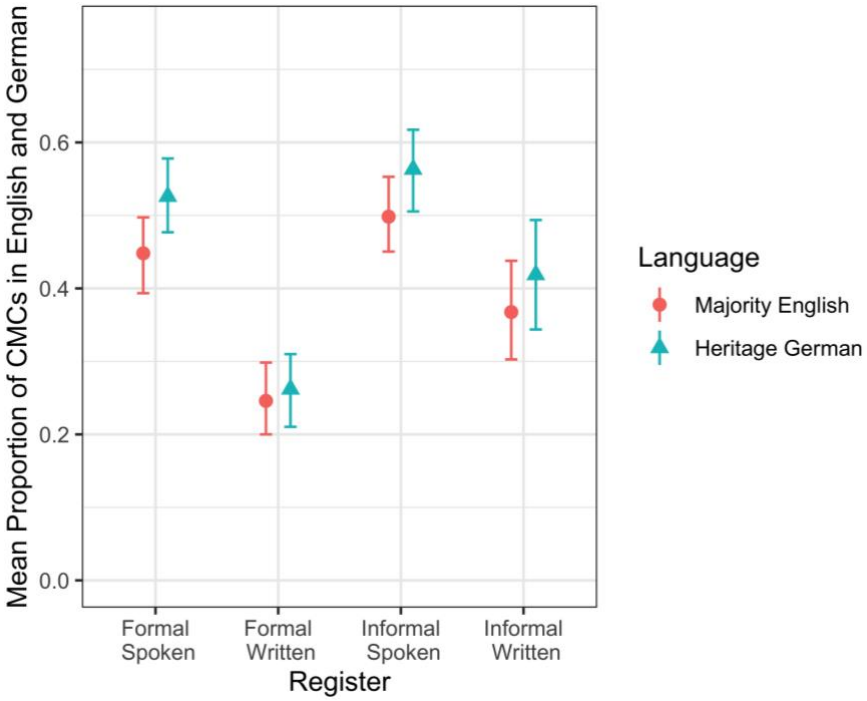

Figure 8: Mean proportion of CMCs in HSs' productions by language and register

4.3.3 Subordinate clauses in majority English and heritage German

For HSs' SCs, we observed a main effect of language (z = 5.52, p < .001): HSs produced more SCs in English than in German (Fig. 9). We also observed a main effect of setting (z = 5.00, p < .001), with more SCs in the formal than informal setting (Fig. 9).

In addition, we observed three interactions. First, there was a significant two-way interaction of language and setting (z = -2.26, p = .024). Tukey's MCT revealed that the difference between English and German was bigger in the informal setting ($mean_{Eng\ informal}$ = 0.22; $mean_{Ger\ informal}$ = 0.10; *estimate* = 0.67, *SE* = 0.18, z = 3.78, p = .001) than in the formal setting ($mean_{Eng\ formal}$ = 0.29; $mean_{Ger\ informal}$ = 0.20; *estimate* = 1.27, *SE* = 0.26, z = 4.96, p < .001), with both differences being significant. In addition, the same test showed a significant difference between the settings both in English and German, with more SCs in the formal setting. However, this difference was more pronounced in German (*estimate* = 0.98, *SE* = 0.23, z = 4.33, p < .001) than in English (*estimate* = 0.38, *SE* = 0.15, z = 2.59, p = .047, Fig. 9).

Second, there was a significant two-way interaction of setting and mode (z = -2.92, p = .003). Tukey's MCT revealed a significant difference between the settings in the written mode, with more SCs in the formal setting ($mean_{fw}$ = 0.28; $mean_{iw}$ = 0.14; *estimate* = 1.06, *SE* = 0.22, z = 4.83, p < .001), but an absence of such difference in the spoken mode ($mean_{fs}$ = 0.22; $mean_{is}$ = 0.18; *estimate* = 0.29, *SE* = 0.15, z = 1.89, p = .232).

Finally, there was a significant three-way interaction between language, setting, and mode (z = 2.53, p = .011). To interpret it, we ran two models, one on the English productions of HSs, and one on the German productions. In the English productions, we observed only the main effect of setting (z = 2.63, p = .009), with more SCs in the formal setting (Fig. 9). At the same time, in the German productions there was a main effect of setting (z = 4.34, p < .001), with more SCs in the formal setting, and an interaction between setting and mode (z = -3.17, p = .002), with no difference between the settings in the spoken mode (*estimate* = 0.29, *SE* = 0.24, z = 1.16, p = .653) but more SCs in the formal than informal setting in the written mode (*estimate* = 1.71, *SE* = 0.38, z = 4.44, p < .001; Fig. 9). These results show that HSs performed differently in their

majority English and heritage German, with overall more SCs in English. At the same time, both setting and mode played a role in SC production, with a complex interplay between them.

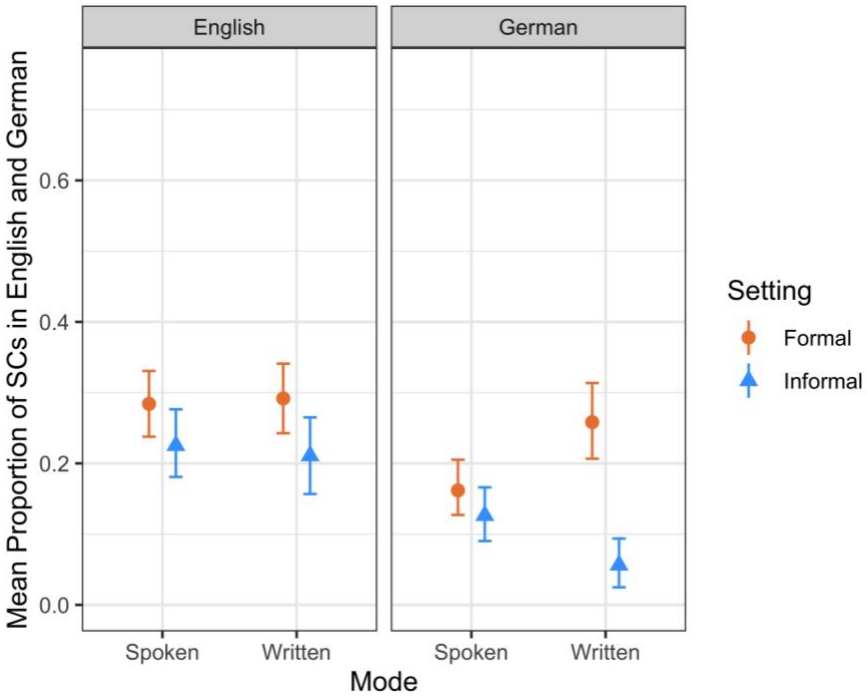

Figure 9: Mean proportion of SCs in HSs' productions by setting and mode, faceted by language

5 Discussion

The aim of this study was to investigate the syntactic and pragmatic resources used by HSs to structure their discourse according to register, and to find out whether the smaller range of communicative situations in which HSs experience their HL influences their choice of options. In order to do so, we analyzed clause type optionality in German HSs living in the United States. We examined three grammatical alternatives (IMCs, CMCs, and SCs) in their narratives in four different registers (formal spoken, formal written, informal spoken, informal written).
All HSs were able to produce the three grammatical alternatives in heritage German (i.e. acquired the syntactic structures of the clause types). This is not surprising even for HSs because clause structures are a core syntactic phenomenon that is acquired early and is robust. Research on L1 German and 2L1 including German shows that canonical SCs emerge between the ages of 3-4 after V2 has been established (Rothweiler, 2006; Sanfelici et al., 2020; Tracy, 2011). Since our bilingual participants were L1 learners of German and produced the whole range of patterns, it is safe to assume that their acquisition history matches what we know from L1 and 2L1 acquisition of German.

Our first research question focused on whether HSs make similar use of the structural options for expressing events (i.e. three clause types) in each of their languages as compared to monolingual speakers. Our data confirms Hypothesis 1, which stated that HSs are similar to monolinguals in English, and dissimilar to monolinguals in German, most likely since HSs are typically more dominant in their ML than in their HL. In English, German HSs and English monolinguals make similar use of structural options, at least in this domain of their ML. Researchers found differences between HSs and monolinguals in other areas, e.g., phonology (Polinsky, 2018) and scope assignment (Scontras et al., 2017). The discrepancy between previous work and our results can be explained by the nature of the investigated phenomena and by the

methodological approach: while Polinsky (2018) and Scontras et al. (2017) looked at subtle differences in a strict experimental setting, we considered less subtle differences in more naturalistic discourse. Therefore, while our results point to the similarity of the global syntactic organization of discourse in HSs and monolinguals, we cannot exclude more fine-grained differences.

In their German narratives, HSs differed from monolinguals. They produced the same frequencies in IMCs and similar overall patterns but different frequencies in CMCs and SCs. HSs produce more CMCs and fewer SCs than monolinguals, thus confirming Prediction 1, which expected fewer SCs in HSs' German productions.

Our results support those of Sánchez Abchi and De Mier (2017), who found that Spanish HSs with German ML produced fewer SCs in Spanish than Spanish monolinguals, possibly due to the typological difference between German and Spanish. Our data reveal the same pattern for a different language pair (English ML and German HL), thus suggesting an influence of ML-HL typological difference on SC use.

Our second question focused on whether HSs use comparable structural options across their two languages, i.e. their ML (English) compared to their HL (German). We had two competing hypotheses based on different lines of argumentation in the literature. Hypothesis 2a expected clause type patterns of HSs to look similar in English and German, since they rely on the same underlying register awareness in both languages. Hypothesis 2b expected register levelling in HSs' German narratives but not in their English ones because they would use their informal spoken register awareness across all registers for German but not for English.

Overall, our results support Hypothesis 2a. Figures 7-9 illustrate that the overall clause type patterns show similar trends in English and German. This could be evidence for transferable register awareness, which can be retrieved from the ML and applied to the HL, supporting Schleppegrell and Colombi (1997) and confirming Prediction 2a.1, which expected similar clause type patterns across HSs' languages. However, the results also show that HSs produce more IMCs and CMCs in German than in English. In addition, HSs use fewer SCs in German than in English. This can be attributed to HSs' dominance in English, absence of formal instruction in German, and absence of parallel structures in English and German SCs. HSs might face higher cognitive load producing SCs in German since its finite V-final word order does not overlap with English SVO and thus requires the inhibition of this option. The increased cognitive load, along with the limited exposure to German, may cause HSs to use fewer SCs in German. The results confirm Prediction 2a.2, which expected different frequencies of clause types in ML and HL, especially more SCs in majority English than in heritage German.

We found no support for Hypothesis 2b and Prediction 2b; if anything, they were contradicted by the interaction between language and setting in SCs. We observed a more pronounced difference in SC frequency between the two settings (formal/informal) in German than in English: HSs do not transfer the patterns of informal spoken register to other registers in heritage German.

Our third research question focused on whether certain registers reveal preferences for particular structural options. Confirming Hypothesis 3, which predicts an association between the clause types and registers, our results show that specific registers indeed have an effect on the choice of structural options in both languages and speaker groups. In the English and German data, mode has an effect on the distribution of IMCs in both speaker groups, with more IMCs in written than in spoken productions.

Interestingly, IMCs seem to be in complementary distribution with CMCs which appear more frequently in spoken modes for both speaker groups. One explanation could be an additional discourse function of coordinating conjunctions such as establishing a smoother

discourse and assuring coherence. Previous studies on spoken conversations found that coordinating *and* is used to repair thematic discontinuity (Turk, 2004), is part of the syntax of repairs (Levelt, 1989) and facilitates temporal organization (Keevallik, 2020; Nevile, 2007). Further qualitative discourse analysis should be performed to establish the exact discourse functions of coordinating conjunctions in spoken narratives.

Setting was another factor contributing to the distribution of CMCs (more in the informal setting) and SCs (more in the formal setting) in both languages. Again, this seems to be a complementary pattern: SCs are more frequent in the formal setting while CMCs are more frequent in the informal setting. This could confirm the connection between increased syntactic complexity of SCs compared to CMCs and the formal register norms. In formal contexts, speakers are expected to use more complex syntax and thus prefer SCs, while in informal contexts such an expectation is absent so speakers use CMCs. This aligns with Koch and Oesterreicher's (2012) model: they suggested a wider use of hypotaxis in the language of distance, which is close to our formal registers, and a wider use of parataxis in the language of immediacy, which is similar to our informal registers. Hence, Prediction 3.1, which associated SCs with formal register and high syntactic complexity, is confirmed.

The results show an interaction between setting and mode in English and German CMCs and SCs. For both clause types, a general trend is that when there is an interaction of these two parameters, mode seems to outweigh setting. For CMCs, in the spoken mode the differences between the settings either are reduced (in German) or completely disappear (in English) compared to the written mode. All participants seem to be more "relaxed" in the spoken mode and do not discriminate as extensively between settings compared to the written mode. This trend is, however, stronger in English, leading us to the conclusion that the participants might feel less obliged to adhere to the formality distinction in the "relaxed" spoken mode in English than German. This could be potentially attributed to different norms of formal spoken register in English and German, even though our study did not address the question of register norms directly.

For SCs, the situation is more complex. Accounting for the three-way interactions between speaker group, setting and mode in German, as well as between HSs' language, setting and mode, we observed the following patterns in SC frequencies in English and German productions:

German monolinguals: fs > is, fw > iw[9]

HSs in majority English: fs > is, fw > iw

HSs in heritage German: fs ~ is, fw > iw

With respect to SC frequencies, German monolinguals differentiate between the settings in both modes. HSs differentiate between the settings in both modes in their majority English. In their heritage German, although they do differentiate between the settings in the written mode, there is no evidence that they do so in the spoken mode, unlike German monolinguals. A reason for the discrepancy in SCs between German monolinguals and HSs might be due to the fact that HSs are less dominant in their HL. For them, cognitive load in spoken productions might be higher (e.g. Miller & Fernandes-Vest, 2006, p. 13) taking their mental resources away from register differences. This is not as prominent in their written production due to its offline nature and the possibility for revisions. This is in clear contradiction with Prediction 3.2, which expected

[9] As above, fs – formal spoken, is – informal spoken, fw – formal written, iw – informal written; ~ – no evidence for differentiation

more formality differentiation in the spoken mode of HSs due to their better speaking skills. Thus, Prediction 3.2 is not confirmed.

One limitation of the present study is that we have only looked at one ML-HL pair. In order to evaluate our results and test claims about global discourse structures, it would be interesting to see whether these clause type patterns across registers can be replicated for other MLs and HLs (see Scontras & Putnam, 2020 for a commentary on lesser-studied HLs). The RUEG corpus (Wiese et al. 2020), which provided the data analyzed here, is a useful resource for this next step because it contains productions of HSs of Russian, Greek and Turkish with English and German as MLs, all collected using the same method.

Another possible extension of this study is the analysis of the three types of SCs (complement, relative, adverbial). Sánchez Abchi and De Mier (2017) provide evidence that HSs use different SC types compared to monolinguals. Research on the interaction between clause types and registers also shows general preferences for specific subordinations in certain registers. Biber and Conrad (2001), for instance, argue that relative clauses are more prominent in written expository registers because they further elaborate on referential information. Hence, further investigation of SC types across registers is likely to provide insightful findings, especially in HSs.

A further consideration that could be addressed in future research is the inclusion of other registers with the same setting and mode parameters. Having teenage participants produce police reports could be a limitation of this study because the scenario might lack ecological validity. Therefore, we suggest adding a different communicative task for the formal setting, such as writing a newspaper article.

6 Conclusion

This study investigated syntactic optionality in HSs' productions across registers. We assessed the occurrence of three clause types in four registers and compared HSs' majority English and heritage German productions with each other and with those of German and English monolinguals. We provided evidence for the similarity of clause type patterns and clause type frequencies in HSs and monolinguals in the ML, in contrast with clear differences in the HL. Our results show that, in line with Systemic Functional Linguistics, registers have an effect on clause type choices in all speaker groups. Moreover, we showed that HSs successfully employ both syntactic and discourse knowledge to differentiate registers in their heritage German productions, despite their non-dominance in this language and their limited exposure to its formal registers. Our research thus contributes to the understanding of how HSs structure their discourse in terms of syntactic choices. We also added to previous work in this field by looking at several registers available to a speaker, thereby advancing our insights into the linguistic repertoires of HSs.

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Deconstructing the Native Speaker: Further Evidence From Heritage Speakers for Why This Horse Should Be Dead!

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The category "native speaker" is flawed because it fails to consider the diversity between the speaker groups falling under its scope, as highlighted in previous literature. This paper provides further evidence by focusing on the similarities and differences between heritage speakers (HSs) and monolingually-raised speakers (MSs) of their heritage and majority languages. HSs are bilinguals who acquire a family (heritage) language and a societal (majority) language in early childhood. Naturalistic exposure from early childhood qualifies them as native speakers of their heritage language. Some HSs are simultaneous bilinguals, which makes them native speakers of their majority language as well. Others are early second language acquirers who may be indistinguishable from simultaneous bilinguals. Previous research shows that the heritage language productions of German HSs in the United States do not completely overlap with those of German MSs, who are, by default, native speakers. In overall clause type selection (independent main, coordinate main, and subordinate), the HSs differ from German MSs in German but are similar to English MSs in English. The present study examines the distribution of finite subordinate clauses and their types (relative, complement, and adverbial) across registers in 27 adolescent HSs of German in the United States, compared to 32 adolescent MSs of German and 32 MSs of English. All participants described a short video in two settings (formal/informal) and two modes (spoken/written). Results demonstrate that, even with respect to a specific phenomenon (subordinate clauses), HSs show similarities and differences to MSs of both languages. Concerning the distribution of subordinate clause types, HSs behave similarly to both English and German MSs. Concerning subordinate clauses in general, HSs use them less frequently than MSs in German. In English, the difference is more nuanced: HSs differentiate between settings in both modes, while MSs do so only in the written mode. This indicates that the category "native speaker" is not a meaningful descriptor since it covers speakers with varying production patterns. We propose that studies including native speakers should assure transparency and replicability of research by specifying and taking into account speaker characteristics such as bilingualism, proficiency, exposure and dominance.

