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One suitcase, two grammars: what can we conclude about Australian Turkish heritage speakers' divergent processing of evidentiality?

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Abstract: This study investigates the processing of evidentiality using an auditory sentence verification task in heritage speakers of Turkish residing in Sydney, Australia. Evidentiality is a grammatical category that marks the sources of information through which the speaker comes to know information regarding an event. Turkish obligatorily marks two distinct forms of direct and indirect evidentials. We compare the sensitivity to evidentiality-information source mismatches of the speakers of Turkish as a heritage language to Turkish speakers who were late arrivals to Australia. The results show that the heritage language speakers perform less accurately and with longer response times than late arrivals, and both the groups' response accuracy is largely predicted by amount of exposure to Turkish during their development. The data suggest that heritage speakers of Turkish show insensitivity to evidentiality. Moreover, diminishing exposure to Turkish throughout heritage speakers' development appears to be an important trigger for divergent attainment of evidentiality in Turkish heritage grammar.

Keywords: Turkish; evidentiality; heritage language speakers; contact-induced language change

1 Introduction

Heritage language speakers are bilingual individuals who have grown up in homes where the language spoken is not the dominant language in the community, that is, it is a heritage language (Benmamoun et al. 2013; Montrul 2015; Pascual y Cabo and Rothman 2012; Polinsky and Scontras 2020; Rothman 2009; Valdés 2005).¹ A heritage language is a home language, spoken mainly by the parents or family, and by the local community, but not spoken by the broader community. Heritage language speakers (HLS) often have their first contact with the majority language at school. Typically, the further HLS proceed through education and the broader their social life, the less heritage language input there is. In parallel, they increasingly master the dominant societal language, and this often ultimately becomes their preferred language for communication (see, e.g., Benmamoun et al. 2013). As a result, adult HLS often diverge from the baseline grammar of the heritage language, reanalyzing and/or

¹ We acknowledge that the heritage language may not be the only language spoken at home by a heritage language speaker and another language could also be spoken and acquired from birth; but within the scope of this study, we focus on the heritage language.

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restructuring grammatical forms (Aalberse et al. 2019). Explanations of this divergence range from incomplete acquisition (Montrul 2008) to attrition after full acquisition of heritage grammars (Polinsky 2011; for an overview, see Lohndal et al. 2019; Putnam and Sánchez 2013).

Burgeoning research on heritage languages has shown that certain grammatical structures are particularly vulnerable to such contact-induced change in heritage language conditions, one of which is verbal inflection (Polinsky and Scontras 2020). Several studies have shown that verbal inflectional forms for aspect/mood in heritage grammars deviate from the “baseline” grammar spoken by monolinguals. For instance, Spanish adult HLS residing in the United States have been shown to be less sensitive to preterit and imperfect aspectual distinctions in Spanish, as well as subjunctive and indicative modal distinctions (Montrul 2002, 2009). Furthermore, imperfective aspect seems to share the same “fate” in Greek spoken in Germany (Paspali et al. 2022), Russian in the US (Laleko 2010; Polinsky 2006), and Hungarian spoken outside of Hungary (De Groot 2005). Taking these findings together, heritage grammars seem to be reduced in complexity in terms of verbal inflection compared to “baseline” grammars, possibly as a result of restructuring and simplification.

How can one explain this grammatical simplification in heritage languages? A number of accounts propose that the emergence of “end state” heritage grammars spoken by adults is associated with different aspects of language experience, such as input quality (Pascual y Cabo and Rothman 2012), lack of formal education in the heritage language (Kupisch and Rothman 2018), and reduced frequency of exposure to the heritage language during development (Putnam and Sánchez 2013). Putnam and Sánchez’s model, in particular, posits that the linguistic features of the heritage grammar are replaced or affected by the majority language of the society whose dominance increases gradually in the HLS.

A second account was proposed by Polinsky and Scontras (2020), who associate the divergence of heritage language grammar structures with a number of triggers. One such trigger was proposed to be characteristics of input and exposure to the heritage language. They also mention a second important trigger: the “economy of online resources”, which assumes that cognitively demanding heritage language structures, such as long-distance dependencies, give rise to processing difficulty. As a result, HLS tend to restructure the heritage grammar to free processing resources, leading to simplified and divergent heritage grammars.

In the current study, we examine Turkish spoken as a heritage community language in Sydney, Australia, with a particular focus on verbal inflection of evidentiality – grammatical marking for sources of information.

1.1 Evidentiality and Turkish as a heritage language

Evidentiality is described as a grammatical form that codifies the sources of information from which a speaker comes to know about the events uttered in a proposition (Aikhenvald 2004). In English, evidential meanings are mostly conveyed through optional lexical elements such as perception verbs (Whitt 2010). However, in Turkish, expressing evidentiality is mandatory when referring to the past and is encoded through inflectional morphology, meanings of which are reserved for marking sources of information (Aksu-Koç and Slobin 1986; Slobin and Aksu 1982; Underhill 1976). The direct evidential marks the speaker’s firsthand access to information via witnessing or participation (see example (1)), whereas the indirect evidential *-miş* encodes that the speaker has non-firsthand access to information through forms of inference or report from another speaker (see example (2)).²

- (1) Direct evidential
*Emeti kuyruklu yıldız korku-sun-dan küfey-e saklan-**dı**.*
 Emeti comet.NOM fear-POSS-ABL basket-DAT hide-PST:EVID:DI.3SG
 ‘Emeti hid in a basket due to her fear of comets.’ (witnessed/direct information)

² Examples follow the Leipzig Glossing Rules. Abbreviations used: 1/3 first/third person; ABL ablative; ACC accusative; DAT dative; EVID:DI direct evidential; EVID:IN indirect evidential; NOM nominative; PL plural; PST past; SG singular.

