# Chapter 7

# Dynamics of verbal aspect in heritage Greek, Russian and Turkish

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Aspect – the grammatical category associated with the internal temporal properties of a situation – is obligatorily marked in the grammar of many languages. Although it is used pervasively, innovative patterns commonly appear in situations of language contact. Thus, aspect provides an ideal window into the dynamic language patterns that occur in heritage grammars. This chapter reviews six studies conducted in the context of the Research Unit *Emerging Grammars* that investigate dynamic patterns in the use of aspect in monolingually-raised speakers of Greek, Russian, and Turkish as well as heritage speakers of each of these languages living in the US and Germany. Each study uses production and/or comprehension tasks to explore one or more potential sources of these dynamic patterns, including cross-linguistic influence, verbal morphology and markedness of the aspectual features, formality (formal vs. informal), mode of expression (spoken vs. written), and participant age. The results show several innovative patterns and some differences in processing in heritage speakers, but largely find that monolingually-raised and heritage speakers produce and process aspect marking in a qualitatively similar way.

## 1 Introduction

In this chapter, we investigate how verbal aspect, either grammatical or lexical, is used in heritage and monolingual varieties of Greek, Russian, and Turkish and how it reflects the dynamic language patterns that occur in heritage grammars.

In particular, we review six studies concerning the production and comprehension of verbal aspect that were conducted as part of the Research Unit *Emerging Grammars in Language Contact Situations: A Comparative Approach*. Each study takes a different perspective on the use of aspect in these varieties (heritage and monolingual) and asks whether aspect use is affected by the language itself (Greek, Russian, Turkish), by the contact language (English, German), and/or by the mode (spoken, written) or formality (formal, informal) of the situation. The studies also cover a number of methods, including elicited narrative, sentence completion tasks, spontaneous speech production, and the Visual World paradigm.

Aspect is one of the most widely explored phenomena across different languages and different groups of speakers, including both monolingually-raised and bilingual speakers (Montrul 2002, Laleko 2010, Montrul & Perpiñán 2011, Cuza et al. 2013). It is described as representing the internal temporal structure of a situation, which is different from the situation's external time, referred to as tense. Researchers typically distinguish between lexical (situation/Aktionsart/inner) and grammatical (viewpoint/outer) aspect (Comrie 1976, Kiyota 2008, Alexiadou et al. 2010). Grammatical aspect is defined as "the different ways of viewing the internal temporal constituency of a situation", while lexical aspect denotes the inherent semantic category of a verb's eventuality (Comrie 1976). Grammatical aspect is a (morpho-)syntactic category and can be variably marked on verbs, while lexical aspect can be determined by the whole verbal phrase. The studies reviewed in this chapter focus either on grammatical aspect, i.e. Rizou et al. (2024), Alexiadou & Rizou (2023), Rizou et al. (2025) and Özsoy, Büyükyıldırım, et al. (2023), or on the interaction of both Rizou (2021), Gagarina et al. (2020).

A major distinction for grammatical aspect is made between imperfective and perfective (Comrie 1976). Imperfective aspect denotes an event or state as progressive, repeating or continuous. Perfective aspect is used to express that an event or an action is completed, or that is ceased without any reference to its tempus. In other words, perfective aspect indicates that an event is bounded in time. Although aspect has several further distinctions that differ across languages (Gagarina 2000), these are not relevant for the current chapter so will not be elaborated here.

Aspect is an ideal phenomenon to investigate in language development because it is regarded as highly dynamic across the spectrum from early L1 acquisition through heritage language acquisition and L2 acquisition. For example, L1 Greek-speaking children produce perfective aspect as early as 1;1,[1] before the

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[1]We report child age as years;months. Thus, 1;1 means 1 year and 1 month old.

imperfective (Stephany 1997, Konstantzou et al. 2013). Although imperfective aspect is also used relatively early, the semantics of imperfective aspect are only acquired later by 5;0 to 6;5 (Delidaki 2006, Panitsa 2010). L1 Russian-speaking children recognize aspectual meanings at an early stage and begin to use aspectual forms that resemble the target language from the onset of speech. However, they occasionally generate novel expressions or innovations, wherein aspectual forms deviate from the target language norms, that may persist until approximately the age of 6 years (Cejtlin 2000, Gagarina 2007, 2011, Kistanova & Sekerina 2019). Finally, L1 Turkish-speaking children acquire the primary aspect/tense markers quite early, namely the perfective-past marker *-(y)DI* and the progressive-imperfective marker *-(I)yor* (Aksu-Koç 1988). These distinct markers serve as a significant focal point for understanding the contrast between perfective and imperfective aspect and are productively used by around the age of 3 (Acarlar et al. 2008).