Keywords: native speakers, heritage speakers, subordinate clauses, heritage German, majority language

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INTRODUCTION

The category "native speaker" has been used to characterize a particular speaker population for many years (see Hopp, 2016; Azar et al., 2019; Ionin et al., 2021; Redl et al., 2021 as recent cases in point). What most researchers seem to agree on is that a native speaker is defined as a speaker who acquires their language naturalistically in early childhood (Cook, 1999; Davies, 2004, 2013). Despite its popularity, this definition can be questioned. It has been criticized for being a political and ideological construct (Bonfiglio, 2010; Dewaele, 2018) and for discrediting late second language (L2) speakers as "deficient versions of natives" (Cook, 2016, p. 186). Another point of criticism is that the category is underspecified because it does not reflect the variation within the subgroups under its scope (Davies, 2004; Lowe, 2020). This criticism holds for the specific native speaker population considered in the present study, namely heritage speakers (HSs). They are broadly defined as "bilinguals who have acquired a family (heritage language) and a majority societal language naturalistically in early childhood" (Pascual et al., 2012, p. 450). Therefore, they are native speakers of both of their languages (Montrul, 2016; Kupisch and Rothman, 2018) irrespective of them being simultaneous bilinguals or early L2 acquirers of the majority language (Rothman and Treffers-Daller, 2014, p. 96).

Comparisons of HSs with monolingually-raised speakers (MSs) reveal areas of difference and similarity (Montrul, 2016, p. 208). The similarities with MSs can be found in both their heritage language (Nagy, 2015; Nagy and Lo, 2019; Łyskawa and Nagy, 2020) and their majority language (Kupisch et al., 2014; Pashkova et al., in press). The differences also become apparent in both their languages (Rothman, 2007; Polinsky, 2018; Scontras et al., 2018 for the heritage language; Scontras et al., 2017; Polinsky, 2018; Paradis, 2019 for the majority language). It is important to mention that the differences are not clear-cut but rather gradient. For example, in a study on clause-type use across registers, we found that German HSs with majority English showed similar distributional patterns in their heritage German productions in independent main clauses and different patterns in coordinate main clauses and subordinate clauses, compared to German MSs (Pashkova et al., in press). These results illustrate a more nuanced difference in clause type productions of MSs and HSs in their heritage language. Taken together, these findings indicate that the category "native speaker" fails to adequately reflect the variation between the speaker groups who fall under its scope, in this case, HSs and MSs.

Consequently, if a linguistic study states that it examined a group of native speakers, we cannot be absolutely certain who these speakers were and if their individual patterns of language use were comparable. The native speaker group could comprise for example MSs, HSs, or late L2 acquirers who emigrated and whose first language (L1) is undergoing attrition. Unquestionably, these speakers use their native language differently. Thus, further specification of the category "native speaker" is necessary to ensure transparency and replicability of research.

In the current study, we continue to address similarities and differences between two groups of native speakers, namely HSs and MSs. Focusing on finite subordinate clauses (SCs), we investigate their general use and the use of their types (complement, adverbial, and relative) across registers. This structural spectrum offers a promising area of variation in the two native speaker sub-groups because it is located at the interface of syntax and discourse (Sorace, 2011).

On the syntactic level, mastery of SCs is a potential source of variation in heritage language due to the complexity of SCs and different word order constraints in SCs in HSs' heritage and majority language (Pashkova et al., in press). Regarding SC types, differences in acquisition timing, paths, and the language input may play a key role in their later production (Andreou et al., 2020a). Researchers have suggested different acquisition trajectories of subordinate clause types (Vasilyeva et al., 2008; Paradis et al., 2017). In heritage language contexts, HSs and MSs presumably have similar acquisition conditions during infancy and early childhood, which then start to diverge once exposure to the majority language increases (around preschool/kindergarten), and especially once formal schooling sets in. Hence, for the heritage language, we can expect that the earliest acquired SC types will be similar in HSs' and MSs' productions, while the later acquired types might show more variation. In the majority language, HSs might experience a delay in late-acquired phenomena but eventually catch up with MSs (Schulz and Grimm, 2019), so we expect, apart from timing, no pronounced qualitative differences between HSs and MSs.

On the discourse level, register awareness creates another source of variation in heritage language use since HSs might not have sufficient exposure to a similarly wide range of registers as MSs of the same language (Polinsky, 2018, pp. 323–324; Aalberse et al., 2019, p. 148). HSs usually experience their heritage language in informal settings, most likely in oral interactions with family members, and might not be as familiar with formal registers. On the other hand, they use their majority language in a greater variety of communicative situations, so they develop a nuanced register awareness comparable to that of MSs of the majority language. Our research has shown that HSs can transfer their register awareness from their majority language to the heritage language, at least while choosing between independent main, coordinate main, and subordinate clauses (Pashkova et al., in press) when all options are available, in principle. What is yet unclear is whether and how this register awareness will manifest itself in a larger speaker sample and within specific sub-domains, such as the use of SC types.

In comparing HSs and MSs in their use of SCs and their types, we will argue that applying the category "native speaker" as a cover term for both these groups obscures a meaningful description of the variation in their patterns of language use. We address this terminological difficulty and propose adding further specification to the category "native speaker," such as presence of bilingualism, to enhance transparency and replicability. We furthermore briefly explore other variables, such as proficiency, exposure and dominance as potential characteristics for specification.

THEORETICAL AND CONCEPTUAL BACKGROUND

The Native Speaker Spectrum

A native speaker has been defined as "a person who learns a language as a child and continues to use it fluently as a dominant language" (Richards and Schmidt, 2013, p. 386). Other characteristics include grammatical and appropriate usage of the native language, self-identification with the community where it is spoken, and intuitions about (un)grammatical structures in that language. Davies (2013) adds creative performance and the ability to translate and interpret into the native language to the list of native speaker characteristics.

However, within these (extra-)linguistic features included in native speaker definitions, only one is uncontroversial and straightforward, namely the childhood acquisition of their L1 (Cook, 1999, p. 187; Davies, 2003, p. 436). Many of the other features mentioned can also be found in L2 speakers: they can use their L2 fluently, grammatically, appropriately, and intuitively, and be creative performers and translators/interpreters. This is the first point of criticism of the category "native speaker": how helpful is the category to group people with similar patterns of language use if the majority of its defining features appears in non-native speakers' productions as well (Lowe, 2020, pp. 21–22)?

Beyond linguistic considerations of fluency, accuracy, and intuition, the category "native speaker" has also been criticized for being politically and ideologically charged. It is noted that being a native speaker is associated with power, language ownership, and even positive personality traits (Bonfiglio, 2010). Race, background, and identity play a role in deciding whether a speaker could be a member of the native speaker group. Holliday (2009) writes that a prototypical English native speaker is a white Anglo-Saxon from an English-speaking western country, and those who do not fit this image might be excluded from native speakerhood. Bonfiglio (2010, p. 12) argues that, in some cases, nativeness is judged based on the speaker's ethnic/immigrant family background and not their language, for instance, Turkish HSs in Germany might not be readily viewed as German native speakers, even though they grew up in Germany and acquired German as one of their L1s.

Monolinguals and Heritage Speakers on the Native Speaker Spectrum

Monolingual speakers are the least disputed speaker population subsumed under the category "native speaker" as they only acquire their L1 naturalistically. HSs, however, have not always been included in the group of native speakers (Polinsky and Scontras, 2020). On the one hand, this might be surprising because HSs fit the criterion of naturalistic acquisition from early childhood. Some researchers might have excluded HSs from native speakers since they equate nativeness with high proficiency and dominance instead of seeing it as a product of naturalistic L1 acquisition (Kupisch and Rothman, 2018). On the other hand, such a confusion is understandable since we do frequently see differences in HSs' heritage language productions compared to MSs'. This is, however, an insufficient criterion for excluding HSs from the native speaker continuum as they are not the only group that might differ from a prototypical, highly proficient monolingual native speaker. We also find these differences in MSs with limited experience with the standard language and in late L2 bilinguals who have migrated and shifted dominance to the L2 and are experiencing L1 attrition (Dewaele, 2018; Kupisch and Rothman, 2018).

If the differences between HSs' and MSs' productions are not due to HSs being non-native speakers, what could they be attributed to? Many researchers agree that differences in amount and quality of input play a very important role in the eventual outcomes of heritage language acquisition (Montrul, 2016, pp. 117–119; Kupisch and Rothman, 2018; Aalberse et al., 2019, pp. 146–149). These differences in input could lead to variation in heritage language productions, for example, case marking in heritage German (Yager et al., 2015; Zimmer, 2020), inflected infinitives in heritage Brazilian Portuguese (Rothman, 2007), or the encoding of motion events in heritage Turkish (Goschler et al., 2020). However, some areas of the heritage language still display substantial similarity with MSs' productions, for example, voice onset times in heritage Italian (Nagy, 2015), case morphology in heritage Polish, Russian, and Ukrainian (Łyskawa and Nagy, 2020), or use of classifiers in heritage Cantonese (Nagy and Lo, 2019).

Yet, it would be too simplistic to say that one domain of heritage language grammar and use would show only similarities to MSs' productions, while another domain would be likely to show only differences. Some areas show both differences and similarities with MSs' productions. For instance, Brehmer and Usanova (2015) report that verb placement in heritage Russian in Germany is different in SCs compared to monolingual Russian, with an increase in use of the verb in clause-final position, which would be an expected transfer from German. However, main clauses in heritage Russian do not feature more use of the verb in second position (V2, required in German) than those in monolingual Russian. Thus, verb placement in heritage Russian exhibits difference and similarities with monolingual Russian. In a similar vein, our own previous research demonstrated that clause type use across different registers in heritage German also shows a combination of differences and similarities with monolingual German. While independent main clauses are used in the same manner by both speaker groups, coordinate main and subordinate clauses exhibit variation: HSs prefer coordinate main clauses, while MSs choose subordinate clauses more frequently (Pashkova et al., in press).

Concerning HSs' majority language, their linguistic behavior in everyday interactions is oftentimes comparable to that of MSs, especially once HSs reach early adulthood (Paradis, 2019). For example, HSs have been reported to not have a foreign accent in their majority language (Kupisch et al., 2014). Further, Pashkova et al. (in press) found no evidence that German HSs use different clause type patterns across registers in their majority English, compared to English MSs—overall, both groups used more independent main clauses in the written mode, more coordinate main clauses in the spoken mode, and more subordinate clauses in the formal setting. However, there is experimental evidence

that HSs might exhibit more fine-grained differences to English MSs in their majority English, for instance in the release of final stops (Polinsky, 2018, pp. 141–144), grammaticality judgments of subject–verb agreement (Paradis, 2019), and scope assignment (Scontras et al., 2017).

Summing up, HSs are typically native speakers of both of their languages since they typically acquire both languages naturalistically in early childhood. This does not mean, however, that HSs' linguistic performance is identical to that of prototypical, highly proficient MSs. These two groups of native speakers show differences and similarities in the patterns of their language use. Therefore, we propose further specification of the category "native speaker" in order to reflect this variability. Our study illustrates that an important variable to specify is the presence of bilingualism; additional specifications can include proficiency, exposure, and dominance.

Subordinate Clauses

The use of SCs and their types across registers is complex in that the speaker requires both syntactic knowledge and register awareness to decide on the appropriateness of SCs according to communicative situations (as explained in section "Register Characteristics of Subordinate Clauses," SCs are often more preferred in formal contexts). As specified in the Interface Hypothesis, structures involving both syntactic and pragmatic choices are particularly open to variation in terms of acquisition timing and/or cross-linguistic influence (Sorace, 2011; Tsimpli, 2014), thus leading to potentially different patterns across different types of natives speakers. We thereby add subordinate clause choice to the phenomena considered in interface research, given that register is a part of pragmatics, a language-external component (Tsimpli, 2014, p. 301). In the following section, we will examine the syntactic mastery of SCs and register awareness in both speaker groups.

Syntactic Characteristics of Subordinate Clauses

Subordinate clauses in general

Syntactically, SCs have the following features (Diessel, 2004, p. 48): they are integrated in the matrix clause, they are dependent structures that are formally incomplete without the matrix clause, and they are part of the same processing and planning unit as the associated matrix clause. This last feature is one of the reasons why SCs have been associated with higher syntactic complexity than juxtaposed matrix clauses (Polinsky, 2008; Neary-Sundquist, 2017; Peristeri et al., 2017; Sánchez Abchi and De Mier, 2017; Housen et al., 2019). Syntactic complexity has been defined, among other things, as the extent to which language users resort to syntactic embedding and SCs or as a structure which requires more steps in the syntactic derivation (Housen et al., 2012; Sanfelici and Schulz, 2021). However, the direct link between SCs and syntactic complexity has also been questioned: several researchers reported that textual complexity correlated not with the number of SCs but rather with mean length of nominal phrases and clauses (Lu, 2011; Wiese et al., 2020; Wang and Tao, 2020). Overall, the evidence for high complexity of SCs appears conflicting. Nevertheless, if SCs reflect textual complexity to some extent, we would expect fewer SCs in HSs' productions in their heritage language compared to MSs of that language.

In addition to the general complexity of SCs across languages, different word order constraints in HSs' heritage and majority language might play a role in SC production. This study examines HSs of German with English as their majority language. German and English differ in SC word order: In finite clauses introduced by complementizers and relative pronouns, German canonically exhibits subject-object-verb (SOV) structure,[1] while English has subject-verb-object (SVO) structure. This typological mismatch between the two languages of HSs might make the production of SCs in German harder for HSs than for MSs due to higher cognitive load because of the inhibition of one structure in the bilingual mind—in this case, SVO (Abutalebi and Green, 2016). This may lead to avoidance of SCs in the German productions of HSs (see Pashkova et al., in press, for a more detailed discussion).

Subordinate clause types

This section focuses on the syntactic characteristics of SC types and on how they might contribute to the variation between HSs and MSs. We follow previous researchers (e.g., Beaman, 1984; Diessel, 2004; Thompson et al., 2007; Paradis et al., 2017; Andreou and Tsimpli, 2020) in subdividing finite SCs into three categories: complement, adverbial, and relative clauses. In the following, we describe each clause type in detail and provide an overview of their L1 acquisition patterns.

Complement clauses are SCs that function as arguments of a predicate in the matrix clause (e.g., *She saw that a car was coming.*) (Biber et al., 1999, p. 658; Diessel, 2004, p. 1; Noonan, 2007; Lust et al., 2015, p. 301). Some researchers have suggested that complement clauses emerge early in L1 acquisition (Vasilyeva et al., 2008; Paradis et al., 2017), one of the reasons proposed for this being that they are narrowly syntactic structures that only require the knowledge of verb complement selection patterns and no pragmatic skills in discourse management (Mastropavlou and Tsimpli, 2011; Andreou, 2015; Andreou et al., 2020a). In child HSs, the accurate repetition of complement clauses in a sentence repetition task at the ages of 8–12 was reported to be associated with the amount of exposure to the language between ages 0 and 3 and at the age of 6 (Andreou et al., 2020a). This suggests that there are crucial periods for the development of complement clauses that correlate with their production later on. Hence, in the heritage language, we would expect similar production patterns in HSs and MSs because they received similar input at an age when language exposure could affect their emergence.

Adverbial clauses are SCs that modify main clauses similarly to adverbs and adverbial adjuncts modifying a proposition (e.g., *While she was walking, she saw an accident*) (Diessel, 2004, p. 1; Thompson et al., 2007). Contrary to narrowly syntactic structures, adverbial clauses, along with relative clauses, involve the syntax–discourse interface because they rely on discourse and pragmatics and call for discourse management skills (Peristeri et al., 2017, pp. 5, 11; Andreou et al., 2020a,b). For this

[1]Unintroduced subordinate clauses require verb-raising into second position, as in main clauses. Those cases are also accounted for in this study, see section "Data Coding."

reason, it has been argued that adverbial clauses are acquired later than complement clauses. Moreover, in child HSs, the accurate repetition of adverbial clauses at the ages of 8–12 was shown to be influenced by current language exposure (Andreou et al., 2020a). This suggests that adverbial clause use might be a locus for greater variation between heritage language and monolingual productions due to differences in the speakers' current language exposure.

Relative clauses are SCs that modify a noun phrase (NP) (e.g., *A woman who was pushing a baby stroller was walking down the street*) (Andrews, 2007). They are characterized by a syntactic gap that is associated with a relative pronoun at their left periphery and requires as its antecedent the relativized constituent of the matrix clause (Biber et al., 1999, p. 608; Diessel, 2004, p. 117). Similar to adverbial clauses, relative clauses are also located at the syntax-discourse interface and require discourse management skills, i.e., the ability to determine what is needed for referent specification in particular contexts. Therefore, one might expect relative clauses to be more influenced by later exposure, hence leading to greater variation between HSs' heritage language productions and those of MSs.

In the current study, we investigate whether the suggested differences of the acquisition onset of SC types impacts their use in HSs who are older than those examined in previous research (Andreou et al., 2020a).