(2) Indirect evidential

Emeti kuyruklu yıldız korku-sun-dan küfey-e saklan-mış.

Emeti comet.NOM fear-POSS-ABL basket-DAT hide-PST:EVID:IN.3SG

'Emeti hid in a basket due to her fear of comets.' (reported/inferred)

Mastering the meanings of evidential forms is not a simple task even in monolingual development (see, e.g., Aksu-Koç 1988; Papafragou et al. 2007). Monolingual Turkish children typically acquire the direct evidential first and the indirect evidential a few months later at around the age of 3 (Aksu-Koç 1988). Nonetheless, children's ability to monitor and distinguish reported and inferential sources from direct witnessing does not fully develop until after the age of 6 or 7 (Öztürk and Papafragou 2016).

Yağmur (1997), using narrative speech production tasks, examined a group of Turkish speakers who were born in Turkey and settled in Sydney during adulthood. He reported that these speakers, when shifting between direct/indirect evidentials and present tense forms, displayed difficulty in maintaining consistent use of tense/evidentiality markers. These inconsistencies in narrative conventions have also been observed in child HLS of Turkish (living in the Netherlands) who produced large numbers of pragmatically unmotivated shifts between evidentials as late as around the age of 10 (Aarssen 2001). Further studies of adult HLS of Turkish in the Netherlands (Arslan and Bastiaanse 2020) and in the UK (Schmid and Karayayla 2020) similarly point to an overuse of direct evidentials over indirect evidentials in narrative speech.

Studies using experimental techniques also suggest evidentials are vulnerable in Turkish heritage grammar. For instance, Arslan et al. (2015), using a methodology that involved monitoring eye movement while participants were listening to speech, examined three groups of Turkish speakers: those who were exposed to German from birth, those who learned it later in life, and Turkish monolinguals. They found that the bilingual groups had fewer accurate responses and a smaller number of target-looks in direct evidential than indirect evidential conditions. Furthermore Arslan et al. (2017) employed an auditory sentence verification task to examine Turkish HLS in the Netherlands compared to monolinguals living in Turkey. The authors used sentence materials that contained a clause introducing either firsthand witnessing ('I saw the man eating') or non-firsthand inferred or reported ('They saw the man eating') information sources followed by a direct or indirect evidential marker; examples of such sentences are given in (3)–(6). Their participants were asked to respond as soon as they detected any unacceptability. The Turkish HLS performed poorly in detecting evidentiality mismatches, with longer response times than monolinguals and with low accuracy of 31 % in firsthand information and 32 % in non-firsthand information conditions. Similar findings were reported for Turkish HLS in an English-dominant region of Canada (Karaca 2018).

(3) Non-firsthand information source – indirect evidential (match)

Yerken gör-müş-ler az önce adam yemeğ-i

Eat see-PST:EVID:IN-3PL just before man.NOM meal-ACC

ye-miş

eat-PST:EVID:IN.3SG

'They saw the man eating, he ate the food.' (The speaker is claiming he has indirect/reported information on event reported by others; Arslan et al. 2017: 462)

(4) Firsthand information source – direct evidential (match)

Yerken gör-dü-m az önce adam yemeğ-i

Eat see-PST:EVID:DI-1SG just before man.NOM meal-ACC

ye-di

eat-PST:EVID:DI.3SG

'I saw the man eating, he ate the food.' (The speaker is claiming to have a direct information on the event; Arslan et al. 2017: 462)

- (5) Firsthand information source – indirect evidential (mismatch)
 * *Yerken gör-dü-m az önce adam yemeğ-i*
 Eat see-PST:EVID:DI-1SG just before man.NOM meal-ACC
ye-miş
 eat-PST:EVID:IN.3SG
 ‘I saw the man eating, he ate the food.’ (The speaker is claiming to have seen an indirect/reported event;
 Arslan et al. 2017: 462)
- (6) Non-firsthand information source – direct evidential (mismatch)
 * *Yerken gör-müş-ler az önce adam yemeğ-i*
 Eat see-PST:EVID:IN-3PL just before man.NOM meal-ACC
ye-di
 eat-PST:EVID:DI.3SG
 ‘They saw the man eating, he ate the food.’ (The speaker is claiming to have direct information on event
 witnessed by others; Arslan et al. 2017: 462)

The data to date suggest that Turkish HLS might be “simplifying” the semantic content of the evidentials that signal information sources, given that they are largely insensitive to source-evidentiality mismatches during sentence comprehension and use direct evidentials in places where an indirect evidential is normally appropriate in narration. It is possible that the divergent performance of the HLS in Arslan et al. (2017) was due to variation in individual factors underpinning language experience, such as exposure to Turkish during childhood, which was not fully accounted for (but see Arslan and Bastiaanse 2020). The authors, as in many other heritage language studies, screened for the amount of exposure during adulthood, but, critically, not during earlier development.

In the current study, we examined adult Turkish-English bilingual speakers residing in Sydney, Australia, and divided them into two groups based on their language acquisition background. Our first group comprised typical HLS of Turkish who were either born in or came to Australia at a very young age (i.e., before 5 years of age). The second group, “late arrivals” (LA), comprised adults who were born in Turkey and emigrated to Australia in adulthood attaining bilingual status at this point. Here we aimed to test evidentiality processing in relation to exposure to Turkish across childhood (3–6 and 6–12 years of age) and adolescence (12–18 years of age). We predicted that HLS would perform poorly in the detection of evidentiality mismatches, and that HLS with limited exposure to Turkish during development would face greater difficulty processing evidentiality than those with longer exposure.