Innovative aspectual forms are also used regularly in situations of language contact, particularly in languages with concatenative morphology like Greek and Russian, as well as in languages with agglutinating structures like Turkish (Laleko 2008, Montrul 2015, Antonova-Ünlü & Wei 2016, Gagarina et al. 2020). This is illustrated in the following example in (1) taken from Gagarina et al. (2020: 115), where the perfective aspect form combines with the auxiliary *budu* 'I will (be)' in the future, a form that is considered ungrammatical in monolingual productions:

(1)  budu      *napisat'
     will-1SG   write-PFV
     '(I) will write'

Given that aspect appears with dynamic and innovative forms across both L1 and L2 acquisition, it seems to be the ideal phenomenon to explore in heritage language use as well. Heritage speakers are typically described as individuals who are bilingual or multilingual, acquire their heritage language(s) during early childhood within their families, and use their heritage language(s) alongside the majority language(s) or official language(s) of the community they live in (Valdés 2005, Rothman 2009, Benmamoun et al. 2013, Guijarro-Fuentes & Schmitz 2015, Montrul 2015, Polinsky 2015, 2018). Generally, heritage speakers are regarded as bilinguals whose family and majority languages are part of a nativeness continuum (Wiese et al. 2022). However, the level of proficiency in their languages can vary throughout their lives, as discussed by Benmamoun et al. (2013), Polinsky (2018), and Wiese (2020). In this chapter, we follow this perspective and do

not compare heritage speakers' data with monolingually-raised speakers' data to explore accuracy. Instead, we consider the heritage and monolingually-raised populations as distinct language varieties, in line with the view expressed in Rothman et al. (2023).

Due to the informal nature of the acquisition of heritage languages, speakers are more accustomed to the spoken form of the language, while the written form requires formal instruction. Research exploring register variation in heritage speakers suggests that when heritage languages are learned within the family context, without receiving any formal instruction in the heritage language, heritage speakers' repertoires exhibit a conversational and informal style, which is often limited to everyday topics, resulting in register narrowing (Dressler 1991, Chevalier 2004). Therefore, several of the studies that we review specifically focus on whether aspect is used differently in spoken vs. written language, and in formal vs. informal settings.

The six studies reviewed in this chapter were conducted within the projects P1, P3 and P10 of the Research Unit *Emerging Grammars* (RUEG)[2], aiming to address the overarching question: How do speakers of heritage and monolingual varieties of Greek, Russian, and Turkish use aspect? Specifically, we investigate whether heritage speakers' production and comprehension of aspect diverges from that of monolingually-raised speakers. We account for different sources of variability including cross-linguistic differences, and language transfer effects. The studies below shed light on different levels of the phenomenon.

The structure of this chapter is as follows. In Section 2, we review a comparative study on grammatical aspect in Greek, Russian, and Turkish (Rizou et al. 2024). This study investigates the monolingual varieties of Greek, Russian, and Turkish as well as their heritage variants in Germany and the US regarding the morphological marking of grammatical aspect. By keeping the analysis as parallel as possible in the three languages, it explores how monolingually-raised and heritage speakers perform on perfective and imperfective aspect use, whether effects of cross-linguistic influence from the majority languages are evident, and how the parameters of formality and mode affect their aspect-related productions. Section 3 highlights a study exploring the use of periphrastic aspectual constructions versus the use of aspect on lexical verbs in different formality levels by Greek heritage and monolingually-raised speakers (Alexiadou & Rizou

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[2]https://hu.berlin/rueg. P1 dealt with "Nominal morphosyntax and word order in heritage Greek across majority languages", P3 with "Nominal morphosyntax and word order in heritage Russian across majority languages", and P10 with "Dynamics of verbal aspect and (pro)nominal reference in language contact".