Register Characteristics of Subordinate Clauses

Register is a variety definable in terms of situational parameters such as participants, channel, purpose, spoken or written mode, and formality of communication (Biber and Conrad, 2001, p. 175). In this study, we operationalize formality as spoken or written communication with public institutions, and informality as spoken or written communication with friends and family. HSs normally do not have as frequent exposure to a variety of registers in their heritage language compared to MSs of that language (Polinsky, 2018, pp. 323–324; Aalberse et al., 2019, p. 148 for recent mention of this tendency). Since the use of the heritage language is mostly limited to interactions with family members and perhaps members of a heritage language community, HSs are usually expected to be more familiar with informal registers and less familiar with formal registers. At the same time, HSs' majority language typically follows a different trajectory: they use it in a wider range of communicative situations and thus develop formal and informal register repertoires comparable to those of MSs. It is an interesting question, then, how HSs approach formal registers in their heritage language: would they use language patterns from the informal registers of their heritage language or would they try to rely on the formal register patterns from their majority language? Schleppegrell and Colombi (1997) argued for the latter option: they showed that Spanish HSs used very similar clause types in academic essays in heritage Spanish and majority English, despite being unfamiliar with formal academic registers in their heritage language.

Our recent study (Pashkova et al., in press) identified a similar tendency: German HSs showed similar clause type patterns in formal and informal registers in heritage German and majority English, which we called "an underlying register awareness"—HSs were able to transfer their register awareness from their majority language to their heritage language. Crucially, HSs used similar clause type patterns in heritage German compared not only to majority English but also to monolingual German. This possibility of transfer appears viable when the heritage and majority languages have similar register-related language use of the phenomenon under scrutiny, as was the case for clause type use in German and English (in both languages, MSs preferred independent main clauses in the written mode, coordinate main clauses in the spoken mode, and subordinate clauses in the formal setting). It is as yet unclear if register awareness can be attested in a larger data sample and transferred to another phenomenon, such as SC types. However, it is important to note that similar patterns of SC use in heritage and monolingual German did not mean the same frequency of SCs—HSs still used overall fewer SCs than MSs, most likely due to the syntactic characteristics of SCs outlined above.

Subordinate clauses and their types show variation across registers, which makes them an interesting phenomenon to examine with respect to register-related linguistic behavior of HSs. For instance, Koch and Oesterreicher (2012) outlined syntactic features of the language of immediacy, i.e., spontaneous face-to-face dialogues between familiar speakers, and the language of distance, i.e., carefully planned interactions between strangers in the public sphere. The language of immediacy is characterized by parataxis, whereas the language of distance is associated with hypotaxis. Our previous study (Pashkova et al., in press) confirmed this claim: in both English and German, we found more SCs in formal registers, which were similar to the language of distance, than in informal registers, similar to the language of immediacy.

Subordinate clause types are also subject to register variation. In English, for example, Biber and Gray (2016, pp. 87–100) reported more complement and adverbial finite clauses in conversation than in academic writing, and more wh-relative clauses in academic writing than in conversation. Beaman (1984) showed that nominal and relative subordinations occur more often in spoken narratives than in written ones, while adverbial subordinations are more frequent in written productions. Even though these findings do not map directly on the registers examined in the current study (a formal report to the police vs. an informal message to a close friend), we can still expect a certain variation in SC type productions according to formality. Our data will serve as an addition to the research on register repertoires of HSs because, to the best of our knowledge, there has not been a study that focuses on the systematic analysis of SC types according to formality.

The Present Study

To address the gaps in the literature just discussed, we pursue the following research questions (RQs) concerning the use of SCs in HSs' productions. Based on findings from the literature, we also lay out hypotheses and predictions for each question.

RQ 1: Do HSs show similarities or differences in the use of SCs according to register in their majority language (English)

compared to English MSs and in their heritage language (German) compared to German MSs?

Hypothesis 1: Based on our previous study of clause type use in a smaller participant sample (Pashkova et al., in press), we expect HSs to show similarities to English MSs and to differ from German MSs due to syntactic complexity and SOV word order of German SCs.

Prediction 1: Comparing HSs' majority English to monolingual English, we expect to find similar frequencies of SCs in all registers. Comparing HSs' heritage German to monolingual German, we expect to find similar patterns across registers but overall fewer SCs in heritage German.

RQ 2: Do HSs show similarities or differences in the use of SC types (relative, complement, and adverbial) according to formality[2] in their majority language (English) compared to English MSs and in their heritage language (German) compared to German MSs?

Hypothesis 2: We expect HSs to show similarities with English MSs, and a combination of differences and similarities with German MSs due to the different acquisition periods of SC types.

Prediction 2.1: Comparing HSs' majority English to monolingual English, we expect to find similar frequencies of SC types across settings (formal/informal). Comparing HSs' heritage German to monolingual German, we expect to find similar frequencies of complement clauses but different frequencies of adverbial and relative clauses, since the latter two SC types are assumed to be acquired later than complement clauses.

Prediction 2.2: Concerning the heritage language, we also expect to observe larger differences between HSs and MSs in the formal setting since HSs are less familiar with formal registers and we have no previous evidence that they can transfer their register awareness from majority English to heritage German in the use of SC types.

MATERIALS AND METHODS

Participants

For this study we looked at 91 adolescents aged 14–18 years (mean age = 16.1, SD = 1.39, 50 females), with 32 in each of the monolingual groups and 27 in the heritage German group with English as their majority language.

1. HSs of German with majority language English (mean age = 15.6, SD = 1.58, 12 females)
2. MSs of German (mean age = 16.6, SD = 0.91, 19 females)
3. MSs of English (mean age = 16.1, SD = 1.49, 19 females).

The HSs of German grew up speaking German with at least one L1 German-speaking parent in the household (21 HSs had one German-speaking parent, five had two, and one participant provided no answer). All speakers were either born in the United States, or moved there before age two. They did not receive bilingual education, but may have participated in German "Saturday schools" or other German-speaking activities in the community. Speakers of established German "language islands" were excluded from the study. We defined monolinguals as speakers whose L1 was the only language spoken at home, but who might have acquired further languages through foreign language instruction.

German HSs were recruited in Boston, Massachusetts; Madison, Wisconsin; and St. Paul, Minnesota by contacting German organizations and institutions as well as via social media platforms. German MSs were recruited via contacting German high schools in Berlin. English MSs were recruited in the same cities as German HSs (and in Long Island, New York) via social media platforms or through personal contacts. The socio-economic status of HSs' families was slightly higher than that of English and German MSs (see **Supplementary Appendix A** for detailed information on parental education) due to the nature of our HS participant pool, which mostly consisted of professionals whose move to the United States was work-related.

The German and English productions of the HSs as well as those of the English MSs were elicited in the United States and those of German MSs in Germany. The data for this study is openly accessible via the Research Unit Emerging Grammars (RUEG) 0.4.0 corpus (Wiese et al., 2020). Both English and German productions of HSs were compared to the productions of MSs of the respective language.

Materials and Procedure

The data was collected using the Language Situations methodology (RUEG group, 2018; Wiese, 2020), which elicits controlled, comparable, and quasi-naturalistic productions across registers. Participants watched a short non-verbal video depicting a minor car accident and recounted what they saw, imagining themselves witnesses to the accident. The procedure was divided into two settings. In the formal setting, the elicitor was formally dressed and met with the participant in a room set up like an office. In the informal setting, the elicitor was casually dressed and met with the participant in a more relaxed setting, with snacks and beverages offered. In order to enhance an easy-going, comfortable atmosphere, the elicitor and the participant engaged in 10–15 min of task-unrelated conversation in the target language at the beginning of the informal session. The participant watched the video three times in total (twice in the first setting, once in the second setting) and was then asked to recount it in two different modes: spoken and written.

The formal recounting was operationalized as a voice message to a police hotline (spoken) and a witness report to the police (written), while the informal recounting comprised a WhatsApp voice message (spoken) and a WhatsApp text message (written) to a friend. The order of settings (formal/informal) and modes (spoken/written) was balanced across participants. The MSs completed all tasks in one session. The HSs completed the tasks in two sessions—one for their majority language (English) and one for their heritage language (German)—with an interval of 3–5 days in between to minimize priming effects. The order of language sessions was counterbalanced across participants. Upon completion of all the narrative tasks, the participants filled out

[2]Due to the small sample size of SC types, we decided to collapse the four registers (formal spoken, formal written, informal spoken, informal written) into two formality conditions—formal vs. informal.

an online questionnaire[3] about their language background as well as a self-assessment of their abilities in each language. Self-assessment showed that HSs rated their speaking and writing skills higher in their majority English (speaking mean = 5, SD = 0; writing mean = 4.96, SD = 0.19) than in heritage German (speaking mean = 3.66, SD = 0.78; writing mean = 2.81, SD = 1.27). English monolinguals rated their skills comparably high (speaking mean = 4.75, SD = 0.51; writing mean = 4.53, SD = 0.57) to German monolinguals (speaking mean = 4.96, SD = 0.17; writing mean = 4.66, SD = 0.66).

Data Coding

As mentioned above, we investigated the use of SCs and their types (complement, adverbial, and relative) in narratives in English and German. In both languages, we examined only clauses that contained finite verbs to constrain the nature of the question. Morphologically non-canonical clauses, i.e., deviations with respect to person and number agreement, were still included, since they do not affect the type that the clause is assigned to. Subordinations missing complementizers or relative pronouns were included because a large proportion of the data stems from spoken productions and omitting complementizer "that" or relative pronouns "who" and "which" (in English) is common in spoken productions (Biber and Conrad, 2001). Non-finite constructions, such as infinitives, present participles, and past participles were excluded. All narratives were split into finite clauses, and each clause was coded for being an SC or a matrix clause. In German, SCs mostly exhibited finite verb-final structures, with the exception of unintroduced complement clauses (see below).[4] Weil V2 clauses were not coded as SCs since *weil* has lost its status of a subordinator in those constructions (Antomo and Steinbach, 2010; Reis, 2013).

Each SC was coded for its type: complement, adverbial, or relative.[5] We included both verb and noun complement clauses in our analysis even though the majority of L1 acquisition literature focuses on verb complements. Noun complement clauses usually complement a certain set of nouns such as *question, thought, report*, *argument* (Biber et al., 1999, pp. 645–656), and therefore appeared quite rarely in our data due to the content of the video. Since there were not enough cases to group them into a separate category, they were collapsed with verb complement clauses. Verb complement clauses (1a) should not be confused with what follows multi-word discourse markers *I think, I mean, I don't know, you know*, which look like epistemic expressions. In order to differentiate a discourse marker from an epistemic expression, a complementizer test was applied: if a complementizer/wh-pronoun was present or could be added after the expression in question, the expression was not taken to be a discourse marker and, hence, the following part was annotated as a complement clause (1b). If a complementizer was absent and could not be added, the expression was taken to be a discourse marker with no complement clause (1c). Each clause in square brackets in (1) was counted as one complement clause.

(1) a. They weren't looking and then realized [a car was coming$_{complement}$] (USbi52FE_fwE)[6]

b. I don't know [what else happened$_{complement}$] (USbi50FD_isE)

c. And then these two cars came by and like I dunno$_{discoursemarker}$ they came to the intersection and the guy dropped his ball (USmo64FE_isE)

In complement clauses, German exhibits finite verb-final structures (2a), but also allows for canonical V2 structures, if the complementizer is omitted after verbs of saying and thinking (2b). Each clause in square brackets in (2) was counted as one complement clause.

(2) a. und konnte daher nicht wissen [ob nach der Ball ein Mensch kommen würde$_{complement}$]

(USbi64MD_fwD)

"And due to this (the driver) could not know if a person would come after the ball."

b. Ich hoffe [ich konnte ihnen behilflich sein$_{complement}$]![7] (DEmo54FD_fwD)

"I hope I could be of help to you!"

All types of adverbial clauses (e.g., temporal, locative, causative, conditional, concessive) were put into one category. Each clause in square brackets in (3) was counted as one adverbial clause.

(3) a. I witnessed the crash [as I was walking along the side of a street$_{adverbial}$] (USbi55FD_fwE)

b. The car stopped short [because there was a dog trying to get the ball$_{adverbial}$] (USmo59FE_iwE)

c. [Als sie die straße überqueren wollten$_{adverbial}$], ist der Mann den Ball aus dem Hand gefallen.

(USbi64MD_fwD).

"As they wanted to cross the street, the ball dropped out of the man's hand."

As for relative clauses, we included not only those modifying an NP (4a,b) but also those modifying an entire proposition (4c,d) (Biber et al., 1999, p. 867). The reasoning here was similar to the inclusion of noun complement clauses: even though the majority of L1 acquisition literature focuses on NP-modifying relative clauses, there were a few cases of proposition-modifying relative clauses, which were, however, not numerous enough to form their own category, so they were collapsed with NP-modifying relative clauses. Even though there has been extensive research on different types of relative clauses in HSs (e.g., Polinsky, 2011; Albirini and Benmamoun, 2014), we did not distinguish between object and subject relative clauses because

[3]Questionnaire for adolescent participants of the Research Unit Emerging Grammars; https://osf.io/qhupg/

[4]We also included seven non-canonical V2 clauses clearly conceptualized as SCs: three complement clauses, two adverbial clauses, two relative clauses. We did not conduct a separate analysis V2 SCs due to their low frequency.

[5]We did not conduct fine-grained qualitative analyses of SC types such as examining word order, choice of complementizers or verb placement, although these characteristics are definitely worth exploring in further research. We did so since any further subdivision on the data would result in a too low number of data points in each subcategory to conduct a statistical analysis.

[6]The participant code in the examples includes the following information: US/DE, country of elicitation, United States or Germany; bi/mo, bilingual/monolingual speaker; 01, speaker number; M/F, speaker's sex; D/E, HS's heritage language (Deutsch for German) or monolinguals' L1 (English or German); f/i, formal/informal setting; s/w, spoken/written mode; D/E, language of elicitation, D for German or E for English.

[7]We preserved the original orthography of the written productions.

TABLE 1 | English clause productions by speaker group and register/formality.

Register	Formal spoken		Formal written		Informal spoken		Informal written	
Speaker group	HS	MS	HS	MS	HS	MS	HS	MS
All clauses	494	511	424	459	393	430	257	290
Subordinate clauses	145	128	119	144	88	95	58	50

Formality	Formal		Informal	
Speaker group	HS	MS	HS	MS
Complement clauses	41	49	40	44
Adverbial clauses	105	114	55	49
Relative clauses	118	109	51	52

TABLE 2 | German clause productions by speaker group and register/formality.

Register	Formal spoken		Formal written		Informal spoken		Informal written	
Speaker group	HS	MS	HS	MS	HS	MS	HS	MS
All clauses	448	732	358	625	370	638	219	399
Subordinate clauses	77	201	90	178	51	114	15	69

Formality	Formal		Informal	
Speaker group	HS	MS	HS	MS
Complement clauses	74	138	19	53
Adverbial clauses	22	65	23	69
Relative clauses	71	176	24	61

we did not have sufficient data points to perform a separate comparison of the two types. Each clause in square brackets in (4) was counted as one relative clause.

(4) a. it tried to like stop for this dog [that was running into the street$_{relative}$] (USmo65FE_isE)

b. Ein Mann [der anscheinend mit seiner Frau spazieren war$_{relative}$] prellte einen Fußball.

(DEmo69MD_fwD)

"A man who was walking apparently with his wife bounced a soccer ball."

c. The dog saw the ball and ran for it, [which caused the car in the front to stop$_{relative}$].

(USbi51FD_fwE)

d. und is dem ersten auto dann raufgefahren [was zu dem unfall geführt hat$_{relative}$]

(DEmo65FD_fsD)

"and drove into the first car which lead to the accident"

Tables 1, **2** show the total number of clause productions in English and German respectively.

Data Analysis

First, the data was coded for SCs and matrix clauses, resulting in a dependent variable "Clause type" with two levels (1 for SC and 0 for matrix clause). We analyzed the use of SCs vs. matrix clauses using generalized binomial linear mixed effect models in R (R Core Team, 2021) and the lme4 package (Bates et al., 2015). We maximally specified the fixed effects by including all theoretically relevant independent variables and their interactions: bilingualism (heritage bilingual/monolingual), setting (formal/informal), mode (spoken/written). We contrast-coded the factors using sum contrast coding (–0.5/0.5). We attempted to maximally specify the random effect of participants and included the random slopes for setting and mode (Barr et al., 2013). The maximal specification worked for German SCs, but not for English SCs, where it led to overfitting, so we removed the random slopes and left only the random intercept.

Second, each SC was coded for its type, resulting in a dependent variable "SC type" with three levels (complement, adverbial, and relative). Then, we recoded the dependent variable "SC type" into three separate dependent variables "Complement clause", "Adverbial clause", and "Relative clause" with two levels (1 and 0). After this manipulation, each SC type was analyzed independently from the other two types also using generalized binomial linear mixed effect models. Due to the small sample size of each SC type (**Tables 1**, **2**), we collapsed the spoken and written modes within each setting and only included the independent variables of bilingualism (heritage bilingual/monolingual) and setting (formal/informal) and their interaction. We contrast-coded the factors using sum contrast coding (–0.5/0.5). Where possible, we maximally specified the random effect of participants by including the random slopes for setting. If this led to a perfect correlation of fixed effects or a random effect variance estimated at 0 or 1, we removed the random slope. In the next section, we report the z- and p-values of the models, for full model summaries, see **Supplementary Appendix B**.

RESULTS

Majority and Monolingual English

Subordinate Clauses in English

For English SCs, we observed a main effect of setting ($z = 4.70$, $p \leq 0.001$): speakers produced more SCs in the formal setting more than in the informal setting (**Figure 1**). In addition, we observed a three-way interaction between bilingualism, setting, and mode ($z = 2.02$, $p = 0.043$). To interpret this interaction, we ran separate models for HSs and MSs. HSs showed a main effect of setting ($z = 2.71$, $p = 0.007$), while MSs showed a main effect of setting ($z = 4.04$, $p \leq 0.001$) and an interaction between setting and mode ($z = -2.46$, $p = 0.014$). Tukey's multiple comparison test (MCT, run with *emmeans* package, Lenth, 2021) revealed a significant difference between the formal and the informal settings in the written mode (estimate = –0.51, SE = 0.16, $z = -3.26$, $p = 0.006$) and an absence of such a difference in the spoken mode (estimate = 0.19, SE = 0.16, $z = 1.24$, $p = 0.602$). This shows that German HSs and English MSs partially overlapped in their SC productions. While they behaved similarly in the written mode, they diverged in the spoken mode: HSs distinguished between the settings whereas MSs did not. Additionally, for both speaker groups, setting played a key role in SC production.