2 Methods

2.1 Participants

Participants were 41 bilingual speakers of Turkish and English living in Australia at the time of testing. Their bilingualism background and demographic details were obtained using an adapted version of the Language and Social Background Questionnaire (Anderson et al. 2018; see Table 1). To examine proficiency, we administered one English and one Turkish cloze test taken from The European Language Certificates (telc GmbH, Frankfurt, Germany, 2014). All participants were exposed to Turkish for around 30 % of their daily lives at the time of data collection.

The experimental group consisted of 20 participants (10 female) who were heritage speakers of Turkish and were born in Australia or moved there before the age of 5. They were exposed to Turkish from birth at home and to English either from birth or from the start of primary school (around the age of 5). All of the HLS had native Turkish-speaking parents, with both parents’ English level reported to vary between elementary ($n = 9$), intermediate ($n = 8$), and advanced ($n = 3$). Six of the HLS participants reported having at least one sibling with

Table 1: Language background of participants: mean (and standard deviation) of self-report measures from the Language and Social Background Questionnaire.

	Heritage language speakers (<i>N</i> = 20)	Late arrivals (<i>N</i> = 21)
Age	30.35 (8.73)	35.95 (7.90)
Age of onset: English	1.25 (2.07)	11.33 (1.98)
Proficiency: Turkish (max = 22)	12.80 (4.56)	20.24 (1.84)
Proficiency: English (max = 22)	17.40 (2.44)	12.95 (4.09)
Years of residence in Australia	28.85 (8.71)	8.51 (7.41)
Percentage exposure to Turkish (ages 3–6)	70.50 (27.38)	100 (0.00)
Percentage exposure to Turkish (ages 6–12)	45.50 (22.59)	98.29 (4.55)
Percentage exposure to Turkish (ages 12–18)	38.25 (21.72)	77.29 (25.64)
Percentage exposure to Turkish (current)	28.50 (18.36)	30.00 (17.03)
Turkish material – written (h/week)	2.97 (2.75)	9.78 (8.92)
English material – written (h/week)	24.00 (20.00)	23.33 (17.94)
Turkish material – audio & video (h/day)	1.68 (1.31)	1.57 (2.16)
English material – audio & video (h/day)	4.15 (6.25)	3.00 (1.30)

Note. Age of onset = the age in which the participants had first contact with a given language. Proficiency = the scores from the telc Turkish or English cloze test (max score = 22). Percentage exposure to Turkish = the (rated) percentage of language exposure during each age bracket that was in Turkish (the remaining percentage is exposure to English).

whom they communicated mainly in English. Fifteen HLS received some degree of Turkish schooling ($M_{TR \text{ schooling}} = 4.9$ years, $SD = 3.3$), usually approximately 4 h a week through the Saturday School of Community Languages or as a language class at primary school.

The reference group of Turkish-speaking late arrivals consisted of 21 participants (10 female) who were born and raised in a monolingual setting in Turkey and arrived in Australia after puberty; they had been residing there 8.51 years on average at the time of data collection. They were also late bilinguals. They were first exposed to English later than the HLS (see Table 1) and in a formal school setting, starting between the ages of 6 and 15 years.

The use of English in the LA group was diverse. Fourteen LA speakers reported that at least one of their parents had a working level of English. Six participants reported that their children preferred to communicate with them in English, and two spoke English with their non-Turkish-speaking partner. As would be expected, on average, the HLS showed higher English proficiency and the LA higher Turkish proficiency (see Table 1).

2.2 Materials and procedure

Stimuli were taken from Arslan et al. (2017). Evidentiality sentences contained 30 items in four conditions. In two conditions, firsthand–direct as in (3) and non-firsthand–indirect as in (4), there was a compatible interpretation between the phrase indicating the information source and the evidential marker. The other two conditions, firsthand–indirect as in (5) and non-firsthand–direct as in (6), were pragmatically incongruent with a mismatch between information source and evidential form (see Appendix A for a full list of items).

In addition, we used 80 control sentences with evidentiality-neutral verb forms. The control conditions contained future or past temporal adverbs either matching or mismatching to verbal participles referring to past or future, hence creating four conditions: past–past, future–past, future–future, past–future (see Appendix B).

The same procedure as in Arslan et al. (2017) was followed.³ The experiment was programmed using E-Prime 3.0 (Psychology Software Tools, Pittsburgh, PA) in a Latin square design with two blocks of trials to avoid each evidential mismatch condition appearing more than once per set of sentences per participant. Participants were asked to press the space bar as quickly as possible when they heard an unacceptability in a sentence.

³ Minor changes were made to non-critical timing parameters to shorten the experiment duration and help maintain participants' attention, compared to Arslan et al. (2017). Each trial started with a fixation cross presented for 500 ms (instead of 1,000 ms) and interstimulus intervals were reduced to 3,000 ms (from 5,000 ms).

Each participant was tested individually in a quiet room and received a remuneration of A\$20 for their time. This research was approved by Macquarie University Human Research Ethics Committee.

Accuracy and response times for correct responses (RT) were analyzed using (generalized) linear mixed-effects regression models using the lme4 package in R (Bates et al. 2015). RTs were log-transformed and continuous variables were centered and scaled where appropriate. Evidentiality condition (Direct \times Indirect) and participant group (HLS \times LA) were included as fixed effects; item blocks nested within trials and participants were added as random structures. To test whether the participants' exposure to Turkish during early or late childhood or adolescence impacted their performance, we used a set of separate generalized linear logistic regression models with exposure and group as fixed effects.