2023). In Section 4, we report a study of the accuracy of Greek monolingually-raised and heritage speakers in an elicited production task with items controlling the interaction of grammatical and lexical aspect (Rizou 2021). The same methodology is employed by the study reported in Section 5, in which morphologically novel forms that appear to be challenging in heritage speakers' grammars are analyzed (Rizou et al. 2025). This is followed in Section 6 by a review of a qualitative study by Gagarina et al. (2020), analyzing aspect use in child, adolescent, and adult productions of Russian heritage speakers in Germany and the US and contrasting it with the productions obtained from monolingually-raised Russian-speaking peers. The last study, in Section 7, focuses on Turkish heritage and monolingually-raised speakers' incremental processing of grammatical aspect (Özsoy, Büyükyıldırım, et al. 2023, Büyükyıldırım et al. in preparation). Using the Visual World Paradigm, this eye-tracking study aims to find the underlying factors that influence processing speed and picture-matching accuracy by individual participants. Finally, in Section 8 we discuss the overall findings and their implications for broadening our understanding of the use of aspect in heritage and monolingually-raised speakers. The novelty of these studies lies in the systematic observation and categorization of verbal structures, providing an overview of verbal aspect cross-linguistically by employing different methodologies and controlling for intra- and extra-linguistic factors.

## 2 A cross-linguistic study on grammatical aspect in heritage and monolingual varieties of Greek, Russian and Turkish by Rizou et al. (2024)

The expression of verbal aspect in Greek, Russian, and Turkish varies in its morphological realization, but all three languages distinguish between perfective and imperfective aspect. In Greek, the stem of the morphologically marked aspect type is formed by suffixation, or weak/strong suppletion (Spyropoulos et al. 2017, Revithiadou et al. 2019). Example (2) shows the addition of the suffix /s/ in the perfective, triggering stem allomorphy.[3]

(2)  a.  pez-o
         play.IPFV-PRS.1SG
         'play'

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[3]In order to keep the aspectual morphological description of the languages under the scope of this study parallel, more details about the Greek verbal morphology are mentioned in Section 5, about Russian acquisition patterns of aspect in Section 6, and about aspect in Turkish in Section 7.

b.  (na) peks-o
    SBJV play.PFV-PRS.1SG
    'to play'

Most verbs in Russian form aspectual pairs and the distinction between perfective and imperfective aspect is primarily marked through morphology: the perfective aspect is derived from the stem of imperfective verbs through processes such as prefixation (as seen in example 3), suffixation or suppletion, and additionally, imperfective verbs may be derived from perfective ones by suffixation leading to secondary imperfectivization (Gagarina 2008a).[4]

(3)  a.  delat'
         do/make.IPFV
         'to do/make'
     b.  s-delat'
         PFV-do/make
         'to do/make'

In Turkish, the copula in past tense *-(y)DI*, the marker *-DI* and the multifunctional evidential marker *-mIş* are mainly applied to mark the perfective aspect, while for progressive-imperfective the verbal marker *-(I)yor* is used. Regarding morphological markedness, the perfective aspect is considered morphologically marked in Greek and Russian, while the imperfective aspect is the marked one in Turkish as seen in example (4).

(4)  a.  bitir-iyor-du-m
         finish-PROG-PST-1SG
         'I was finishing.'
     b.  bitir-di-m
         go-PST.PFV-1SG
         'I finished.'

The aim of our investigation was to analyze how grammatical aspect is expressed in typologically different languages, namely Greek, Russian, and Turkish. By employing a consistent analytical framework for all three languages, the study explored the usage of perfective and imperfective aspect by both monolingually-raised and heritage speakers of the respective languages in the US and

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[4]There are verbs that do not form aspectual pairs, such as *perfectiva tantum*, as well as *imperfectiva tantum* (Gagarina 2007).

Germany. An intriguing angle of this investigation is the examination of verbal aspect in heritage Greek, Russian and Turkish in contact with majority English, a language that marks aspect, and with majority German, which does not. The study seeks to understand whether and to what extent the use of aspect in heritage Greek, Russian, and Turkish is influenced by the language contact situation. Furthermore, the study addresses the question of whether the notion of morphological markedness impacts the production of grammatical aspect in heritage Greek, Russian and, Turkish, and if so, how. Additionally, the research delves into the impact of formality and mode on grammatical aspect productions. What distinguishes this study from previous research is its emphasis on cross-linguistically comparable and ecologically-valid data obtained from monolingual and heritage varieties of Greek, Russian, and Turkish through narration tasks.