Subordinate Clause Types in English

For English complement clauses, we observed a main effect of setting ($z = -3.73$, $p \leq 0.001$): there were fewer complement

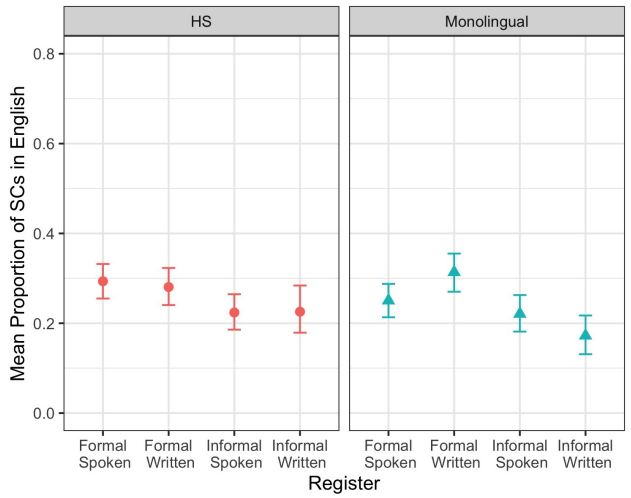

FIGURE 1 | Mean proportion of SCs in English by speaker group and register.

clauses in the formal setting than in the informal one (**Figure 2A**). For English adverbial clauses and relative clauses, we did not observe any main effects or interactions (**Figures 2B,C**). These results indicate that German HSs and English MSs performed similarly regarding the production of all SC types, and formality played a role only for complement clauses, with fewer complement clauses in the formal setting.

Heritage and Monolingual German

Subordinate Clauses in German

For German SCs, we observed two main effects and two interactions. First, there was a main effect of bilingualism ($z = -3.55$, $p \leq 0.001$), with HSs producing fewer SCs than MSs (**Figure 3**). Second, we found a main effect of setting ($z = 6.35$, $p \leq 0.001$): there were more SCs in the formal setting than in the informal setting. Then, we observed an interaction of setting and mode ($z = -2.98$, $p = 0.003$), with a greater difference between the formal and informal settings in the written mode (estimate = 1.08, SE = 0.18, $z = 5.94$, $p \leq 0.001$) than in the spoken mode (estimate = 0.45, SE = 0.13, $z = 3.37$, $p = 0.004$), according to Tukey's MCT. Finally, we observed a three-way interaction between bilingualism, setting, and mode. To interpret it, we ran separate models for HSs and MSs. The HS model indicated a main effect of setting ($z = 4.61$, $p \leq 0.001$), with more SCs in the formal setting than in the informal setting. In addition, there was an interaction of setting and mode. Tukey's MCT revealed a difference between the formal and informal setting in the written mode (estimate = 1.45, SE = 0.30, $z = 4.84$, $p \leq 0.001$) but not in the spoken mode (estimate = 0.22, SE = 0.20, $z = 1.09$, $p = 0.698$). The MS model showed only a main effect of setting ($z = 4.36$, $p \leq 0.001$). This shows that German HSs and MSs differed in the overall SC productions: while HSs distinguished between the settings only in the written mode, MSs did so in both modes. In addition, for both speaker groups, setting played a key role in SC production.

Subordinate Clause Types in German

For German complement clauses, we observed a main effect of setting ($z = -5.74$, $p \leq 0.001$), with fewer complement clauses in the formal setting than in the informal setting (**Figure 4A**). For adverbial clauses, we observed a main effect of setting ($z = 2.90$, $p = 0.004$), with more adverbial clauses in the formal setting than the informal setting (**Figure 4B**). For relative clauses, we observed a main effect of setting ($z = 2.30$, $p = 0.022$), with more relative clauses in the formal setting than the informal setting (**Figure 4C**). These results indicate that German HSs and German MSs performed similarly regarding the production of all SC types. Formality played a role for both speaker groups: they produced fewer complement clauses but more adverbial clauses and relative clauses in the formal setting than the informal setting.

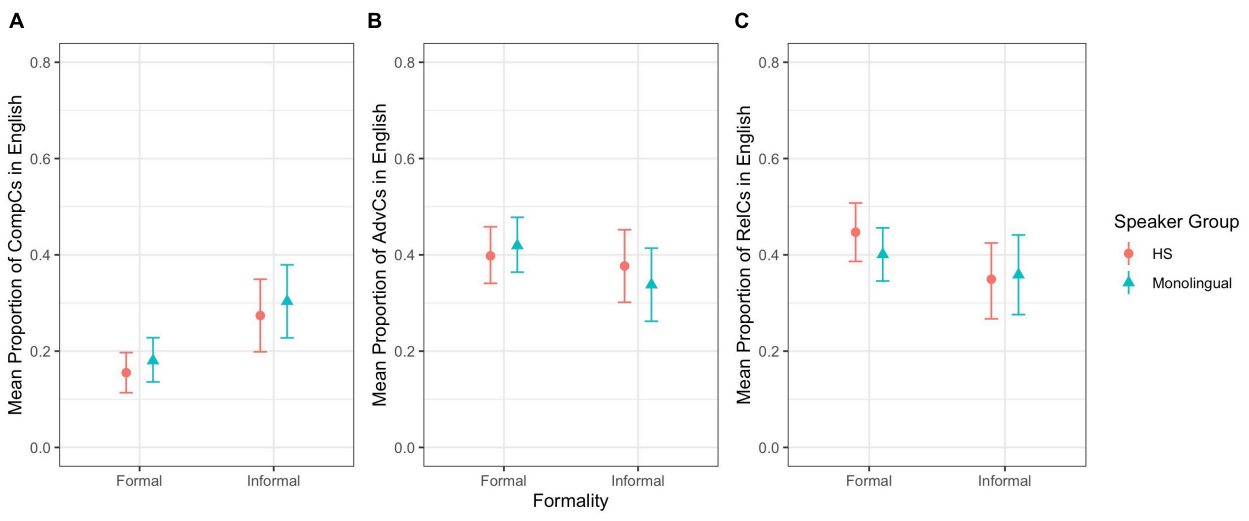

FIGURE 2 | Mean proportion of SC types in English by speaker group and formality: **(A)** Complement Clauses, **(B)** Adverbial Clauses, **(C)** Relative Clauses.

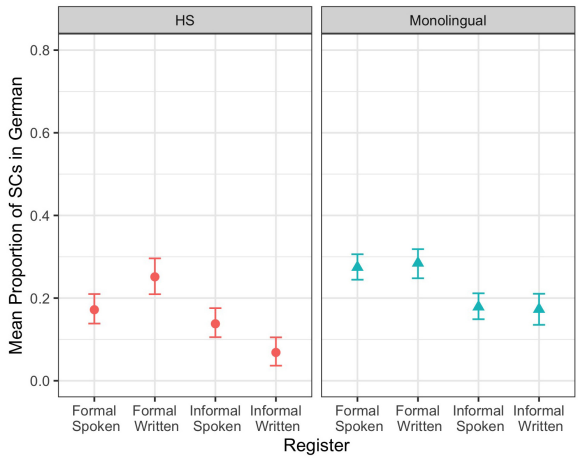

FIGURE 3 | Mean proportion of SCs in German by speaker group and register.

DISCUSSION

This study aimed at presenting reasons for why the category "native speaker" is flawed and should be further specified to account for the variation between the groups that fall under its scope. Such a specification would enhance transparency and replicability of research. We analyzed two native speaker groups—HSs and MSs—to argue that there are differences and similarities, as well as a combination of both, between the groups. In particular, we compared German HSs residing in the United States with English and German MSs. We looked at the use of SCs and their types (complement, adverbial, and relative) in spoken and written narratives across registers.

Our first research question focused on whether HSs use finite SCs in a similar or different way in their majority language compared to English MSs and in their heritage language compared to German MSs. With respect to HSs' majority language, our data does not confirm Hypothesis 1 and Prediction 1, which state that in their majority language, German HSs will perform similarly to English MSs. Overall, both speaker groups produce more SCs in the formal setting, confirming previous results, thus exhibiting similarity (see Pashkova et al., in press). This similarity is however only partial because a closer look at SC productions across registers reveals that HSs distinguished between the settings in spoken and written modes while MSs did so only in the written mode. With respect to HSs' heritage language, our data confirms Hypothesis 1 and Prediction 1, which state that in their heritage language, German HSs will produce significantly fewer SCs than German MSs. Additionally, HSs distinguished between the settings only in the written mode, while MSs did so in both modes. This can be attributed to the cognitive load of spoken online productions in combination with the general complexity of SCs and word order differences in SCs in English and German (Pashkova et al., in press).

Our second research question zoomed in on the use of finite SC types according to formality. We wanted to know whether HSs would show similarities or differences in their majority language compared to English MSs and in their heritage language compared to German MSs. With respect to HSs' majority language, our data confirms Hypothesis 2 and Prediction 2.1, which state that HSs and MSs should show similar frequencies of SC types across settings. With respect to HSs' heritage language, our data does not confirm Hypothesis 2 and Prediction 2.1, which expect a combination of differences and similarities between HSs and MSs, because both speaker groups in fact behaved similarly regarding the frequencies of SC types across settings. Consequently, we did not find any support for Prediction 2.2, which argued for a bigger difference between HSs and MSs in the formal setting.

Overall, the results show that the locus of variation between HSs and MSs is not where we predicted it to be. For English

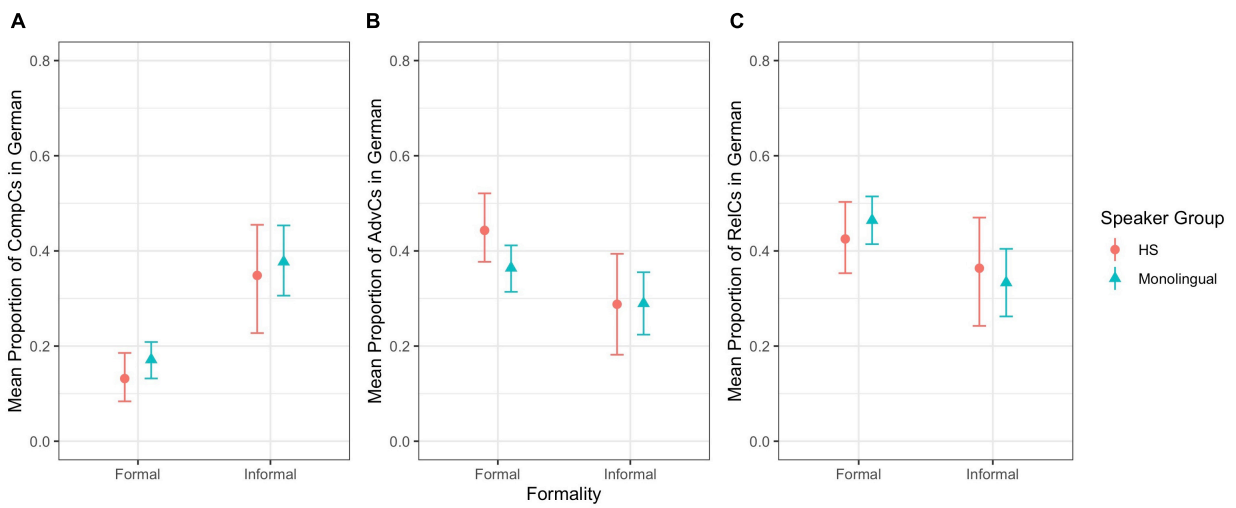

FIGURE 4 | Mean proportion of SC types in German by speaker group and formality: **(A)** Complement Clauses, **(B)** Adverbial Clauses, **(C)** Relative Clauses.

SCs, we expected to find only similarities between HSs and MSs, and instead we observed a combination of differences and similarities. HSs adhere to formality distinctions regardless of mode, unlike English MSs, who do so only in the written mode. This could be attributed to the different attitudes toward our study among HSs and MSs: HSs were well aware that their language competence was under scrutiny, and were probably trying to show their best language skills. This is especially true for the heritage language but could also have influenced their performance in the majority language, which might explain their strict adherence to the formality distinction in both modes. This illustrates that the two groups of native speakers show variation in their performance, potentially due to extralinguistic factors such as their perception of the situation. Therefore, the category "native speaker" groups together speakers with different patterns of language use and is not specific enough to allow comparability in a speaker population.

Another unpredicted result is that in German, HSs behave similarly to MSs with regard to all SC types, even adverbial and relative clauses, which we expected to differ between the speaker groups due to their later acquisition and location at the syntax-discourse interface. This is contrary to the previous findings by Andreou et al. (2020a), who showed that the current language exposure influences the production of adverbial clauses by child HSs in a sentence repetition task. However, their participants were much younger than ours (mean age 9.01 vs. mean age 15.6), which could be the reason for the discrepancy in our results. Perhaps, the use of adverbial clauses is influenced not only by the current language exposure but also by the overall cognitive maturity of the speaker (see Paradis et al., 2017 on the advantages of higher cognitive maturity in early L2 acquisition). Furthermore, the absence of difference could be attributed to the relatively small sample size in this study, which could have prevented us from capturing it. Productions of more speakers need to be analyzed to confirm our result. The analysis of SC types and SCs in German illustrated that we can still find similarities within a narrower phenomenon (SC types) between the sub-groups of native speakers even if a more general phenomenon (SCs) shows differences between the same speaker groups.

An additional unexpected finding was that concerning SC types, HSs behaved similarly to German MSs in their heritage language and similarly to English MSs in their majority language, even though the MSs of the respective languages behaved differently—in English, formality only had an effect on complement clauses, whereas in German, formality had an effect on all SC types. This shows that German and English differ in their formality-related language use and that HSs are able to adapt to the MS pattern in both their languages. This is surprising since the HSs' ability to adjust their SC type productions in their heritage language does not appear to originate from their exposure to formal registers in German or from transfer of their formality awareness from English into German. Further research is needed to pinpoint the source of this behavior.

The presented findings lead us to the conclusion that the category "native speaker" is too general to adequately define a speaker population because the speakers subsumed under this category may well differ in their linguistic behavior. Therefore, we argue for a more specific categorization, which provides more fine-grained information on their language background, allowing the possibility of capturing both group and individual variation, which are gradient (Ortega, 2020). Previous literature suggests that the category" "native speaker" should be replaced with "L1 user" (Dewaele, 2018). We argue for the necessity of further specification since even within L1 users, we can see differences as illustrated throughout this paper. This specification could include information on bilingualism, language exposure, proficiency, and dominance. In the current statistical analysis, we included only the variable of bilingualism in heritage language context. Further studies are needed to examine the influence of proficiency, language exposure, and dominance, which we expect to play a role in the variability among native speakers. Following this suggestion, for example, the majority of our German HSs could be described as bilinguals who are simultaneously raised in German and English, residing in the United States, with English as their current dominant language and German as their less dominant language. A typical German MS could be described as a monolingually-raised German speaker, residing in Germany, with German as their current dominant language.

One limitation of the present study, as already mentioned, is the relatively small sample size of the three SC types, which did not allow us to look into the interaction of bilingualism, formality and spoken/written mode. Since this interaction proved significant in the SC use, it would be very interesting to examine it in SC types as well. Due to a small sample size, we also were not able to assess potential qualitative differences in SC types (word order, choice of complementizer, or verb placement). Another possible extension of the current study is to examine further heritage-majority language pairs, probably typologically more distant, to see whether the patterns we describe here would manifest themselves in other native speaker groups. The RUEG corpus, which provided the data analyzed in this study, is a useful resource for such an extension since it contains comparable data for Greek, Turkish, and Russian HSs in Germany and the United States, plus data for their monolingual counterparts. Another aspect that could be addressed in future studies is the register-related language use in English, German, and possibly other languages. It is noteworthy that English and German MSs in our study did not behave similarly with respect to formality, and further research would be needed to uncover the possible sources of this difference. An additional step could be the inclusion of a wider range of registers with the same formality and mode distinctions, to see whether the formality sensitivity is tied to a particular situation (e.g., a police report) or if it is more general.

CONCLUSION

This study investigated the appropriateness of the category "native speaker" by comparing productions of two native speaker groups, namely heritage and monolingual speakers. We assessed the use of SCs and their types (complement, adverbial, and relative) in narratives produced by adolescent HSs of German

in the United States in comparison with adolescent German and English MSs. We provided evidence that there are similarities, differences, and a combination of both in the productions of HSs and MSs. Our results show similarities in the production of SC types between HSs' majority English and monolingual English, as well as between heritage and monolingual German. Differences were found in SC productions between heritage and monolingual German. A combination of differences and similarities was found in SC productions between majority and monolingual English. These findings support existing criticism of the category "native speaker" and further highlight its underspecification. As is, the category fails to adequately reflect the variation among speaker groups who fall under its scope. Therefore, we argue that we should enhance the category "native speaker" with more specific descriptions of speaker groups in order to provide unambiguous information about them.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: RUEG corpus https://doi.org/10.5281/zenodo.3236068.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Deutsche Gesellschaft für Sprachwissenschaft ethics committee and the Institutional Review Board (IRB) University of Maryland at College-Park. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.717352/full#supplementary-material

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Left dislocations across discourse types in monolinguals and bilinguals' English

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Abstract

Left dislocation (LD) has been described as a feature of informal, spoken discourse. However, much of the research on LD relies on a collection of examples of the structure, rather than on larger data sets. To gain a clear understanding of the use of LDs across discourse types, we investigate the frequency of LDs in a corpus of 287 participants with four narrative types: informal spoken, formal spoken, informal written, formal written. We additionally investigate the relevance of the speaker characteristics of age (i.e., adolescent and adult), gender (i.e., female and male), and speaker group (i.e., English monolinguals and heritage speakers of German, Greek, Russian, and Turkish). We also complete an analysis of the LD characteristics (e.g., noun phrase, function) based on formality. In line with previous research, results indicated that spoken mode contained more LDs than the written one and that informal narratives had more LDs than formal ones. However, the effect of formality was modulated by speaker group: only Greek and Turkish heritage speakers produced more LDs in the informal narratives than the formal ones, while the other groups showed no evidence of any formality effect. No evidence of age and gender effects was discovered. Lastly, participants used LDs of the same characteristics in both formalities. Overall, the study confirms previous findings on the use of LDs across discourse types. It additionally raises the importance of including bilingualism as a speaker characteristic rather than considering solely monolinguals as a baseline.