3 Results

Table 2 presents a summary of the data and Table 3 provides the outputs from the mixed-effects regression models.

3.1 Control sentences

In the time reference sentences, which were control sentences, there was only a significant effect of group in both accuracy and RT analyses with the LA group responding significantly more accurately and somewhat faster than the HLS group. There was no significant effect of condition, nor an interaction. Participants performed comparably in the future–past and past–future conditions (see Table 2).

3.2 Evidentiality sentences

There were significant fixed effects of evidentiality condition and participant group on accuracy without a significant interaction between them. The HLS group performed more poorly in detecting evidentiality mismatches than the LA group. Tukey post hoc comparisons confirmed that this was true for both the non-firsthand–direct ($\beta = 1.95$, $SE = 0.68$, $z = 2.85$, $p = 0.004$) and firsthand–indirect ($\beta = 2.05$, $SE = 0.69$, $z = 2.96$, $p = 0.003$) conditions. The effect of condition indicated that the firsthand–indirect conditions were significantly more accurate (better detection of mismatches) than the non-firsthand–direct condition. Our participants also produced false alarms, where they indicated that they judged “match” sentences as unacceptable. Although HLS' false alarms were only minimal (about 9 % in indirect evidential and 4 % in direct evidential conditions), these false alarm rates increased as the participants' length of stay in Australia increased ($\beta = 0.03$, $SE = 0.008$, $z = 3.75$, $p < 0.001$).

Table 2: Mean (and standard deviation) response accuracy to mismatching conditions and response times to correctly identified mismatching sentences.

	Heritage language speakers		Late arrivals	
Evidentiality sentences				
	Firsthand–indirect	Non-firsthand–direct	Firsthand–indirect	Non-firsthand–direct
Accuracy (0 = inaccurate–1 = accurate)	0.57 (0.50)	0.51 (0.50)	0.84 (0.37)	0.79 (0.40)
Response time (ms)	2,232.33 (1,218.71)	2,205.16 (1,262.82)	1,676.76 (1,143.87)	1,757.14 (1,188.01)
Time reference sentences				
	Future–past	Past–future	Future–past	Past–future
Accuracy (0 = inaccurate–1 = accurate)	0.81 (0.39)	0.79 (0.40)	0.92 (0.27)	0.95 (0.22)
Response time (ms)	2,295.77 (1,285.90)	2,174.44 (1,145.29)	1,897.06 (1,203.97)	1,827.53 (1,096.15)

Table 3: Statistical outputs from mixed-effect regression models conducted on response time and accuracy data from evidentiality and time reference conditions.

	Evidentiality sentences				Time reference sentences			
	β	SE	z	p	β	SE	z	p
<i>Accuracy</i>								
Intercept	1.23	0.34	3.67	<0.001	2.60	0.25	10.40	<0.001
Condition	-0.48	0.19	-2.57	0.017	0.18	0.25	0.72	0.47
Group	-2.00	0.67	-3.00	0.002	-1.49	0.46	-3.26	<0.001
Condition \times group	0.10	0.34	0.76	0.76	-0.65	0.38	-1.70	0.09
<i>Response time</i>								
Intercept	7.48	0.07	104.93	<0.001	7.48	0.06	119.04	<0.001
Condition	0.04	0.04	0.98	0.33	-0.03	0.03	-0.90	0.37
Group	0.35	0.14	2.51	0.01	0.25	0.12	2.05	0.05
Condition \times group	-0.02	0.06	-0.42	0.68	-0.02	0.05	-0.40	0.69

In terms of response times, there was a significant fixed effect of group with longer response times for the HLS group than the LA group. No other significant effects were observed (see Table 3).

We computed an additional set of logistic regression models to further investigate exposure to Turkish. Outputs from these models are given in Table 4, and illustrated in Figure 1 (Panels A–D). These models showed that there was a different picture depending on the amount of exposure in each phase of the developmental trajectory. Exposure to Turkish during early childhood (i.e., 3–6 years of age) significantly predicted response accuracy overall with greater accuracy when there was greater exposure. This pattern did not significantly interact with group. However, it should be noted that this pattern was, most likely, driven by the HLS as during this period the LA group had exposure only to Turkish (see Figure 1, Panel A). Exposure to Turkish during late

Table 4: Statistical outputs from generalized linear regression models investigating impact of Turkish exposure on response accuracy.

	β	SE	z	p
Accuracy predicted by early childhood exposure (ages 3–6)				
Intercept ^a	0.84	0.32	2.61	0.009
Exposure_TR3_6	0.06	0.03	2.07	0.037
Group	-1.14	0.16	-7.14	<0.001
Accuracy predicted by later childhood exposure (ages 6–12)				
Intercept	1.64	2.29	0.71	0.47
Exposure_TR6_12	-0.01	0.23	-0.06	0.94
Group	-1.67	2.30	-0.72	0.46
Exposure \times group	0.05	0.23	0.24	0.80
Accuracy predicted by adolescent exposure (ages 12–18)				
Intercept	0.09	0.28	0.33	0.73
Exposure_TR12_18	0.18	0.03	4.94	<0.001
Group	0.26	0.33	0.79	0.42
Exposure \times group	-0.24	0.05	-4.47	<0.001
Accuracy predicted by current exposure				
Intercept	2.18	0.21	10.12	<0.001
Current exposure	-0.21	0.05	-3.89	<0.001
Group	-1.17	0.27	-4.32	<0.001
Exposure \times group	-0.07	0.07	-1.07	0.28

^aInteraction removed from the model due to ceiling exposure in the LA group (all individuals reported 10 h max score).