The data analyzed in Rizou et al. (2024) were collected according to the *language situations* approach by Wiese (2020). This methodology provides comparable naturalistic data in both oral and written modes and in formal and informal registers. During the elicitation, the participants were shown a short video of a staged minor car accident, and their task was to narrate what happened to either a close friend or a police officer, imagining that they witnessed the incident. In that way, participants took part in four different communicative settings within one experimental session. Heritage speakers took part in two sessions at least three days apart, one in their majority and one in their heritage language, while monolingually-raised participants took part only in one session in the majority language of the respective country of elicitation. To test how formality and mode affect narrations, we simulated formal-spoken, formal-written, informal-spoken, and informal-written settings. The elicitation orders were balanced. Table 1 presents the overall information about the number of participants grouped by country of elicitation, their mean chronological age[5] and their age of onset to bilingualism, and the number of tokens in the RUEG subcorpora of Greek, Russian, and Turkish.[6]

Verbs were tagged automatically as either perfective or imperfective and corrected manually by native speakers of Greek, Russian, and Turkish. The data

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[5]Within each group, two age groups were tested, namely adults (age range 25–35) and adolescents (age range 14–18). In the present study, this further categorization was not taken into account, and all participants were analyzed together as the age variable was not a significant factor for grammatical aspect.

[6]A token is often used to mean something like a graphemic word but is technically defined as the smallest unit in a corpus, independent of what this smallest unit might be linguistically (Schmid 2008, Sauer & Lüdeling 2016).

Table 1: Participants information

| Country | Group | Participants | Tokens | Verbs | M age | M AoO |
|---------|-------|--------------|--------|-------|-------|-------|
| Greece | monolinguals | 64 | 27,931 | 4,954 | 21.4 | - |
| Russia | monolinguals | 66 | 25,930 | 3,965 | 21.0 | - |
| Turkey | monolinguals | 64 | 20,947 | 4,609 | 22.2 | - |
| | heritage Greek | 48 | 19,782 | 3,494 | 22.6 | 1.8 |
| Germany | heritage Russian | 61 | 32,882 | 4,624 | 21.1 | 1.3 |
| | heritage Turkish | 64 | 23,722 | 4,986 | 21.5 | 2.5 |
| | heritage Greek | 63 | 18,302 | 4,371 | 23.0 | 1.3 |
| US | heritage Russian | 60 | 29,214 | 4,342 | 22.2 | 3.3 |
| | heritage Turkish | 58 | 18,502 | 4,257 | 22.0 | 2.5 |

extracted from the corpus were processed and analyzed in R using the *tidyverse* and *brms* packages (Schmidt & Wörner 2014, Wickham et al. 2019, R Core Team 2021). The observations of aspect were categorized as a binary dependent variable with two levels: imperfective and perfective. This resulted in a total of 26,788 data points, with 8,829 from Greek, 11,626 from Russian, and 6,333 from Turkish. To draw cross-linguistic (Greek, Russian and Turkish heritage speaker groups) and cross-variational (monolingually-raised vs. heritage speakers) comparisons, we applied methods from a Bayesian statistical framework (Gelman et al. 2013, Kruschke 2014, Kruschke & Vanpaemel 2015). Bayesian regression models with 89 credibility intervals (CIs) were constructed for each language, incorporating random slopes for participants to accommodate individual differences. The independent variables in these models included Country of elicitation (Germany, US, and the native countries Greece, Russia, and Turkey), Formality (formal vs. informal), Mode (spoken vs. written), and Tense (past vs. present). Tense was included as one of the variables because of the interdependence between tense and grammatical aspect. Employing a uniform model structure across all languages ensures comparability in interpreting the outcomes. The availability of both data and analysis code in an open repository ensures the reproducibility of the analysis.