Keywords: Left dislocation, discourse types, bilingualism, heritage speakers, majority English

1 Left dislocations across discourse types in monolinguals and bilinguals' English

Left dislocation (LD) in English has been discussed frequently in terms of its discourse function. Specifically, studies have focused on LD as a topic promoting device or as a method of introducing discourse-new subjects (Prince 1984; Westbury 2016). While many studies allude to the use of LDs based on discourse types (formality, mode) or speaker characteristics (age, gender), none of the existing studies examine the use or distribution of LDs in a systematic way (cf., Geluykens 1992; Gregory and Michaelis 2001). Further, many of the studies make no mention of the speaker characteristic of bilingualism, which is relevant given a substantial proportion of bilinguals among English speakers - for instance, 21.7% of US residents speak a language other than English at home (US Census Bureau 2022). The current study uses data from adolescents and adults to investigate whether and how the use of LDs differs in informal spoken, formal spoken, informal written, and formal written narratives. We additionally compare the use of LDs across the speaker characteristics of age, gender, and bilingualism. The participants include monolingual English speakers and heritage speakers (HSs) of German, Greek, Russian, and Turkish living in the United States. The following section provides details on previous studies on LD, including how they differ from the current analysis, and information on HSs, including how bilingualism is a relevant speaker characteristic when examining LDs.

2 Background

2.1 Left dislocation

Throughout the literature, left dislocation[1] (LD) is described as a structure in which a constituent precedes its core clause (1). Specifically, a noun phrase occurs outside of its canonical position, to the left of the core clause or proposition. The argument position within the core clause is instead filled with a pronoun that is coreferential with the dislocated noun phrase (Gregory and Michaelis 2001; Prince 1984, 1997; Shaer and Frey 2004; Westbury 2016). Because the argument position is filled by the pronoun, the noun phrase is extra-syntactic and independent of the host sentence (Gregory and Michaelis 2001; Shaer and Frey 2004).

(1) My father, he's Armenian.
(Prince 1997: 2)

Three main sub-categories of LDs are described in the literature, which are distinguished by the type of coreferential element in the clause. In hanging topic LDs, the coreferential element can be a variety of different structures, including a strong or weak pronoun, an agreement morpheme, or an epithet (2a) (Agnastapopoulou 1997; Shaer and Frey 2004; Westbury 2016). Clitic LDs have a clitic pronoun in the argument position of the clause (2b) (Agnastapopoulou 1997; Westbury 2016). Contrastive LDs are similar to clitic LDs, but they have a d-pronoun, or weak pronoun, in the argument position of the clause (2c) (also called German Weak pronoun LD) (Agnastapopoulou 1997; Frey 2005; Shaer and Frey 2004). Notably, topicalization is not considered an LD; topicalization has a left dislocated referential expression, but there is no resumptive, coreferential pronoun in the clause (2d) (Gregory and Michaelis 2001; Prince 1984, 1997; Szűcs 2014).

(2) a. Hanging Topic LD (French)
Blue et Linda, ils se lavent les dents.
blue and linda they REFL wash the teeth
'Blue and Linda, they are washing their teeth.'
(Hervé et al. 2015: 992)

b. Clitic LD (Spanish)
A sus amigos, Pedro los invitó a cenar.
ACC his friends pedro CL.ACC invited.3SG to dine
'As for his friends, Pedro invited them to dine.'
(Alexiadou 2006: 670)

c. Contrastive LD (Dutch)
Die man die ken ik niet.
that man that.one know I not
'That man, I don't know.'
(Anagnostopoulou 1997: 152)

d. Topicalization (English)
Mary, John saw yesterday.
(Prince 1984: 213)

[1] Some other terms used for left dislocations are left edge topics (Polinsky and Potsdam 2014), subject doubling (Tagliamonte and Jankowski 2019, 2023), and left peripheral elements or left peripheral constructions (Frey 2005; Shaer and Frey 2004).

Geluykens (1992) argues that a semantic classification of LDs is more effective than a syntactic one; in this way the superficial syntactic differences between the types of coreferential element can be ignored while the semantic similarities of LDs still allow them to be grouped. This then incorporates LDs in which the pronoun and noun phrase are linked through a partial rather than total coreferential relationship[2] (3 and 4) (Geluykens 1992; Westbury 2016).

(3) Steve, his mother likes beans.
(Geluykens 1992: 20)

(4) My first husband, we had a car then a motorcycle.
(Westbury 2016: 28)

LDs – regardless of the syntactic differences – have several functions in discourse. First, LDs are widely considered a topic promoting device (5) (Geluykens 1992; Gregory and Michaelis 2001; Szűcs 2014; Westbury 2016; though see Prince 1984, 1997). Second, LDs are used to introduce new or not currently salient referents by removing discourse-new entities from the disprefered subject position (6) (Gregory and Michaelis 2001; Prince 1984, 1997; Szűcs 2014; Westbury 2016). Third, LDs are used to indicate that the dislocated element is part of a partially ordered set that is already evoked in the discourse (7) (Gregory and Michaelis 2001; Szűcs 2014). As part of a set relation, LDs link the current utterance to previous discourse (Shaer and Frey 2004).

(5) Topic Promotion
A: Well **our house in New Mexico, it** was stucco. But we had all this trim to paint and lots of it.
B: Yeah.
A: And we did basically seventy-five percent of the **house** and then I was afraid to do the eves and high stuff.
(Gregory and Michaelis 2001: 1689)

(6) (Re-)Introduction
Once there was a king who was very wise. He was rich and was married to a beautiful queen. They had two sons. The first was tall and brooding, he spent his days in the forest hunting snails, and his mother was afraid of him. The second was short and vivacious, a bit crazy but always game. **Now the king**, **he** lived in Switzerland...
(Westbury 2016: 36)

(7) Ordered Set
She had an idea for a project. She's going to use three groups of mice. **One**, she'll feed **them** mouse chow, just the regular stuff they make for mice. **Another**, she'll feed **them** veggies. And the third, she'll feed junk food.
(Prince, 1997: 129)

Various other functions of LDs have also been discussed. For example, McLaughlin (2011) lists several possible functions of LDs, including clarification (clarify referent, avoid ambiguity), contrast (overtly contrastive), turn taking (signal beginning of speaker's turn),

[2] Also called "Chinese-Style Topic Constructions" (Westbury 2016).

filler (hesitation with no clear pragmatic motivation), and epithet (information about the referent).

The use of LDs might be influenced by properties of the discourse, the speaker, or the sentential subject. LDs are more common in informal spoken discourse than in any other formality or mode of discourse (Geluykens 1992; Keenan 1977). English-speaking adults produce LDs most under casual, spontaneous circumstances and rarely in planned or written discourse (Keenan 1977). Two studies on the use of LDs in English in two communities in Canada found differing patterns of use of LDs based on age in the two communities. In the primarily bilingual community, there was an age-graded pattern of use of LDs, meaning that middle-aged speakers used LDs least while younger and older speakers used LDs more. In the primarily anglophone community they found that the use of LD was relatively low by all speakers, and in the process of decline (Tagliamonte and Jankowski 2019, 2023). On the other hand, another study found no evidence of an effect of age or gender on the use of LDs (Gregory and Michaelis 2001). An additional major predictor of LDs is subject animacy; proper names and humans occur in LDs significantly more than groups of humans and non-human subjects (Tagliamonte and Jankowski 2019, 2023).

2.1.1 Prior studies on left dislocation

Despite the apparent wealth of information on LDs, most of the studies just described relied on a collection of examples rather than a large data corpus or it is unclear what data was used (e.g., Prince 1984, 1997; Shaer and Frey 2004; Szűcs 2014; Westbury 2016). The few studies that included more data still did not investigate the distribution of LDs based on discourse type or speaker characteristic in a systematic way. For example, Gregory and Michaelis (2001) examined the functional contrast of LDs and topicalization using data from a switchboard telephone corpus. The corpus contained data from unacquainted adults, including men and women of varying ages and dialect groups. The study stated that many ages, both genders, and many dialects were represented among the speakers that used LDs, and there was no evidence that any of these were significant factors in the use of LDs. Gregory and Michaelis's (2001) study provides insight into the use of LDs, but the participants include only adults and there is no mention of bilingualism although it is likely that many of the speakers in the study could be heritage speakers (HSs), L2 speakers of other languages, or L2 speakers of English. Further, the data come from only one discourse type – phone conversations among unacquainted adults – and it is unclear what formality this represents.

As another example, Geluykens (1992) provides an overview study of LDs, particularly the communicative function of LDs. The study examined four data types: spoken conversational, spoken non-conversational, written printed, and written unprinted. The spoken conversational data included face-to-face and telephone conversations, and the spoken non-conversational included spontaneous and prepared (but unscripted) orations. The written printed data included arts and sciences materials, excerpts from newspapers, and fiction writing, and the written unprinted data included business letters, intimate letters, and personal journals. The division of spoken language represents more and less interactive discourse, while the division of written language represents more and less formal writing. Thus, the study provides a foundation for understanding LD use based on formality or mode. One of the claims of the study is that LDs are most frequent in informal spoken discourse (p. 21). However, judging by the frequency results (p. 34), it is difficult to determine if LD use is formality-based or interaction-based, as the formality is unclear in the given data (e.g.,

a telephone conversation could be either formal or informal). Additionally, the data came from male and female participants, but the age and language background of the speakers was not specified.

To expand on this prior work, our study investigates the distribution of LDs across informal spoken, formal spoken, informal written, and formal written narratives. Further we include the speaker characteristics of age (i.e., adolescent and adult), gender (i.e., male and female), and bilingualism (i.e., English monolinguals and HSs of German, Greek, Russian, and Turkish).

2.2 The current study

The current study examines if and how the use of LDs in English differs across the following discourse types: informal spoken, formal spoken, informal written, and formal written. We additionally ask how speaker characteristics and LD characteristics affect the use of LDs. We approach this question in several ways.

Narrative Characteristics. First, we investigate the frequency of LDs in English narratives by formality (informal and formal) and mode (spoken and written). This allows us to manipulate formality and mode without an additional variable of interactive discourse type, which will provide clarity to Geluykens' (1992) finding that LDs are primarily a feature of informal conversation.

Speaker Characteristics. Next, we investigate the frequency of LDs by age (adolescent and adult) and gender (male and female). This allows us to expand the ages investigated in Gregory and Michaelis' (2001) and Tagliamonte and Jankowski's (2019, 2023) studies to younger speakers and confirm their finding that gender is not a significant factor in LD use. Additionally, we investigate the frequency of LDs by monolingual and bilingual speakers. In the US, 21.7% of residents speak a language other than English at home, so bilingual speakers should be included in studies on English to be representative of actual language use (US Census Bureau 2022). Further, in some bilingual populations dynamic patterns of LD use have been found. For example, in Hervé et al.'s (2015) study on French-English bilingual children (ages 5;4-6;7), the researchers found that the bilingual children used more LDs in English contexts than the English monolingual children who instead preferred NP+VP constructions. Similarly, Nadasdi (1995) investigated LDs[3] in the spoken French of English-French bilingual adolescents in Ontario, rather than in their English. He found that speakers with less exposure to French (i.e., more exposure to English) used LDs less often in French. In the current study, we examine the use of LDs by English monolinguals and four groups of bilinguals (German HSs, Greek HSs, Russian HSs, and Turkish HSs speaking English as their dominant language). HSs are bilinguals who speak a heritage language at home that is not the majority language of the community (Benmamoun et al. 2013; Rothman 2009). HSs often are dominant in their heritage language at young ages, but this typically shifts during childhood such that they become dominant in the community language as adolescents and adults (Benmamoun et al. 2013). Lastly, we examine the interaction between formality and age, gender, and speaker group to determine if speakers with these various characteristics treat the formality distinction differently.

[3] Nadasdi (1995) refers to these structures as subject doubling and specifically distinguishes that from LD, stating that the NP in LDs occupies a topic position while the NP in subject doubling occupies a subject position. However, based on Geluykens's (1992) semantic characterizations of LDs, this distinction would be irrelevant.

LD Characteristics. Finally, we perform an exploratory analysis of the characteristics of LDs used, including the referent in the LD, the type of noun phrase, the type of pronoun, and the function of the LD.

Based on previous literature, we hypothesize that the frequency of LDs will be higher in the informal than formal contexts and in the spoken than written modes (Geluykens 1992; Keenan 1977). We expect no evidence of age and gender effect on the use of LDs (Gregory and Michaelis 2001) but an effect of bilingualism on the use of LDs, as differences in LD use have been shown in other bilingual populations (Hervé et al. 2015; Nadasdi 1995).

3 Methods

3.1 Participants

Participants are five groups of English speakers living in the United States: English monolinguals and bilingual speakers of English and one of four heritage languages (German, Greek, Russian, and Turkish). The participants are further divided by age – adolescent (13-18 years) and adult (20-37 years, Table 1).

Table 1:
Distribution of participants.

Group	Adolescent		Adult	
	N (Male/Female)	Mean age (SD)	N (Male/Female)	Mean age (SD)
English MSs	32 (13/19)	16.1 (1.4)	32 (13/19)	28.5 (3.9)
German HSs	27 (15/12)	15.5 (1.5)	7 (2/5)	25.3 (4.1)
Greek HSs	33 (16/17)	16.3 (1.4)	32 (13/19)	29.1 (3.4)
Russian HSs	32 (13/19)	15.8 (1.4)	33 (11/22)	27.5 (3.3)
Turkish HSs	32 (10/22)	16.0 (1.6)	27 (9/18)	26.2 (4.1)

The majority of HSs (91.9%) were first exposed to English at the age of 5 or earlier, with 45.7% having the first contact with English from birth. Monolinguals were defined as those for whom English was the only language spoken at home, with no other language exposure before age 6. HSs are those who speak English as the majority language of their community as well as a heritage language which they learned from birth from at least one parent who is an L1 speaker of the heritage language.

We assessed the English proficiency of participants using speech rate (syllables per second) and two measures of lexical diversity: moving-average type-token ratio (MATTR) and measure of textual lexical diversity (MTLD). We found no difference in proficiency of the groups based on participants' speech rates. As recommended in the literature (Zenker and Kyle 2021), we calculated MATTR and MLTD only on the narratives with at least 50 tokens – 1065 out of 1148. Contrary to the speech rate findings, English monolinguals and Turkish HSs differ in both lexical diversity measures. The other HSs groups do not differ from the monolingual speakers. Table 2 includes the three proficiency measures for each speaker group (group values and SEs predicted by linear models); for the models and data see the OSF repository[4], and for the spoken files that were used for the speech rate

[4] The OSF repository can be found at https://osf.io/ygk6m/?view_only=5c080b841a2b495aac73771bbd74dc3f.

calculation, see release 0.4.0 of the Research Unit on Emerging Grammars (RUEG) corpus (Wiese et al. 2021).

Table 2:
Proficiency measures by speaker group.

Group	Speech rate Predicted value (SE)	MATTR Predicted value (SE)	MTLD Predicted value (SE)
English MSs	3.26 (0.052)	0.68 (0.005)	38.84 (0.93)
German HSs	3.34 (0.071)	0.68 (0.006)	40.31 (1.26)
Greek HSs	3.23 (0.051)	0.67 (0.005)	37.85 (0.91)
Russian HSs	3.20 (0.051)	0.67 (0.005)	38.73 (0.92)
Turkish HSs	3.22 (0.054)	0.66 (0.005)	36.07 (0.94)

3.2 Data

Data collection followed the Language Situations methodology (Wiese 2020; Wiese et al. in press), which elicits controlled, comparable, and quasi-naturalistic productions across formalities and modes. Participants watched a short video depicting a minor car crash and then recounted what they saw as if they were a witness to the accident. This procedure was completed in a formal context and an informal context, as well as in spoken and written modes. For the formal context, the participant recounted the video as a voice message to a police hotline and as written police report. For the informal context, the participant recounted the video as a WhatsApp voice message and a WhatsApp text message to a friend. Thus, each participant produced four narratives.

All narratives[5] were divided into communication units (CU) – a main clause plus any dependent clauses[6] (Schneider et al. 2005) using EXMARaLDA software (Schmidt and Wörner 2014). CUs served as the unit of comparison for our study, since each CU could contain a maximum of one LD. An example of an informal, spoken narrative is shown in (9), including the division into CUs and further annotations. The annotated data are accessible through the OSF repository.

3.3 Annotation

We first identified all LDs in the corpus according to the definition in Section 2.4. We then annotated each LD for four features as detailed in the following paragraphs: referent, type of pronoun, type of noun phrase, and function.

Referent. Across all narratives, we identified a total of 19 referents that were frequently used: MAN, WOMAN1, COUPLE, FAMILY, BALL, STROLLER, BABY, WOMAN2, DOG, LEASH, GROCERIES, TRUNK, CAR1, CAR2, CAR3, CARS, DRIVER1, DRIVER2, DRIVERS. We annotated each narrative for the presence of these 19 referents (8), determining which referents were realized as LDs.