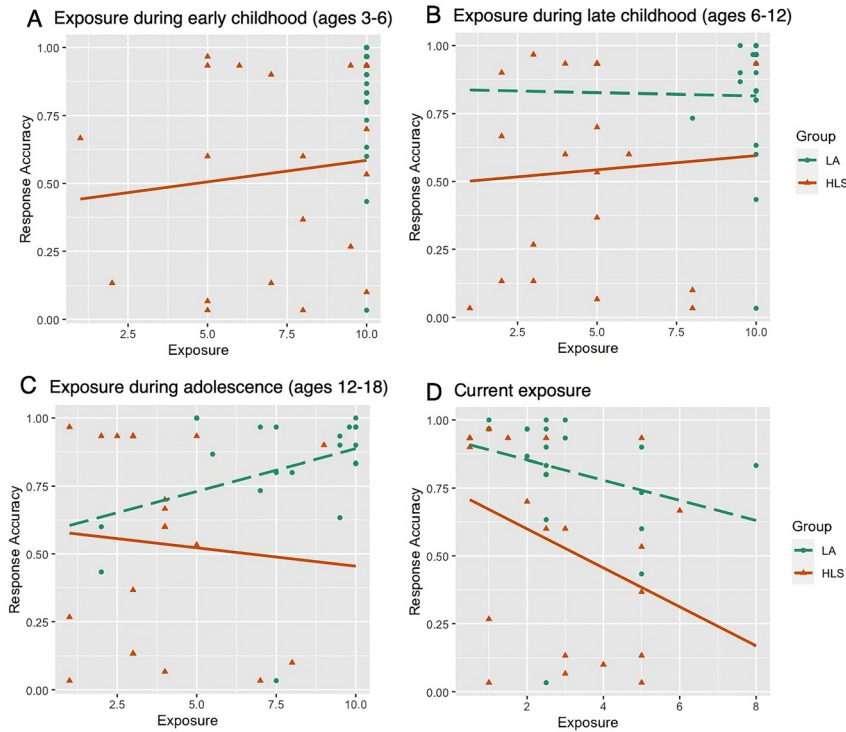


Figure 1: Accuracy of heritage language speakers (in orange triangles and solid lines,) and late arrivals (in green dashed lines and circles) on the evidentiality task predicted by exposure to Turkish during (A) early childhood, (B) late childhood, and (C) adolescence; and predicted by (D) participants' current age.

childhood (i.e., 6–12 years) did not yield any significant impact on performances nor an interaction with group. In contrast, exposure during adolescence (12–18 years) showed a significant interaction between exposure and speaker group: the LA group's accuracy benefited from greater Turkish exposure, while the HLS group's accuracy did not (Figure 1, Panel C). Finally, current exposure during adulthood significantly influenced accuracy in our participants (with no interaction with group). However, this relationship was not as expected: greater exposure to Turkish was associated with poorer response accuracy in understanding evidentiality (see Figure 1, Panel D).

4 Discussion

In this study, we examined processing of evidentiality in Turkish heritage speakers living in Australia in comparison to a group of Turkish speakers of English as a second language who arrived as adults in Australia (i.e., late arrivals). Our aim was to examine the extent to which Turkish bilingual speakers under heritage language conditions were able to interpret evidentials and the extent to which this was modulated by the amount of exposure to Turkish during their childhood (ages 3–6 and 6–12) and adolescence (ages 12–18).

Following Arslan et al.'s (2017) results for Turkish HLS in the Netherlands, we predicted that the Turkish HLS in Australia would perform poorly in detecting mismatches on the evidentiality task. Our results support this prediction: the HLS group performed poorly and with longer response times as compared to the LA group. This finding converges with previous studies that used sentence interpretation tasks including evidential conditions (Arslan et al. 2017; Karaca 2018; Schmid and Karayayla 2020). Our HLS here seem to have slightly outperformed those reported in Arslan et al. (2017), with around 50% compared to 32% accuracy on this same task. This difference could be due to the fact that the HLS in the current study had access to instruction in heritage language through community schools in Australia, while those in Arslan et al. (2017) may not have had equivalent opportunities in the Netherlands.

Unlike Arslan et al. (2017), we found an effect of condition: bilingual speakers in the current study found indirect evidential forms that violated witnessed (i.e., firsthand) information source contexts easier to identify than direct evidentials that violated non-witnessed (i.e., non-firsthand) information source contexts. Arslan et al. in fact report a similar asymmetry for their monolingual Turkish speakers, who responded to violations by indirect evidentials with faster response times than violations by direct evidentials, suggesting that they took less time to identify mismatches in the former condition. The lack of this asymmetry for HLS in Arslan et al.'s study might have been caused by a "floor effect" given their poor performance overall (32 %).