Applying descriptive statistics, we observed a different distribution of perfective and imperfective in the three languages. Greek, Turkish, and only two groups of Russian speakers showed a higher frequency of perfective aspect, whereas Russian heritage speakers in Germany did not align with this pattern. The results of the Bayesian statistical analysis of the estimates revealed that there were no

meaningful effects for the Greek-speaking groups besides the increased production of perfective forms by the Greek heritage speakers in the US as compared to the grand mean [0.13, 0.31]. Russian heritage speakers in Germany opted for imperfective forms more likely than other Russian speaker groups [−0.22, −0.09]. In addition, all Russian-speaking groups tended to produce more imperfective forms in the spoken communicative situation compared to the written one [−0.19, −0.13]. For the Turkish-speaking groups, no meaningful effects of Country were observed, but at the level of formality, we found a small effect indicating that speakers produce more imperfective in the formal compared to the informal condition [−0.13, −0.04]. For mode, Turkish speakers tended to produce more imperfective forms in the spoken compared to the written mode [−0.12, −0.02]. Finally, a common meaningful effect in all three languages was achieved by the Tense factor. Specifically, more verbs bearing the perfective aspect were produced in the past tense than in the present, which can be explained by a task effect initiated by the stimulus question "What happened?".

All in all, this cross-linguistic study offers an assessment of speakers' use of grammatical aspect. Although the comparison involves languages that all encode perfective and imperfective aspect grammatically, we observed divergent results for different groups of speakers. This could be driven by language contact or typological differences. The majority languages English and German in contact with heritage languages Greek, Russian, and Turkish seem to affect the use of perfective and imperfective in different ways. Additionally, we found effects of mode and formality. Providing a better overview of the distribution of grammatical aspect among heritage speakers of different languages and different varieties of the same language is the most important contribution to the overall research question.

## 3 Periphrastic constructions in Greek by Alexiadou & Rizou (2023)

Heritage varieties of Greek are claimed to show interesting dynamics in terms of aspectual formation and use. Several studies investigating verbal aspect show that this feature is challenging for Greek heritage speakers. The first scholar to identify discrepancies in the aspect category within heritage Greek was Seaman (1972), who noted a general simplification of verb forms and the application of periphrastic constructions among Greek heritage speakers residing in the US. Corroborating these findings, the study by Alexiadou & Rizou (2023) that is reviewed in this section investigates more systematically two groups of Greek heritage

speakers, namely one in the US and one in Germany, regarding the production of analytic forms. According to Haspelmath (2000), a periphrasis refers to the linguistic phenomenon where a specific idea is conveyed using a combination of words rather than a single term. An example for Greek is shown in (5), where the light verb like *do* and a noun are used instead of a lexical verb. In Greek, there is a morphological syncretism in light verbs meaning that the perfective and imperfective verbal stems are identical in contrast to full verbs.

(5)  kano katathesi vs. katatheto
     do    testify    vs. testify
     'conduct a testimony' vs. 'testify'

In the study reported here, the use of periphrastic structures employing light and/or auxiliary verbs to convey past events was explored. These constructions stand in opposition to the synthetic representation of such events, which frequently entails morpho-phonological alterations within the verbal system. Finally, this study controlled for extra-linguistic factors such as mode and formality.

The goal of the study was to detect whether the repertoires of different groups of heritage speakers differed in comparison to monolingually-raised speakers regarding the use of periphrastic constractions. Boon (2014) observed that heritage Welsh speakers resort to different strategies, such as code-mixing, in case they cannot retrieve morpho-phonological elements or lexical clusters. This has also been observed for heritage Greek by Alexiadou & Lohndal (2018). Specifically, analytic structures were assembled from Greek light verbs that lack certain morphological features, and a borrowed infinitival verbal form from the majority language. Alexiadou & Rizou (2023) investigated morphologically deviant patterns in heritage speakers' repertoires compared to monolinguals' productions, as well as emerging novel patterns and periphrastic constructions. Finally, the study explored the question of why heritage speakers make use of periphrastic constructions. What the authors proposed is that monolingually-raised Greek speakers utilize periphrasis to indicate different formality levels and distinguish between oral and written communicative settings, while heritage speakers tend to adopt forms linked with informal communicative settings, and this preference is influenced by the morpho-phonological intricacies of the formality of the communicative setting,[7] leading to a tendency of register levelling overall.