(8) [Hey bud]$_{CU}$ [so I was uh I was just walking down the street]$_{CU}$ [and there was this um on one side of the street there was *this couple*$_{COUPLE}$ walking down]$_{CU}$ [*the guy*$_{MAN}$ had *a ball*$_{BALL}$]$_{CU}$ [and the th/ *the chick*$_{WOMAN1}$ had *a carriage*$_{STROLLER}$ with

[5] The narratives are transcribed and included here exactly as they were written or spoken by the participants. Any apparent errors are copied from the data. The spoken narratives do not include punctuation.
[6] The CU division guidelines from Schneider et al. (2005) were applied with one difference – two coordinated finite verbs in main clauses were considered two CUs, not one.

*a baby*BABY in *it*STROLLER I'm guessin]CU [uh and on the other side of the street was this um *this lady*WOMAN2 with *a dog*DOG]CU [and *she*WOMAN2 was loading *groceries*GROCERIES into *her car*CAR3]CU [um and then down these down the street comes *these two cars*CARS]CU [and *the guy um that had the ball*MAN *he*MAN accidentally kicks *his ball*BALL across the street]CU [and then *the dog*DOG runs out into the street right in front of *this car*CAR1]CU [uh and then *the lead car*CAR1 stops short]CU [and this *the car*CAR2 right behind it rear/ rearends *it* CAR1 cause *it*CAR1 like it stops so suddenly]CU [um and then *the guy with the ball*MAN *he*MAN runs over to help *this chick*WOMAN2 with *her groceries*GROCERIES]CU [um and then I guess when *he*MAN's done *he*MAN walks over to to check out what's up with *these drivers*DRIVERS]CU [and one of them I think *one of them*DRIVER1 called nine one one]CU
(USbi07MR_isE)[7]

Pronoun Type. We identified three types of pronouns: personal, possessive, and partitive (9). We annotated each LD for pronoun type.

(9)

Personal:	A guy, he dropped a soccer ball. (USbi60MD_isE)
Possessive:	The person who was unloading the car, their stuff kinda rolled into the street. (USmo52FE_fsE)
Partitive:	The two cars, one of them rear-ended the one in front of him. (USmo58ME_fsE)

Noun Phrase Type. We identified four types of noun phrase: simple noun phrase, noun phrase with a preposition, noun phrase with coordination, and noun phrase with a relative clause. These can also be combined; we found examples of coordination with a preposition and relative clause and a relative clause with a preposition (10). Again, we annotated each LD for noun phrase type.

(10)

Simple:	A guy, he dropped a soccer ball. (USbi60MD_isE)
Preposition:	And the guy with the ball, he's like bouncing it. (USbi67MG_isE)
Coordination:	The guy and his wife, they're starting to cross the parking lot. (USbi50FR_isE)
Relative:	The two cars that were coming, they were like in the way. (USbi64FG_isE)
Coordination-Prep.-Rel.:	Who I assume to be the husband or the man with the ball or who lost the ball, he retrieved the ball. (USmo12ME_fsE)

[7] The speaker code in the examples includes the following information: US - country of elicitation, United States; bi/mo - bilingual/monolingual speaker; 01 - speaker number (>50 for adolescents, <50 for adults); M/F - speaker's sex; D/G/R/T/E - HS's heritage language (D for German, G for Greek, R for Russian, T for Turkish) or monolinguals' L1 (English); f/I - formal/informal setting; s/w - spoken/written mode; E - language of elicitation (English).

Relative-Preposition: The man in the first car who was the one who got hit, he called the police immediately after this happened. (USbi83FR_fsE)

Function. We identified four functions of LDs in the data (11). "New introduction" denotes LDs that introduce new referents in the discourse. "Re-introduction" denotes LDs that re-introduce referents that are not currently salient in the discourse. "Set" denotes LDs that indicate that a referent is part of a set. Finally, "Clarification" denotes LDs that are used to clarify the narrative in some way. Although LDs are widely considered topic promoting devices, we did not consider this function because there is no clear method of determining topic in English (Prince 1984, 1997).

(11) New introduction: I saw a man accidentally drop a ball in the middle of the road, when a car just stopped for two seconds. The second car stopped as well, but it crashed in front of the other car. The woman who was packing her groceries in the trunk, she did not realized her dog was chasing the ball and the dog could of been hit by the car. (USmo24FE_fwE)

Re-introduction: There was this couple walking down the guy had a ball and th/ the chick had a carriage with a baby in it I'm guessing uh and on the other side of the street was this lady with a dog and she was loading groceries into her car um and then down this street comes these two cars and the guy um that had the ball he accidentally kicks his ball across the street. (USbi07MR_isE)

Set: I decided to take a walk, and as I was walking, there was a little family walking, Im assuming it was the father, he was tribbling a soccer ball. (USbi73FG_iwE)

Clarification: I saw this guy he was walking with his wife and his baby and he dropped his ball into the road and this dog tried to go after it and the lady across the street who was loading her car um her food fell and he tried the guy he went to go help the lady pick up her food. (USbi76FD_isE)

3.4 Analysis

Our analyses fall into three broad categories – narrative characteristics, speaker characteristics, and LD characteristics. The data, R code and Excel workbook that can be used to reproduce all analyses can be accessed through the OSF repository.

3.4.1 Narrative characteristics

We first analyzed the data by the narrative characteristics of formality and mode. We coded each CU as containing an LD or not and then predicted the presence of LDs in CUs using generalized binomial linear mixed effects models employing the lme4 package (version 1.1-30, Bates et al. 2015) in R (R Core Team 2022). This type of modelling assumes that each CU provides exactly one chance for an LD to appear (e.g., "the man, he dropped the ball")

since more than one LD is generally not possible in a CU (e.g., "*the man, the ball, he dropped it")[8]. Table 3 (Section 4.1) shows the raw numbers of LDs and CUs that the models were based on, and Figure 1 represents the proportions of LDs used by each speaker in each narrative (formal spoken, formal written, informal spoken, informal written).

We included two predictors as fixed effects: formality (formal/informal) and mode (spoken/written). We did not include an interaction of formality and mode because there were only three data points in the written mode.

We used treatment contrast coding for the predictors, with formal setting and spoken mode as reference levels. We performed model selection as described in Gries (2021): first, we maximally specified the random effect of participants by including a by-participant random intercept and mode and formality random slopes. Next, we performed a step-by-step reduction of random effects: we removed the random effect that explained the least variance and compared the model fit of the new reduced model with the model fit of the previous model using ANOVA at each step. When the random effects could not be simplified anymore (i.e., any further reduction resulted in a worse model fit), we moved on to the second step - the reduction of fixed effects using drop1() function. We removed fixed effects until the reduced model had a significantly worse fit than the previous model.

3.4.2 Speaker characteristics

We analyzed the data by the speaker characteristics of gender and age group since they were explored in previous research (Gregory and Michaelis 2001; Tagliamonte and Jankowski, 2019, 2023). We also included the significant predictors from the narrative characteristics model as control variables. As in the narrative characteristics analysis, we used binomial generalized linear mixed effects models, the outcome variable being CUs containing an LD or not. The predictors included gender (female/male), age group (adults/adolescents), setting (formal/informal), mode (spoken/written) and the interaction of gender and age group.

All predictors were treatment contrast coded, with female gender, adult age group, formal setting and spoken mode being the reference levels. We maximally specified the random effects by including a by-participant random intercept as well as mode and formality random slopes. Subsequently, we performed the same model selection procedure based on Gries (2021) as in the narrative characteristics analysis.

3.4.3 Interaction of speaker characteristics with formality

In addition, we fit an exploratory model that included the two already-covered speaker characteristics of gender and age and added a new one – speaker group (English monolinguals/German HSs/Greek HSs/Russian HSs/Turkish HSs) – that has not been explored in previous LD studies. We also included the interactions of the three speaker characteristics with the narrative characteristic of formality, since our previous research has shown that at least some speaker groups can approach formality distinction differently (Tsehaye et al. 2021). We also aimed to see if other speaker characteristics interacted with formality.

[8] Only one CU in our data had 2 LDs, one in the main and one in the subordinate clause: [and then **another woman, she** was packing loading her groceries] [until like of the guy I mean until **the guy his ball** just runs on the street] (USbi17FT_isE). For the purposes of this analysis, this CU has been split into two CUs, so that each CU could only have 1 or 0 LDs.

Similar to the previous two analyses, all predictors were treatment contrast coded, with female gender, adult age group, English monolingual speaker group, formal setting and spoken mode being the reference levels. We maximally specified the random effects (by-participant random intercept as well as mode and formality random slopes) and performed the same model selection procedure based on Gries (2021) as before. In Section 4, we report the estimates, SEs, z- and p-values obtained from the three final models (4.1, 4.2 and 4.3).

3.4.4 LD characteristics

Lastly, we completed a descriptive analysis of the following characteristics of LDs used in each formality: type of noun phrase, type of pronoun, referent, and function (details in Section 2.3). We calculated the proportion of LDs with a certain characteristic out of the total LDs produced in each formality. For example, we determined the number of LDs with a personal pronoun out of the total LDs in the informal and formal contexts, the LDs with a possessive pronoun out of the total LDs in the informal and formal contexts, and the LDs with a partitive pronoun out of the total LDs in the informal and formal contexts. We further determined the frequency of referents realized in LDs out of the total occurrences of that referent in all narratives to determine if patterns of frequency were because certain referents occur more in LDs or because of the overall frequency of the referent. Due to the limited number of LDs in the data, this is a descriptive analysis to determine if there are possible differences in the LD characteristics used based on formality, which can be investigated in detail in future research.

4 Results

4.1 Narrative characteristics

First, we examined the frequency of LDs by formality and mode. Table 3 shows the overall proportions of LDs out of CUs for each formality and mode combination. Figure 2 shows the individual proportions of LDs out of CUs for each combination of formality and mode, along with predicted probabilities derived from the linear mixed model (see below). From this, it is clear that LDs are used relatively infrequently overall and almost exclusively in the spoken narratives.

Table 3:
Raw numbers of LDs and CUs by formality and mode.

	LD	CU	LD/CU
Formal spoken	48	4015	0.0120
Formal written	1	3066	0.0003
Informal spoken	78	3656	0.0213
Informal written	2	2409	0.0008

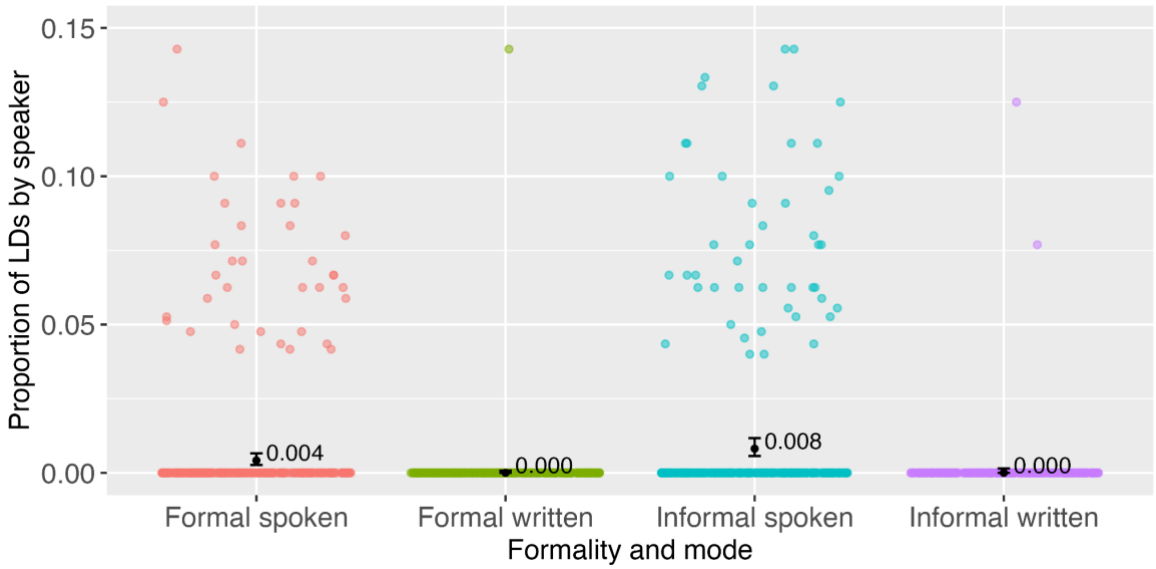

Figure 1:
Predicted probabilities of LDs by formality and mode and individual proportions of LDs out of CUs. Colored dots represent speakers; black dots with whiskers represent predicted probabilities of LDs based on the linear mixed effects model. The y-axis is zoomed from the original size of 0-0.3 to the size of 0-0.15 to make the model predictions more visible. When zooming, 10 data points above the 15% mark were removed: two in formal spoken, eight in informal spoken.

In the inferential analysis, the final model contained the fixed effects of formality and mode and the random effects of formality and mode random slopes uncorrelated with a speaker random intercept. In this final model (Figure 1), we observed a strong main effect of mode (est. -7.7253, SE 3.0693, z -2.517, p = .0118), with fewer LDs in the written mode compared to the spoken mode. In addition, there was a main effect of formality (est. 0.6728, SE 0.2957, z 2.275, p = .0229), with more LDs in the informal narratives than in the formal ones.

4.2 Speaker characteristics

In this analysis, we examined the frequency of LDs by gender and age group and their interaction, including formality and mode as control variables since it was clear from the narrative characteristics analysis that they were significant predictors. Table 4 shows the overall proportions of LDs out of CUs for the four combinations of gender and age group, split by formality and mode. Figure 2 shows the individual proportions of LDs out of CUs for each combination of gender and age group, split by formality and mode.

Table 4:
Raw numbers of LDs and CUs by gender and age, split by formality and mode.

	Formal spoken			Formal written			Informal spoken			Informal written		
	LD	CU	LD/CU	LD	CU	LD/CU	LD	CU	LD/CU	LD	CU	LD/CU
Adult female	13	1192	.011	1	918	.001	23	1117	.021	0	718	.000
Adult male	5	682	.007	0	474	.000	9	616	.015	1	400	.003
Adolescent female	18	1239	.015	0	1005	.000	28	1118	.025	1	786	.001
Adolescent male	12	902	.013	0	669	.000	18	805	.022	0	505	.000

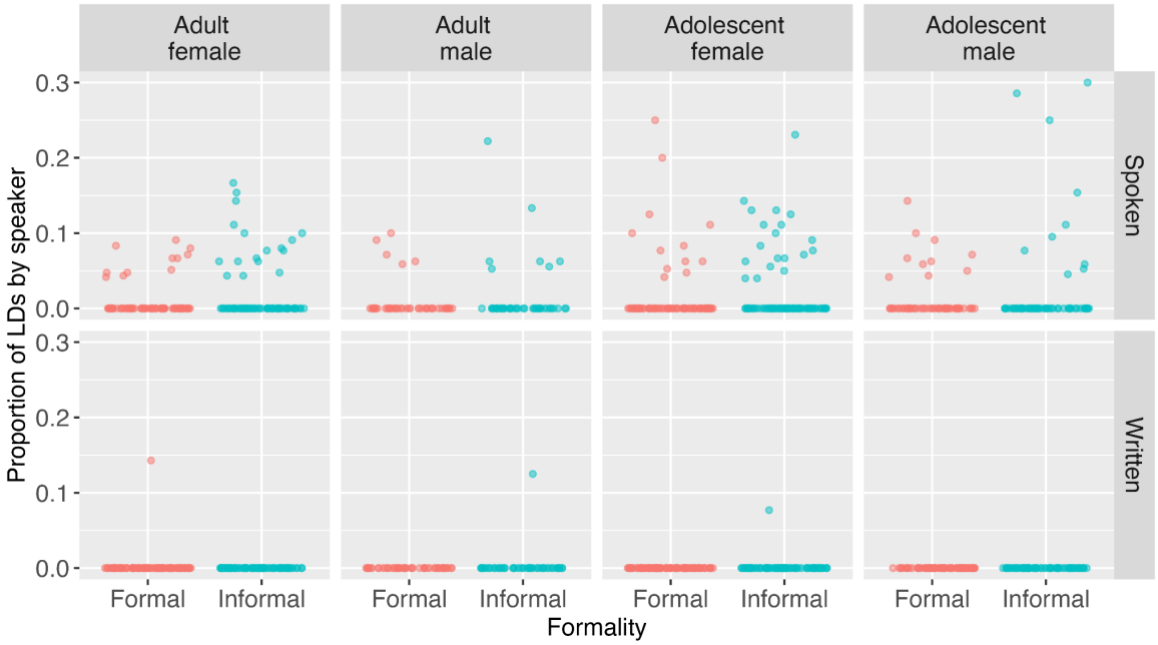

Figure 2:
Individual Proportions of LDs out of CUs by Age Group and Gender, Split by Formality and Mode. Colored dots represent speakers, one dot = one speaker. No predicted probabilities are displayed because the gender and age group predictors were removed during model selection.

In the inferential analysis, the gender and age group predictors were removed during the model selection, meaning that they did not significantly contribute to predicting LD use. The final model was very similar to the final model in the narrative characteristics analysis: it contained mode and formality as fixed effects but only a mode random slope uncorrelated with a by-speaker random intercept (in narrative characteristics, we had both mode and formality random slopes). In this final model, we observed a strong main effect of mode (est. -3.4129, SE 0.6941, z -4.917, $p < .001$), with fewer LDs in the written mode compared to the spoken mode. In addition, there was a main effect of formality (est. 0.9293, SE 0.2846, z 3.266, $p = .001$), with more LDs in the informal setting than in the formal one.