Following Putnam and Sánchez (2013), who proposed reduced quantity of exposure to heritage language would trigger grammatical divergence at the end state of heritage grammars, we further predicted that those participants with more limited exposure to Turkish during development would encounter greater difficulty in processing evidentiality conditions. To test this prediction, we conducted a complementary analysis, examining whether accuracy on the evidentiality task was predicted by the amount of exposure to Turkish during developmental stages from early childhood to adulthood. The outcomes showed that the HLS group benefited from exposure to Turkish in early childhood (i.e., 3–6 years of age), as those who received a greater amount of input during this period performed better on the evidentiality task than those who received lower amount of input. However, after this period, the HLS did not seem to have benefited from exposure to Turkish, unlike the LA group (see Figure 1). Arslan and Bastiaanse (2020) found that critical amount of exposure to Turkish (they reported 2.8 h per day to be precise) was vital for maintenance of evidentiality in Turkish heritage grammar, and suggested that less than this amount would lead to greater likelihood of inappropriate use of evidential suffixes in narratives. In the current study, we provide converging evidence that reduced exposure to heritage language during early childhood is one important factor leading to gaps in heritage grammar. These findings are in fact very much in line with the heritage language acquisition literature. See, for instance, Montrul (2018), who argued that the initial state of acquisition in bilingual children resembles first language acquisition, while the ultimate attainment in the heritage language lags behind monolingual language acquisition. Our results therefore point to the fact that exposure to the heritage language during early childhood is an important factor that might shape the ultimate attainment of heritage language grammar.

Inappropriate usage of evidential markers has in fact been reported in child heritage speakers of Turkish: Aarssen 2001 found that Turkish HLS produced inappropriate evidential forms in their narratives until the age of 10, and Pfaff (1993) reported heritage language-speaking children with German as a society language were more likely to produce fewer evidential forms than Turkish-dominant bilingual children. Therefore, our finding that amount of exposure predicts ultimate attainment of the evidentiality system in Turkish heritage grammar fully supports Putnam and Sánchez's (2013) claim that reduced exposure to heritage language during development triggers the divergent attainment of heritage grammar structures. Please note that these findings are also in line with Polinsky and Scontras (2020) who suggest input conditions to be sensitive triggers for shaping heritage grammars.

We observed a divergence in evidentiality in Turkish heritage grammars in the form of the speakers' insensitivity to unacceptable sentences; however, we should note that there was substantial individual variability among the participants in reference to amount of Turkish exposure in adulthood even in the LA group. This is reconcilable with Yağmur (1997), who found that those Turkish speakers who were long-term residents in Australia and had a later onset of exposure to English as a dominant society language (i.e., first-generation immigrants to Australia) experienced difficulty maintaining a consistent use of evidential forms in narratives. In support of this finding, we have shown that false alarm rates reflecting erroneous responses that acceptable sentences were unacceptable were much higher in individuals with a longer length of stay in Australia. In other words, the longer Turkish speakers stay away from the baseline grammar, the more likely it is that they will tune to the divergent heritage grammar characteristics.

Above we mentioned that an asymmetry emerged in our participants' profiles pointing to better performance in responding to the condition where a firsthand information source was mismatched with an indirect evidential marker than when a non-firsthand information source was mismatched with a direct evidential marker condition. The indirect evidential is semantically more marked as it signals a range of functions from inference to

reported non-firsthand information, and it is acquired slightly later in typical development, possibly due to its cognitively demanding nature. See, for instance, Öztürk and Papafragou (2016), who noted that Turkish children's ability to monitor non-firsthand information (i.e., reported or inferred) is only mastered much later in development than firsthand information. Following Polinsky and Scontras (2020), in addition to factors relating to input conditions and amount of exposure to Turkish, we may have expected our HLS to perform poorly on the evidentiality task as a consequence of the extensive cognitive demands required when processing evidentiality. Recall that Polinsky and Scontras (2020) proposed that cognitively demanding structures are likely to be restructured and simplified in heritage grammars in order to avoid exceeding the limits of cognitive processing. However, our data is somewhat at odds with this claim since the HLS seem to have performed better on a set of evidentiality-neutral control sentences including time reference mismatches within subject relative clause constructions (future–past 81 % and past–future 79 %) than on evidentiality sentences. Subject relative constructions are also known to be syntactically complex and difficult to process (Polinsky 2011), and further, relative participles in Turkish do not fully develop before the age of 8 (see Slobin 1986). Therefore, our data do not seem to support the idea that cognitive limitations on complex grammar structures shape the ultimate attainment in heritage grammars.

This selective insensitivity to the evidentiality but not time reference per se might, however, reflect crosslinguistic influences on performance. It is possible that the Turkish HLS have simplified evidential distinctions under the influence of the majority language, which does not have the same realization of this linguistic unit (similar results have been shown in other languages for various linguistic units; see, e.g., Gürel and Yılmaz 2011; Kim and Montrul 2004; Kim et al. 2005, 2009; Montrul 2010; Polinsky 2006). Specifically, as mentioned in Section 1, unlike in Turkish, evidentiality in English is not grammaticalized and it is optional to refer to the source of information when referring to the past. Consequently, it is possible that HLS' oversimplified evidentiality distinctions in the past tense is due to the lack of a crosslinguistic equivalent in English. Indeed, this is consistent with the performance of the HLS, who exhibited better performance on sentences with violations of past or future time reference, structures which are found in English, compared to sentences with violations of the information source through mismatching evidentiality markers, structures which are not found in English.

Finally, this study was not without limitations. We examined divergence of a structure from a reference group of bilingual speakers. However, without having a baseline control group of monolinguals, it is impossible to contemplate whether our LA group was affected by language attrition. However, they do seem to have similar accuracy and response times to the monolingual Turkish speakers reported in Arslan et al. (2017). Although we agree that using a monolingual group is common practice in heritage language research, we should note that it has disadvantages. This is because monolinguals' performance might not differ from that of HLS just because they have had full acquisition or better mastery of the baseline grammar, but also because they have different linguistic systems by virtue of being monolingual rather than bilingual. Consequently, we chose to use a group of speakers who grew up as monolingual Turkish speakers prior to becoming bilinguals later in life, and who now also experience heritage language conditions putting them on an equal footing with our HLS.