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[7]The Greek lexicon encompasses components that are delineated along the [+/−learned] spectrum, a trait that directly corresponds to the high and low register and the diglossic context prevalent in the 19th and 20th century.

Methodologically, the narration task in the frame of *language situations* by Wiese (2020) was employed.[8] Two distinct age groups of Greek heritage speakers, namely adolescents and adults, residing in Germany and the US were tested. Additionally, a group comprising monolingually-raised speakers of similar age was included in the study. Their meta-linguistic data (self-ratings, mean age of onset, current input and literacy practices in the heritage language, hours and years of education in the heritage language, parents' generation) were collected in a form of a questionnaire and correlated with the use of periphrastic constructions.

The results showed a general preference for periphrastic constructions by Greek heritage speakers. These analytic constructions were analyzed in terms of appropriateness of use. This means that each construction was evaluated in terms of grammaticality and felicitousness in each context regarding the perfective/imperfective aspectual value. Only a few ambiguous and infelicitous cases were detected in heritage speakers' grammar. The most important finding is that heritage speakers use periphrasis to indicate the perfective aspect instead of using lexical verbs that require morpho-phonological changes as seen in example (6). As the light verb *do* in past tense has one identical stem for perfective and imperfective, speakers prefer to use this instead of lexical verbs that require morpho-phonological changes to form the perfective aspect.

(6)  ekanan bam vs. sigkrustikan
     did     bam vs. collided
     'crashed' (attribution with the sound) vs. 'collided'

Another crucial tendency observed in the data is that heritage speakers utilized analytic forms interchangeably in the different formality settings, unlike monolingually-raised speakers who used them mainly in the informal setting. A common finding in both heritage and monolingually-raised speakers' narrations was that they both made use of analytic forms in the spoken mode across formality settings as an indicator of colloquial speech.

In sum, this study revealed some alternative strategies used by Greek heritage speakers for producing grammatical aspect. The investigation of analytic forms suggests a wider use of periphrastic constructions, pointing to a reorganization of heritage speakers' linguistic repertoire. Furthermore, the exploration of different communication settings highlights an emerging pattern, which is the use of periphrastic constructions across formality variation by heritage speakers in the

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[8]More information can be found in Section 2. Detailed user guidelines and all experimental materials are available in an open-access repository: https://osf.io/qhupg/.

US. The contribution to the overarching research question is that it brings to the fore a strategy systematically used by Greek heritage speakers.

## 4 Verbal aspect in heritage and monolingually-raised Greek speakers: Data from narration and production tasks by Rizou (2021)

Grammatical aspect in Greek can be either perfective or imperfective, as mentioned before. The perfective aspect in Greek denotes either completion or instantaneity of events, and it is marked on the verb stem, as we show below. The imperfective aspect is unmarked on the verb stem and corresponds to either continuous (example 7) or habitual (example 8) interpretation. Imperfective aspect has the continuous or the habitual interpretation depending on the context. The use of lexical cues like adverbs or adverbial phrases clarifies the relevant interpretation as shown in examples (7) and (8) (Moser 1994). As there is no aspectual distinction for the present tense in indicative mood in Greek, we illustrate this distinction by using past tense.

(7) I Maria magireve gia tris ores.
The Mary cook.IPFV.PST for three hours.
'Mary was cooking for three hours.'

(8) I Maria magireve tis Kiriakes.
The Mary cook.IPFV.PST on Sundays.
'Mary used to cook on Sundays.'

The aim of the study by Rizou (2021) was to provide qualitative insights from the narration described in Section 2 and to measure the accuracy rate of Greek heritage speakers in an elicited production task as described below. Furthermore, the study investigated whether heritage speakers rely on the inherent semantics of the verbs as predicted by the Aspect Hypothesis by Andersen & Shirai (1994) and combine the perfective aspect with telic complements and the imperfective with atelic in semi-spontaneous production tasks. Additionally, the differences between two age groups, namely adults and adolescents, within each speaker group are also explored in this study.