4.3 Interaction of speaker characteristics with formality

Our third analysis examined the interaction of formality with the speaker characteristics of gender, age group and speaker group. Mode was included as a control variable. Table 5 shows the overall proportions of LDs out of CUs for the five speaker groups, split by formality and mode. Figure 3 shows the individual proportions of LDs out of CUs by speaker group, split by formality and mode, along with the predicted probabilities of LDs based on the linear model.

Table 5:
Raw numbers of LDs and CUs by speaker group, split by formality and mode.

	Formal spoken			Informal spoken			Formal written			Informal written			Total		
	LD	CU	LD/CU	LD	CU	LD/CU	LD	CU	LD/CU	LD	CU	LD/CU	LD	CUs	LD/CU
English MSs	15	834	.018	8	771	.010	1	615	.002	0	514	.000	24	2734	.009
German HSs	5	463	.011	10	397	.025	0	374	.000	0	265	.000	15	1499	.010
Greek HSs	5	903	.006	12	812	.015	0	661	.000	2	503	.004	19	2879	.007
Russian HSs	19	971	.020	22	883	.025	0	763	.000	0	553	.000	41	3170	.013

Turkish HSs	4	844	.005	26	793	.033	0	653	.000	0	574	.000	30	2864	.010

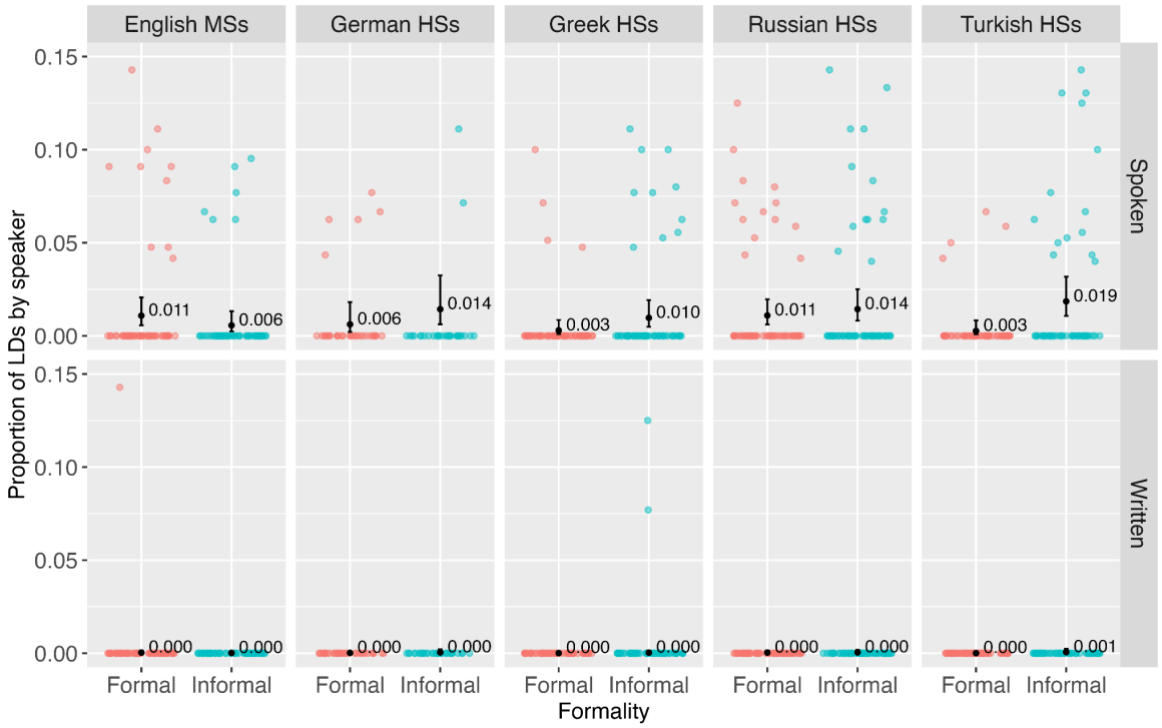

Figure 3:
Predicted probabilities of LDs by speaker group, split by formality and mode and individual proportions of LDs out of CUs. Colored dots represent speakers; black dots with whiskers represent predicted probabilities of LDs based on the linear mixed effects model. The y-axis is zoomed from the original size of 0-0.3 to the size of 0-0.15 to make the model predictions more visible. When zooming, 10 data points above the 15% mark were removed: two in English MSs, three in German HSs, two in Russian HSs, and three in Turkish HSs.

In the inferential analysis, the final model included formality, speaker group and mode as fixed effects as well as an interaction of formality and speaker group. Random effects included only a by-speaker random intercept. The significant interaction of formality and speaker group indicated that the formality slope was different in Greek HSs and Turkish HSs, compared to English monolinguals (Greek HSs est. 1.863, SE 0.777, z 2.396, p = .017; Turkish HSs est. 2.621686, SE 0.778, z 3.370, p < .001). The simple effect of formality within English monolinguals indicated no evidence of the difference between formal and informal setting in English monolinguals' productions (est. -0.660378, SE 0.493393, z -1.338, p = .18).

To see if there is a difference between the formal and informal settings in the four HS groups, we re-leveled the speaker group predictor four times (to have German, Greek, Russian and Turkish HSs one after the other as reference levels) and refit the model four times. The simple effects of formality in the refit models revealed that German and Russian HSs show no evidence of difference between formal and informal setting, similar to English monolinguals (German HSs est. 0.8771, SE 0.6179, z -1.419, p = .156; Russian HSs est. 0.2734, SE 0.3486, z 0.784, p = .43). On the other hand, Greek and Turkish HSs use significantly more LDs in the informal setting than the formal one (Greek HSs est. 1.1875, SE 0.5905, z 2.011, p = .044; Turkish HSs est. 1.880, SE 0.577, z 3.259, p = .001; Figure 3).

Overall, the results of the three inferential analyses show that mode is an important predictor of LD use, with the spoken mode having more LDs than the written one, as

predicted based on Geluykens (1992). Formality also plays a role - when taken as a non-interacting predictor, we observe that the informal setting has more LDs than the formal one, as predicted based on the claim by Geluykens (1992). However, our exploratory analysis indicated that the formality effect is modulated by the speaker group: it is actually Greek and Turkish HSs that make the expected distinction between the formality settings (more LDs in the informal one). In contrast, English monolinguals, along with German and Russian HSs, do not show evidence of the formality distinction - the speakers in our sample used similar proportions of LDs in formal and informal settings. Finally, we observed no evidence of gender and age group effects, similar to Gregory and Michaelis (2001).

4.4 LD characteristics

Lastly, we analyzed the LD characteristics – noun phrase, pronoun, referent, and function – used by formality. The frequency of different types of noun phrases used in LDs by formality is shown in Table 6; the frequency is represented as a proportion[9] of LDs of each type out of the total LDs used in the informal and formal contexts, as well as overall. Overall, speakers mostly use simple noun phrases, followed by noun phrases with a preposition, and then noun phrases with a relative clause.

Table 6:
Type of noun phrase used in LD by formality.

	LDs	Simple	Prep.	Coord.	Relative	Prep.-Rel.	Coord.-Prep.-Rel.
Informal	80	0.475	0.338	0.050	0.100	0.038	0.000
Formal	49	0.265	0.306	0.082	0.245	0.082	0.020
Total	129	0.395	0.326	0.062	0.155	0.054	0.008

The frequency of different pronoun types in LDs by formality is given in Table 7. Personal pronouns are used most frequently, followed by possessive pronouns.

Table 7:
Type of pronoun used in LD by formality**.**

	LDs	Personal	Possessive	Partitive
Informal	80	0.925	0.075	0.000
Formal	49	0.776	0.184	0.041
Total	129	0.868	0.116	0.016

A total of 10 referents were produced at least once using an LD: MAN, WOMAN1, COUPLE, FAMILY, WOMAN2, CAR1, CAR2, CARS, DRIVER1, and DRIVERS. Table 8 shows the proportion of LDs with each referent out of the total LDs for each formality. The most frequent referents in LDs are MAN, WOMAN2, COUPLE, and FAMILY, while the least frequent referents in LDs are CAR1 and WOMAN1.

Table 8:
Referent expressed using LD by formality.

	LDs	man	woman2	couple	family	driver1	car2	cars	drivers	car1	woman1

[9] The proportions in Tables 5 through 11 may not add to 1.00 due to rounding.

Informal	80	0.513	0.113	0.088	0.025	0.063	0.050	0.050	0.063	0.038	0.000
Formal	49	0.327	0.245	0.020	0.061	0.102	0.061	0.061	0.041	0.061	0.020
Total	129	0.442	0.163	0.062	0.039	0.078	0.054	0.054	0.054	0.047	0.008

To determine if this was the result of the overall frequency of each referent rather than the specific referent itself we calculated the occurrences of each referent in an LD out of the total occurrences of that same referent as shown in Table 9 (e.g., in the informal data there were 41 LDs with the referent MAN, and there were 1251 occurrences of MAN total; the proportion, then, is 0.033 (41/1251)).

Table 9:
Proportion of referent in LDs out of total occurrences of that referent by formality.

	LDs	man	woman2	couple	family	driver1	car2	cars	drivers	car1	woman1
Informal	80	0.033	0.011	0.025	0.027	0.008	0.007	0.009	0.017	0.002	0.000
Formal	49	0.009	0.009	0.002	0.030	0.008	0.003	0.004	0.004	0.002	0.003
Total	129	0.018	0.010	0.011	0.029	0.008	0.005	0.006	0.009	0.002	0.002

If the choice of referent in LDs were solely based on the frequency of the referent overall, we would expect all of the proportions within each formality to be the same. That is, if LDs occur with 10% of all referents regardless of referent type, we would expect 10% of the occurrences each referent to be in an LD, i.e., 10% of occurrences of MAN, 10% of occurrences of WOMAN2, and so on would be in an LD, resulting in a proportion of 0.10 for each referent in Table 9 above. Instead, MAN, WOMAN2, COUPLE, and FAMILY are still the most frequent referents in LDs in both informal and formal contexts. To determine the cause of this, we look more closely at the overall number of each referent in each formality. Table 19 shows the proportion of each referent out of the total number of selected referents[10] (e.g., in the informal data there were 1251 occurrences of MAN and 5733 total referents that appeared at least once in an LD, so the proportion is 0.218 (1251/5733). In other words, MAN makes up approximately 20% of the selected referents).

Table 10:
Proportion of each referent out of total number of selected referents by formality.

	Total Referents	man	woman 2	couple	family	driver1	car2	cars	drivers	car1	woman 1
Informal	5733	0.218	0.141	0.050	0.013	0.105	0.100	0.075	0.053	0.211	0.034
Formal	8742	0.209	0.155	0.054	0.012	0.074	0.104	0.077	0.059	0.210	0.046
Total	14499	0.213	0.150	0.052	0.012	0.086	0.102	0.076	0.056	0.210	0.041

From this, it is clear the most frequent referents overall are MAN, CAR1, WOMAN2, and CAR2. However, CAR1 and CAR2 are relatively infrequent in LDs. Further, FAMILY, WOMAN1, and COUPLE are the least frequent referents overall in every group, but both FAMILY and COUPLE are among the most frequent referents in LDs. Human referents are the most frequent referents in LDs for both formalities. This suggests that the use of a referent in an LD

[10] For this calculation we only consider the 10 referents that appear at least once in an LD rather than all of the possible referents in the entire data set.

depends on a combination of overall frequency of the referent and animacy of the referent, which is consistent with Tagliamonte and Jankowski's (2019, 2023) findings that a major predictor of left dislocation in English and French is subject animacy.

Lastly, the frequency of the functions of LDs by formality is provided in Table 11. LDs are used mostly to reintroduce referents and to introduce new referents in the narrative.

Table 10:
Function of LD by formality**.**

	LDs	New-intro	Re-intro	Set	Clarif.	New-intro, set	Clarif., re-intro	Re-intro, set	Clarif., set
Informal	80	0.300	0.425	0.138	0.038	0.075	0.013	0.013	0.000
Formal	49	0.286	0.429	0.143	0.000	0.041	0.000	0.082	0.020
Total	129	0.295	0.426	0.140	0.023	0.062	0.008	0.039	0.008

5 Discussion

We investigated the use of left dislocations in English across informal spoken, informal written, formal spoken, and formal written narratives to expand on prior research and provide clarity to the use of LDs based on formality and mode. Additionally, we investigated the use of LDs based on the speaker characteristics of age, gender, and bilingualism. Lastly, we completed an analysis on the different types of LDs used in each formality.

First, from the inferential analysis on narrative characteristics, we found that LDs are used significantly more in the spoken mode than written mode. Additionally, LDs were used significantly more in the informal setting than formal setting in general, without taking the speaker group into account (but see the interaction below). This aligns with Geluykens' (1992) finding that LDs are a phenomenon of informal conversation.

Next, we found no overall differences in LD use based on gender or age, which is consistent with Gregory and Michaelis (2001). However, through our exploratory analysis on the interaction between formality and the speaker characteristics of age, gender, and speaker group, the speaker characteristic of bilingualism was found to affect the use of LDs. We found that English monolinguals did not use LDs differently in the informal and formal settings, and the German and Russian HSs behaved similarly to the English monolinguals. In contrast the Greek and Turkish HSs used significantly more LDs in the informal than formal setting. Numerically, English monolinguals were the only speaker group that had slightly (but not significantly) more LDs in the formal setting than in the informal setting (see Figure 2). The HS groups had the reverse pattern – more LDs in the informal than in the formal setting. However, the reversal was large enough to reach significance only for Greek and Turkish HSs, not for German and Russian HSs. Thus, we can conclude that the formality effect is modulated by speaker group: Greek and Turkish HSs treated the formality distinction differently than the English monolinguals, while German and Russian HSs did not.

The differences in the use of LDs across speaker group could be the result of various causes. For example, it is possible that cross-linguistic influence from the heritage Greek and Turkish to the majority English affects the use of LDs – for example, if LDs are used more frequently in Greek and Turkish than in English. Alternatively, extralinguistic factors

such as speaker attitude and perception of the situation could cause these differences. HSs might use more formal language in the formal narratives than monolinguals to demonstrate their language skills in general. This could be due to many underlying factors, including pressure to conform to standard English, more exposure to language tests, or more frequently discussing language in general/their own language use than monolinguals. This would be consistent with Tsehaye et al.'s (2021) finding that monolingual speakers and HSs approach the formality distinction differently when using subordinate clauses, likely due to extralinguistic factors. As a reminder, all HSs reverse the formality trend compared to English monolinguals. While this is only significant for the Greek and Turkish HSs, perception of the situation may be similar for all HS groups. Additionally, the Turkish HSs had lower lexical diversity scores than all other speaker groups, which could contribute to the pressure to conform to standard English. This being said, it is not possible to make definitive conclusions regarding the cause of the different use of LDs by speaker group without further research. Future studies should examine the use of LDs by the HSs in their Greek and Turkish, as well as the language of monolingual Greek and Turkish speakers to support these findings.

Lastly, through our descriptive analysis of LD characteristics, we found several similarities across the informal and formal narratives, suggesting that the structure of LDs across discourse type is not appreciably different. Most noun phrases in LDs were simple noun phrases or noun phrases with a preposition. Most of the pronouns used in LDs were personal pronouns. LDs were most frequently used to introduce or reintroduce referents. Lastly, the referents in LDs were typically MAN or WOMAN2, which are also used frequently in the narratives in general, while LDs rarely referred to CAR1 or CAR2 even though they are used relatively frequently in the narratives. We concluded that the use of referent in LDs is a result of frequency of the referent overall and the animacy of the referent. Thus, the types of LDs are consistent with descriptions of LDs in English throughout the literature (Gregory and Michaelis 2001; Prince 1984, 1997; Tagliamonte and Jankowski 2019; Westbury 2016), which indicates that speakers use LDs in the same way regardless of discourse type.

To summarize, we found a significant effect of mode and formality on the use of LDs in English. We additionally found an interaction of formality and speaker group. Specifically, LDs were distributed differently across formal and informal settings in the majority English of Greek and Turkish HSs as compared to the English monolinguals and the German and Russian HSs. The underlying cause of this result (e.g., cross-linguistic influence or extralinguistic factors) should be explored in future research.

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Chapter 5. General Discussion

The overarching aim of this dissertation was to explore similarities and differences in the majority language of adolescent and adult HSs and their MS counterparts by comparing language productions of the two groups. This serves the theoretical goal of understanding the influence of the less dominant language on the more dominant one, as well as the general influence of bilingualism or bilingual experience on the more dominant language. The practical goal of this research is to describe language patterns in the majority language of HSs in order to explore the possibility of long-term detrimental effects of heritage language maintenance on the majority language.

To this end, we have examined elicited narratives in majority English produced by German, Greek, Russian, and Turkish HSs, as well as English MSs (adolescents and adults). The narratives were produced in four registers – formal spoken, formal written, informal spoken, and informal written. We asked the following research questions and put forward the following hypotheses:

RQ1. What differences and similarities can we observe in the use of majority English by HSs and MSs in an ecologically valid setup of elicited narratives?

H1. We expected to find a substantial number of similarities and some differences between the two groups.

RQ2. What differences and similarities can we find in the way HSs and MSs differentiate registers?

H2. We expected HSs and MSs to differentiate registers in a similar way.

RQ3. Do different HS groups perform similarly or differently regarding selected structures in elicited narratives?

H3. We expected HS groups to perform differently regarding selected structures.

Answering RQ1, we observed a considerable number of similarities between HSs and MSs in the use of the majority language across registers. In Study 1, we reported similar

proportions of pronouns and null anaphora used for subjects of coordinated clauses, as well as similar proportions of modified referring expressions in the English productions of German, Greek, Russian, and Turkish HSs and English MSs across registers. In Study 2, we observed similar proportions of independent and coordinate main clauses used by German HSs and English MSs in four registers. In Study 3, we found similar proportions of adverbial, complement, and relative subordinate clauses produced by German HSs and English MSs across registers. In Study 4, we saw that both HSs and MSs used left dislocations almost exclusively in the spoken narratives. These findings indicate that HSs and MSs in our sample displayed a considerable overlap in their use of majority English, despite the fact that the examined structures were expected to be dynamic in bilinguals according to the Interface Hypothesis.