In conclusion, we have replicated earlier findings that grammatical coding of evidentiality is vulnerable to restructuring and simplification in heritage grammars evidenced with forms of insensitivity to evidentiality-information source mismatches. The heritage language speakers performed more poorly and more slowly in their responses to evidentiality sentences with incorrect information source contexts as compared to a reference group of "late arrival" speakers of Turkish. This insensitivity was predicted by the amount of exposure during heritage language development. We suggest that lack of exposure to the heritage language is an important trigger shaping heritage language structures. As there were qualitative similarities between the two bilingual groups, we suggest that the performance that HLS exhibit in their heritage language is better characterized as "different" rather than "poor" or "defective" relative to the monolingual standard.

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Appendix A: List of experimental sentences used for the evidentiality conditions

- (1) Yerken gördüm/Yerken görmüşler, az önce adam yemeği yedi/yemiş. 'Previously I have seen him eating/They have seen him eating; he ate [direct/indirect] the food.'
- (2) Kiralarken gördüm/Kiralarken görmüşler, az önce kadın evi kiralamış. 'Previously I have seen her renting/They have seen her renting; she rented [direct/indirect] the house.'
- (3) Kırarken gördüm/Kırarken görmüşler, az önce kız bardağı kırdı/kırmış. 'Previously I have seen her breaking/They have seen her breaking; she broke [direct/indirect] the glass.'
- (4) Dökerken gördüm/Dökerken görmüşler, az önce annesi yemeği döktü/dökmüş. 'Previously I have seen her trashing/They have seen her trashing; she trashed [direct/indirect] the food.'
- (5) Ütülerken gördüm/Ütülerken görmüşler, az önce kadın elbiseyi ütiledi/ütülemiş. 'Previously I have seen her ironing/They have seen her ironing; she ironed [direct/indirect] the dress.'
- (6) Süpürürken gördüm/Süpürürken görmüşler, az önce kadın halıyı süpürdü/süpürmüş. 'Previously I have seen her vacuuming/They have seen her vacuuming; she vacuumed [direct/indirect] the carpet.'
- (7) Şişirirken gördüm/Şişirirken görmüşler, az önce çocuk balonu şişirdi/şişirmiş. 'Previously I have seen the boy blowing/They have seen the boy blowing; the boy blew [direct/indirect] the balloon.'
- (8) Kilitlerken gördüm/Kilitlerken görmüşler, az önce adam kapıyı kilitledi/kilitlemiş. 'Previously I have seen him locking/They have seen him locking; she locked [direct/indirect] the door.'
- (9) İçerken gördüm/İçerken görmüşler, az önce adam sütü içti/içmiş. 'Previously I have seen him drinking/They have seen him drinking; he drank [direct/indirect] the milk.'
- (10) Sularken gördüm/Sularken görmüşler, az önce adam çiçekleri suladı/sulamış. 'Previously I have seen him watering/They have seen him watering; he watered [direct/indirect] the flowers.'
- (11) Katlarken gördüm/Katlarken görmüşler, az önce adam elbisesini katladı/katlamış. 'Previously I have seen him folding/They have seen him folding; he folded [direct/indirect] his cloth.'
- (12) Yıkarken gördüm/Yıkarken görmüşler, az önce adam arabayı yıkadı/yıkamış. 'Previously I have seen him washing/They have seen him washing; he washed [direct/indirect] the car.'
- (13) Boyarken gördüm/Boyarken görmüşler, az önce adam evi boyadı/boyamış. 'Previously I have seen him painting/They have seen him painting; he painted [direct/indirect] the house.'
- (14) Budarken gördüm/Budarken görmüşler, az önce kadın çiçekleri budadı/budamış. 'Previously I have seen her pruning/They have seen her pruning; she pruned [direct/indirect] the flowers.'
- (15) Doğrarken gördüm/Doğrarken görmüşler, az önce kız domates doğradı/doğramış. 'Previously I have seen her peeling/They have seen her peeling; she peeled [direct/indirect] a tomato.'
- (16) Çizerken gördüm/Çizerken görmüşler, az önce çocuk resim çizdi/çizmiş. 'Previously I have seen the child drawing/They have seen the child drawing; the child drew [direct/indirect] a picture.'
- (17) Açarken gördüm/Açarken görmüşler, az önce kadın kapıyı açtı/açmış. 'Previously I have seen her opening/They have seen her opening; she opened [direct/indirect] the door.'
- (18) Toplarken gördüm/Toplarken görmüşler, az önce kadın domates topladı/toplamış. 'Previously I have seen her picking/They have seen her picking; she picked [direct/indirect] tomatoes.'
- (19) Doldururken gördüm/Doldururken görmüşler, az önce kadın bardağı doldurdu/doldurmuş. 'Previously I have seen her filling/They have seen her filling; she filled [direct/indirect] the glass.'
- (20) Silerken gördüm/Silerken görmüşler, az önce kadın halıyı sildi/silmiş. 'Previously I have seen her wiping/They have seen her wiping; she wiped [direct/indirect] the carpet.'
- (21) Isıtırken gördüm/Isıtırken görmüşler, az önce adam sütü ısıttı/ısıtmış. 'Previously I have seen him warming/They have seen him warming; he warmed [direct/indirect] the milk.'
- (22) Patlatırken gördüm/Patlatırken görmüşler, az önce çocuk balonu patlattı/patlamış. 'Previously I have seen the child popping/They have seen the child popping; the child popped [direct/indirect] the balloon.'