The methodology employed for the narration task conforms with the *language situations* approach by Wiese (2020) as described in Section 2. To elicit verbal forms marked for grammatical aspect, an oral controlled production task in the form of sentence completion created by Agathopoulou & Papadopoulou (2009)

was used. This task consisted of thirty items in total, mapping the three conditions of grammatical aspect, namely ten sentences denoting the perfective aspect, ten the imperfective continuous interpretation, and ten the imperfective habitual.[9] The task was performed orally, meaning that the elicitor read the sentences out loud, leaving a 2-second pause in the place where the verb should be produced. Participants had to repeat the whole sentence with the answer, which was recorded.

Three groups of Greek speakers took part in this study, namely Greek monolingually-raised speakers and Greek heritage speakers in Germany and in the US; see Table 1. A further categorization was conducted for age groups, namely adults and adolescents within the three groups.[10]

The results from the qualitative analysis of the narrative data revealed patterns of perfectivization of verbs, mainly with atelic events and the verb class of activity verbs as shown in example (9) from the original publication. This pattern was observed mostly in the narrations of heritage speakers rather than in those of monolingually-raised speakers, and it was found in both formal and informal communication settings.

(9)  Itan         ena zevgari pu  *perpatisan    me  ena karotsi.
     there was a    couple  who  walk.PST.PVF with a    stroller
     'There was a couple with a stroller that was walking.'

Moving to the controlled elicited production task, a one-way multivariate analysis of variance test (MANOVA) showed no differences between the three independent groups. The outcome revealed a significant difference between the monolingually-raised and heritage speakers in the US across aspectual conditions. A weak three-way interaction between the groups and the age groups was reported, and so adults and adolescents in the respective groups were analyzed separately. It was found that heritage adults in the US performed more accurately in the three conditions of aspect compared to adolescent heritage speakers in the US. In contrast, Greek adult heritage speakers in Germany performed worse compared to adolescent heritage speakers in Germany. There was no statistical difference between the age groups in the different conditions of aspect.

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[9]There are 9 strong verbs that require an exponent /s/ to mark the aspectual feature, 8 verbs that exhibit weak allomorphy requiring the exponent /s/, and 4 verbs that exhibit only weak allomorphy with vowel alternation patterns. Finally, there is one verb with strong suppletion, requiring a different stem altogether. 22 out of 30 verbs belong to the first conjugation class, and 8 of them belong to the second conjugation class.

[10]Further information concerning the number of participants in each age group can be found in Rizou (2021: 41–42).

Summarizing, the overall contribution of the study is the exploration of different age groups, namely adult and adolescent heritage speakers' performance in an offline production task. Via the particular task, which has previously been used for different populations such as L2 speakers and bilingual children, the author obtained similar results to previous studies: the most challenging condition is the imperfective habitual one, for Greek heritage speakers both in Germany and in the US. The most important contribution, though, is the slight reverse pattern observed within and between the groups, namely the performance of adult and adolescent heritage speakers. This finding calls for future research on other factors affecting performance on verbal aspect (grammatical and lexical).

## 5 Novel forms for the expression of aspect in heritage Greek by Rizou et al. (2025)

Greek has a rich verbal morphology; each verb is marked for tense, aspect, voice and agreement. Recent analyses of the verbs in the first and second conjugation classes (CC) have been conducted by Spyropoulos et al. (2017) and Revithiadou et al. (2019). The first CC comprises verbs in which the stress falls on the root of IPFV [–PAST] forms like *graf-o* 'write', while the second CC includes all verbs that exhibit non-root stress for example *agap-ao/o* 'love' and *poth-o* 'desire' Holton et al. (1997: 126–136).

Focusing on the aspectual feature, the first pattern for the verbs of the first CC, in which the root ends either in a vowel or in a consonant in imperfective (e.g. *idri-o* 'establish'), is the addition of the exponent /s/ at the right edge of the root (e.g. *(na) idri-s-o* 'to establish'). These verbs are called regular/strong verbs in the literature (Spyropoulos et al. 2017, Revithiadou et al. 2019).