We also discovered several differences between HSs speaking majority English and English MSs. Study 1 showed that Russian and Turkish HSs used more explicit referring expressions in informal registers compared to English MSs: these HSs produced more noun-headed NPs than English MSs in the same discourse contexts. Study 3 demonstrated a stricter differentiation of formal and informal registers by German HSs than by English MSs in the use of subordinate clauses – German HSs used more subordinate clauses in the formal narratives than in the informal ones both in speech and writing, while English MSs did so only in writing. Finally, Study 4 found a similar pattern of stricter register differentiation by HSs in the use of left dislocations: while English MSs used very similar proportions of left dislocation in the formal and informal spoken narratives, Greek and Turkish HSs produced more left dislocations in the informal spoken narratives than in the formal spoken ones.

Overall, we observed more similarities than differences in the majority English of HSs and MSs, which is consistent with our hypothesis H1. The discovered differences were quantitative and had to do with the distribution of language phenomena in various registers. Our results did not indicate qualitative shifts in the use of English – qualitatively new patterns

that are not typical for MSs, such as innovative prosodic contours in Queen (2012) and Rijswijk et al. (2017) or acceptance of syntactic constructions that are rejected by MSs in Lee-Ellis (2012).

In fact, two out of the three discovered differences – stricter differentiation of formalities in the use of subordinate clauses and in the use of left dislocations – made HSs' productions more consistent with the expectations based on the literature. Subordinate clauses are associated with more formal discourse (Koch & Oesterreicher, 2012), and German HSs adhered to this formality distinction both in spoken and written mode, as opposed to English MSs, who only did so in the written discourse. In a similar vein, left dislocations are typically associated with discourse informality (Geluykens, 1992), and Greek and Turkish HSs adhered to this formality-based register expectation by using more left dislocations in informal narratives than in formal ones. English MSs, on the other hand, did not make a formality distinction in the use of left dislocations.

What these results might point to is HSs' underlying willingness to adhere to the standards of the majority language, possibly due to the fact that their language skills might have been questioned due to their bilingualism or ethnic background. This might apply in testing situations such as our study or in other contexts as well. The willingness to adhere to the majority language standards might be caused by so-called majority language anxiety, which has been documented in HSs despite their dominance and nativeness in the majority language. According to Sevinç and Dewaele (2018), Turkish HSs residing in the Netherlands reported experiencing moderate levels of anxiety when speaking Dutch to Dutch MSs in public, or even speaking Dutch when Dutch MSs are simply present in the surroundings. Slightly lower, but still measurable levels of anxiety were reported when speaking Dutch to Dutch friends. Self-reported majority language anxiety was shown to correlate with a physiological marker of anxiety, electrodermal activity (Sevinç, 2018).

However, the language anxiety explanation of our results has to be taken with caution since not all HSs have been found to experience majority language anxiety (see Jee, 2022 for an absence of this type of anxiety in Korean HSs in Australia). An alternative account has been recently proposed by Bunk (in press) who interviewed four HSs speaking majority German. The informants did not report majority language anxiety but emphasized high levels of perceived pressure to adhere to the norms of standard German and strive for "perfect German". One informant shared that simply meeting the criteria for German proficiency is not enough – they felt that they should rather demonstrate such linguistic and rhetoric excellence that will prove that they have overcome their "migration background". According to the interviewed HSs, exceptional linguistic excellence in the majority language is seen as a sign of integration into society and a pathway to societal acceptance.

Further research is definitely needed to verify the hypothesis that stricter formality differentiation by HSs is caused by their wish to adhere to the majority language standards exceptionally well, which in turn might be a result of majority language anxiety or pressure to excel at the majority language. If this explanation is confirmed, it will be a new reason for differences between the majority language of HSs and MSs that has not been discussed in the heritage bilingualism literature yet (see Chapter 2).

The third difference that was highlighted by our research – the fact that Russian and Turkish HSs produced more explicit referring expressions in some contexts in informal registers – aligns well with the reasoning that some aspects of HSs' majority language might be influenced by HSs' frequent communication with L2 speakers of this language. It is quite likely that HSs communicate with L2 speakers (most probably their parents and other family members) in informal contexts, so it is plausible that the effects of this communication are visible in our informal elicitation setting. As to the nature of the influence itself, it consists of two potential sources: majority language input provided by L2 speakers and HSs' accommodation of their communication style to the needs of L2 speakers. The former is

discussed by Azar et al. (2020) and Georgiou and Giannakou (2024) and implies that HSs receive input in the majority language from late L2 speakers, whose speech differs from that of majority language MSs. Previous research on referring expressions in L2 speakers has provided evidence that adult late L2 speakers tend to use noun-headed NPs instead of pronouns, compared to their own L1 (Gullberg, 2006; Hendriks, 2003) and compared to L1 speakers of their L2 (Hendriks, 2003; Yoshioka, 2008). Consequently, HSs might incorporate this input into their language repertoire and thus perform differently to their MS peers. The latter source is suggested by Polinsky (2018, p. 144), who writes that HSs accommodate their speech to the communicative needs of L2 speakers, who might benefit from extra clarity and absence of omitted material. It is conceivable that L2 speakers would find it helpful to hear/read full NP references to characters or objects in the narrative instead of pronouns since the story is quite complicated and involves five people, a dog, a ball, and three cars. As we can see, both sources of L2 influence appear to be viable – HSs might have adopted the higher explicitness strategy from the input provided by L2 speakers or they might have created it themselves in order to ensure smooth communication with L2 speakers. To disentangle the two sources, future research should examine productions of L2 speakers from HSs' families using the same methods. Irrespective of the exact source of influence, our research provided new evidence that communication with L2 speakers is a quite likely source of the differences in the majority language of HSs and MSs, a reason that is not as widely-discussed in the literature as cross-linguistic influence from the heritage language.

Summing up the answer to RQ1, we can conclude that we did not discover long-term negative effects on the use of English by HSs who maintained their heritage language into adolescence and adulthood. Instead, we observed a substantial number of similarities between HSs and MSs speaking majority English. The few discovered differences between HSs and MSs pointed to the fact that HSs might adhere more strictly to the majority language standards and produce more explicit, or more informative, reference. This appears to be in

contrast with numerous differences between HSs and MSs described in the previous majority language research (Chapter 2), which can most probably be attributed to the experimental nature of these studies.

Turning to RQ2, we conclude that HSs approach registers differently than English MSs in some cases, sometimes being stricter about register differentiation (in subordinate clauses and left dislocations) or being more explicit in the informal registers (in referring expressions). These results go against our hypothesis H2, which suggested that HSs and MSs would distinguish registers in similar ways. This is not extremely surprising given that our hypothesis was based on a single previous study that examined elicited narratives in various registers in the majority language (Labrenz, 2023).

As discussed above, the first difference between HSs and MSs, the stricter register differentiation by HSs, might be due to their desire to perform well in a language-related experiment, possibly due to majority language anxiety or pressure to excel at the majority language. The second difference, the higher explicitness of HSs in informal registers, might be connected to HSs' communication with L2 speakers. These speaker group differences might be one of the contributing factors to internal register variation – the degree to which the texts within one register contain different linguistic features with different rates of occurrence (e.g., Biber et al., 2020, p. 585). This group-level variation appears to complement individual variation within the speakers/writers who produce discourse in a given register. Therefore, our results lead to the conclusion that speakers/writers' HS status or, more broadly, bilingualism should be included into register analyses if this information is available.

From the perspective of majority language research, our findings imply that studies that use naturalistic (e.g., interviews or conversation analysis) or semi-naturalistic prompted productions (e.g., elicited narratives or referential communication tasks) should specify the register of the productions during the data collection procedure. If the data come from an already existing source, such as a corpus of recorded conversations, register or at least some

situational parameters of the communication should be included into the analysis. If the register of the productions is not specified to the speakers and/or is not taken into account in the analysis, it might lead to incorrect conclusions. For instance, in Study 4 on left dislocations, the predicted probability of a left dislocation in English MSs' informal spoken productions is 0.006, and the predicted probability of a left dislocation in Turkish HSs' formal spoken productions is 0.003 (see Figure 3 in Study 4). If we had not specified the register of the elicited narratives, it might have happened that English MSs perceived the elicitation situation as informal and Turkish HSs as formal, and thus the difference between the two groups would be quite small – 0.003. In reality, when the formality of elicited registers has been specified to the speakers, the differences between the groups are larger – 0.008 in the formal spoken narratives, and 0.013 in the informal spoken ones. This example illustrates that register of (semi-)naturalistic productions is important for drawing conclusions regarding speaker group differences.

In addition to the differences in register differentiation by HSs and MSs outlined above, we recorded a significant number of similarities between the two speaker groups. To reiterate, both HSs and MSs produced more noun-headed NPs, null anaphora and modified referring expressions in the formal written register than any other registers (Study 1). Both groups used more independent main clauses in the written narratives than in the spoken ones, and more coordinate main clauses in the informal written register than the informal spoken one (Study 2). Additionally, HSs and MSs used more complement clauses in informal narratives, while making no register distinction for adverbial and relative clauses (Study 3). And finally, HSs and MSs produced left dislocations almost exclusively in the spoken narratives (Study 4). These findings provide evidence that HSs and MSs have similar register awareness in many areas of the majority language.

To sum up the answer to RQ2, we found some evidence that HSs approach registers in their majority language differently than HSs: we observed stricter differentiation of formal vs.

informal registers by some groups of HSs than by MSs, as well as more explicit reference in informal registers by some groups of MSs. None of our findings points to a lack of register awareness that could impact HSs' communication in the majority language, such as absence of register differentiation (i.e., using the same linguistic forms in all registers). Additionally, we can conclude than the differences reported here do not occur in all the examined phenomena – in each of our studies, we also documented a considerable overlap in register differentiation in HSs' and MSs' productions, pointing to similar register awareness of HSs and MSs in the majority language.

Finally, turning to RQ3, we can say that HSs speaking majority English are not a uniform group, which is in line with our hypothesis H3. In the two studies that individually compared several HS groups to English MSs (Study 1 and Study 4), it was not the case that all HS groups demonstrated the same degree of similarity or difference to MSs. In the study on referring expressions (Study 1), it was Russian and Turkish HSs who differed from English MSs, while in the study on left dislocations (Study 4) it was Greek and Turkish HSs. While we cannot exclude cross-linguistic influence of the heritage languages, it is quite unlikely that it caused Russian and Turkish HSs to use more noun-headed NPs only in the informal registers in English, as opposed to all registers. Additionally, it seems improbable that the cross-linguistic influence occurred only in the noun-headed NP vs. pronoun comparison, and not in the pronoun vs. null anaphor comparison, where it would be quite conceivable since both Russian and Turkish allow for more null elements than English. As for Study 4, it would be quite surprising if cross-linguistic influence from Greek and Turkish caused HSs to use left dislocations in a stricter alignment with register expectations of English (i.e., the expectation that left dislocation is an informal phenomenon).

Following our explanations for the differences in the answer to RQ1, we would rather arrive at the assumption that Russian and Turkish HSs have been more strongly influenced by L2 speakers from their families or communities than German and Greek HSs (Study 1) and

that Greek and Turkish HSs are keener to adhere to register expectations of the majority language than German and Russian HSs, possibly due to higher levels of majority language anxiety or pressure to excel at the majority language (Study 4). At the current stage, these suggestions are speculative, and they would need to be confirmed or disconfirmed in future research.

However, as noted above, we cannot absolutely exclude the possibility of cross-linguistic influence. Two of the four previous studies that used elicited narratives claimed that this factor played a role in the discovered differences between HSs and MSs in the majority language (Böttcher & Zellers, 2023; Queen, 2012). In the experimental literature on the majority language, cross-linguistic influence of the heritage language is the most prominent factor that has been reported in many studies. Since we did not conduct an investigation of referring expressions and left dislocations in the heritage languages (including the heritage language as produced by HSs, by HSs' input providers and by MSs who speak HSs' heritage language as their only L1), we cannot be certain that the heritage language does not impact the majority language in the use of these structures. Therefore, we conclude that the precise nature of the differences between HS groups speaking the same majority language is still open to debate and should be addressed in further research.

Chapter 6. Conclusion and Outlook

The present dissertation has aimed to outline similarities and differences in majority English as produced by German, Greek, Russian, and Turkish HSs in comparison to English MSs. We specifically targeted ecologically-valid data of elicited narratives, since most of the previous majority language research has been experimental. Additionally, we compared HSs and MSs across four registers (formal spoken/written and informal spoken/written), which was only sporadically done in previous research despite a profound influence of register on linguistic choices. Finally, we individually compared four HS groups with German, Greek, Russian and Turkish as heritage languages to English MSs, thus adding to the few existing studies that conducted similar comparisons and have not achieved a consensus on whether HS groups perform similarly or differently in the majority language.

The most important finding of our work is that HSs did not show any long-term negative effects in elicited narratives in their majority English, and they were similar to English MSs in many aspects (the use of pronouns and null anaphora for subjects of coordinate finite clauses, the use of modified and non-modified referring expressions, the use of several clause types and the of left dislocations in the spoken mode). If the differences occurred, they were connected with different proportions of certain phenomena in different registers. First, Russian and Turkish HSS produced more noun-headed NPs and fewer pronouns than English MSs in some informal narratives (sometimes in referent maintenance and sometimes in referent reintroduction). Second, Greek and Turkish HSs differentiated formalities more strictly in the use of subordinate clauses and left dislocations than English MSs. We suggest that these differences are linked to HSs' experiences. The first difference between HSs and English MSs (more frequent use of noun-headed NPs) could be a result of HSs' frequent communication with L2 speakers of the majority language. The second difference (the stricter register differentiation) could be caused by a wish to adhere to majority language standards exceptionally well, which in turn could be an outcome of majority

language anxiety or a pressure to excel at the majority language in order to gain societal acceptance and prove one's high level of integration into society.

This dissertation highlights the importance of these two reasons for the explanation of the differences observed between HSs speaking their majority language and MSs of this language. To our knowledge, these reasons have not been as thoroughly addressed in previous majority language research as the cross-linguistic influence from the heritage language (except for Azar et al., 2020; Georgiou & Giannakou, 2024; Polinsky, 2018 for the influence of communication with L2 speakers; Bunk, in press for the pressure to excel at the majority language). We believe that these reasons should be further explored in future research, given that they are viable explanations for our current findings and given that they appear to be a part of HS experience that has the potential to influence HSs' language choices.

More specifically, future studies can correlate various aspects of HSs' linguistic performance with their self-reported frequency of communication with L2 speakers, ratings of majority language anxiety, and perceived pressure to excel at the majority language. Furthermore, as mentioned above, it would be helpful to test the L2 speakers from HSs' families or communities to see if the patterns observed in HSs' majority language can also be found in L2 speakers' productions. If this is the case, then we can talk about the influence of L2 input on the majority language of HSs more confidently. If L2 speakers do not show the same patterns as HSs, then the influence of L2 input would be an unlikely cause of differences between HSs and MSs in the majority language. In this case, it would be more plausible that HSs develop certain strategies to accommodate to the communicative needs of L2 speakers.

The accommodation to the communicative needs of L2 speakers can be further investigated by comparing HSs speaking the majority language and other groups of speakers who come in contact with L2 speakers of their native language, for example, monolingually-raised English speakers who teach English as a second language (ESL) or foreign language

(EFL). If HSs with majority English and monolingually-raised English teachers have similar patterns in their productions, it would confirm that HSs adapt their speech to the needs of L2 speakers, and this adaptation might not be connected to their bilingualism.

The second finding of our work is that HSs might approach registers differently than MSs, at least in some contexts in the majority language. This appears to be a source of internal register variation (i.e., variation in rates of occurrence of various linguistic features within one register) since some speakers/writers producing texts in a given register might be HSs, while others might be MSs. Therefore, we concluded that register research should take into account speakers/writers' HS status or, more broadly, bilingualism if this information is available. Moreover, we argued that majority language studies that use naturalistic or semi-naturalistic data would benefit from specifying the register of elicited data and/or including it into the statistical analysis.

To draw a more holistic picture of register differentiation in the majority language by HSs and MSs, future studies should explore registers beyond the ones investigated in the present work (witness reports to the police and messages to a friend). It would be sensible to include formal registers that might be more familiar to participants than police reports, such as news reports, school reports or university lectures. This would further improve the ecological validity of the Language Situations method (Wiese, 2020). In addition, various other types of naturalistic data should be used to confirm or disconfirm the findings from elicited narratives – these data can include various communication tasks, interviews, spontaneous conversations and other types of unprompted discourse.

Lastly, our findings indicated that German, Greek, Russian and Turkish HSs do not constitute a uniform group when speaking majority English. This implies that we cannot draw conclusions about HSs' majority language by relying only on the results from HSs with one heritage language background. Methodologically, it means that all studies that claim a difference or a similarity between HSs and MSs in the majority language and that are based

on only one HS group should be replicated with at least one other HS group with a different heritage language. While such replication constitutes a significant practical challenge, it will eventually allow us to understand the underlying characteristics of the majority language.

Further research should also contribute to our understanding of the reasons for the differences between HS groups. While our studies could not rule out the possibility of cross-linguistic influence from the heritage languages, it is not the only conceivable reason for the observed differences. These differences can also be related to higher levels of majority language anxiety or societal pressure to excel at the majority language that is experienced by some groups more than the others. Similarly, L2 input or levels of adaptation to L2 speakers' needs might vary across HS groups, for instance, due to varying proficiency in the majority language among HSs' family and community members.

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Publikationen

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