- (23) Satarken gördüm/Satarken görmüşler, az önce adam arabayı sattı/satmış. ‘Previously I have seen him selling/They have seen him selling; he sold [direct/indirect] the car.’
- (24) Yırtarken gördüm/Yırtarken görmüşler, az önce çocuk resmi yırttı/yırtmış. ‘Previously I have seen the child ripping/They have seen the child ripping; the child ripped [direct/indirect] the picture.’
- (25) Taşırken gördüm/Taşırken görmüşler, az önce adam eşyayı taşıdı/talımı. ‘Previously I have seen him carrying/They have seen him carrying; he carried [direct/indirect] the furniture.’
- (26) Saklarken gördüm/Saklarken görmüşler, az önce kadın eşyayı sakladı/saklamış. ‘Previously I have seen her hiding/They have seen her hiding; she hid [direct/indirect] the object.’
- (27) Yakarken gördüm/Yakarken görmüşler, az önce adam gazeteyi yaktı/yakmış. ‘Previously I have seen him burning/They have seen him burning; he burned [direct/indirect] the newspaper.’
- (28) Okurken gördüm/Okurken görmüşler, az önce adam gazeteyi okudu/okumuş. ‘Previously I have seen him reading/They have seen him reading; he read [direct/indirect] the newspaper.’
- (29) Yazarken gördüm/Yazarken görmüşler, az önce kız mektup yazdı/yazmış. ‘Previously I have seen her writing/They have seen her writing; she wrote [direct/indirect] a letter.’
- (30) Gönderirken gördüm/Gönderirken görmüşler, az önce kız mektup gönderdi/göndermiş. ‘Previously I have seen her sending/They have seen her sending; she sent [direct/indirect] a letter.’

Appendix B: List of experimental sentences used for the time reference conditions

- (1) Şu okuldan çıkan benim dün/yarın yemek pişirdiğim/pişireceğim adam. ‘That man leaving the school is the man for whom I cooked/will cook yesterday/tomorrow.’
- (2) Şu çok yer gezen benim dün/yarın oyuncak sattığım/satacağım kadın. ‘That woman who travels a lot is the woman I sold/will sell toys yesterday/tomorrow.’
- (3) Şu bize bakan benim dün/yarın çiçek aldığım/alacağım kadın. ‘That woman looking at us is whom I bought/will buy flowers for yesterday/tomorrow.’
- (4) Şu alışveriş yapan benim dün/yarın sofraya hazırladığım/hazırlayacağım adam. ‘That man shopping is the man I prepared/will prepare the table for yesterday/tomorrow.’
- (5) Şu radyoyu açan benim dün/yarın kazak ördüğüm/öreceğim adam. ‘That man turning on the radio is the man whom I knitted/will knit the sweater yesterday/tomorrow.’
- (6) Şu koltuğa oturan benim dün/yarın ceviz kırdığım/kıracağım adam. ‘The man sitting in that chair is the man I cracked/will crack a walnut for yesterday/tomorrow.’
- (7) Şu sofradan kalkan benim dün/yarın kahve ısmarladığım/ısmarlayacağım kadın. ‘The woman who got up from the table is whom I ordered/will order coffee yesterday/tomorrow.’
- (8) Şu duvarın yanındaki benim dün/yarın tokat attığım/atacağım çocuk. ‘That boy next to the wall (is) whom I slapped/will slap yesterday/tomorrow.’
- (9) Şu kuş avlayan benim dün/yarın kek yaptığım/yapacağım çocuk. ‘That bird-hunting boy is whom I made/will make a cake for yesterday/tomorrow.’
- (10) Şu kapağı kapatan benim dün/yarın gitar çaldığım/çalacağım adam. ‘That man closing the lid is whom I played/will play the guitar for yesterday/tomorrow.’
- (11) Şu portakal soyan benim dün/yarın resim gösterdiğim/göstereceğim adam. ‘That man peeling the orange is whom I showed/will show a picture yesterday/tomorrow.’
- (12) Şu sokağa çıkan benim dün/yarın telefon ettiğim/edeceğim kadın. ‘The woman who went out into the street is whom I called/will call yesterday/tomorrow.’
- (13) Şu topa vuran benim dün/yarın altın taktığım/takacağım adam. ‘That man hitting the ball is whom I gave/will give gold yesterday/tomorrow.’

- (14) Şu kartonu kesen benim dün/yarın para verdiğim/vereceğim çocuk. 'That child cutting the cardboard is whom I gave/will give money to yesterday/tomorrow.'
- (15) Şu her yeri arayan benim dün/yarın laf soktuğum/sokacağım kadın. 'That woman who is looking everywhere is whom I jabbed/will jab at yesterday/tomorrow.'
- (16) Şu dikkatlice dinleyen benim dün/yarın soru sorduğum/soracağım adam. 'That man who is listening carefully is whom I asked/will ask a question yesterday/tomorrow.'
- (17) Şu yorgun olan benim dün/yarın çatal sapladığım/saplayacağım adam. 'That tired man is whom I stuck/will stick a fork in yesterday/tomorrow.'
- (18) Şu berberden gelen benim dün/yarın çay döktüğüm/dökeceğim kadın. 'That woman who is coming from the barber is whom I poured/will pour tea yesterday/tomorrow.'
- (19) Şu camdan bakan benim dün/yarın fotoğraf çektiğim/çekeceğim adam. 'That man looking out the window is the man I took/will take a picture for yesterday/tomorrow.'
- (20) Şu köşede duran benim dün/yarın özür dilediğim/dileyeceğim kadın. 'That woman in the corner is whom I apologized/will apologize to yesterday/tomorrow.'

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