The second pattern concerns the irregular/weak roots, which undergo reshaping due to phonological adjustments, suppletion, and omission or addition of a consonant and syllables. There are two allomorphic vowel patterns of the same root, one for [–]PFV environments (e.g. *sern-o* 'drag') and one for [+]PFV, (e.g. *(na) sir-o* 'to drag').[11]

The third pattern requires suppletion under which verbs undergo a complete stem change or strong suppletion, (e.g. *tro-o* 'eat' for [–]PFV and *(na) fa-o* 'to eat' for [+]PFV environments), unlike the verbs that require weak suppletion. The verbs of the second CC exhibit two allomorphic stems in [–]PFV (e.g. *pul(a)-o* 'sell') and [+]PFV aspect (e.g. *(na) puli-s-o* 'to sell').

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[11]The /-n/ does not belong to the root and thus, the root vowel changes into /i/ when the coronal /-n/ disappears.

The study by Rizou et al. (2025) explored whether the productions of heritage speakers of Greek differed from those of monolingually-raised speakers regarding the encoding of several morpho-phonological features given the concatenate verbal morphology and, in more complex cases, the addition of prefixes. Specifically, the goal of the study was to reveal whether there were mismatches in verbal features such as aspect, tense, voice, *phi*-features (person and number), and whether there were any other asymmetries in morpho-phonological alternations like vocalic elements or stress placement.

Previous studies have shown that certain morphological features seem to be open to dynamic patterns in bilingual/heritage grammar across a variety of languages. One of the first researchers to mention differences in Russian heritage speakers' verbal morphology was Romanova (2008). Slabakova (2014) and Mikhaylova (2018) proposed the Bottleneck Hypothesis for L2 learners and heritage speakers, proposing that these speakers face difficulties with morphological features in languages with rich inflection. Furthermore, Perez-Cortes et al. (2019) and Fernández-Dobao & Herschensohn (2021) report differences in mood and tense for Spanish heritage speakers while Jóhannsdóttir (2023) reports an overstandardization of tense features in heritage Icelandic, meaning that the speakers resort to default strategies. It has been observed by Scontras et al. (2015) that heritage speakers often alter the structure of the verbal morphosyntactic system, resulting in the simplification of intricate morpho-phonemic rules.

The methodology employed in Rizou et al. (2025) is the same as that used by Rizou (2021), and was described in Section 4. In the elicited production task, there were twenty verbs of the first CC and ten of the second. Both strong verbs and verbs that require weak allomorphy were included in the experimental conditions. The participants who took part in this study were Greek monolingually-raised speakers recruited in Athens, Greece, and Greek heritage speakers recruited in Germany and in the US. They performed an elicited production task with fixed conditions for the production of perfective and imperfective aspect. More details can be found in the aforementioned publication.

The highlight of the analysis is that heritage speakers in the US produced more innovative verbal forms compared to heritage speakers in Germany. In Greek heritage speakers' productions, numerous patterns were detected pointing to a systematic restructuring of stem change, conjugation class change, stress and /s/ suffixation misplacement, and erroneous or dropped augment /e/ as seen in examples (10) categorized in the second CC. Another tendency was detected regarding the voice feature, indicating that heritage speakers make use of the productive rule proposed by Oikonomou & Alexiadou (2022) of employing the

non-active voice as opposed to the typical active voice, suggesting a potential generalization of the voice feature for the sake of morphological simplification.

(10)

(11)   *(è)-for-e            vs. fòra-g-e
         augment-wear-3sg vs  wear-ipvf-3sg
       'was wearing'

(12)   pònak*-s-e          vs ponù-s-e
       hurt-<sub>vocalic element</sub>-3sg vs hurt-ipfv-3sg
       'was hurting'

Overall, morphological analyses of verbal features are rare in Greek heritage linguistics. This study contributes to filling this gap through a detailed analysis of dynamic verbal features in Greek heritage grammars. Insights on the features encoded in verbs are provided in this qualitative analysis, shedding light on this unexplored field and pointing the way to further studies on other phenomena that are encoded with different features in different languages.

# 6 Aspect acquisition and use in heritage Russian in Germany and the US by Gagarina et al. (2020)

Aspect production in adult heritage Russian speakers is often characterized by systematic patterns that differ from standard Russian (Pereltsvaig 2004, Laleko 2008). Besides, studies on child heritage Russian report innovations in the use and formation of perfective and imperfective verbs (Gagarina 2011, Antonova-Ünlü & Wei 2016, Kistanova & Sekerina 2019). One explanation for this dynamic linguistic behavior might be the missing sustainability hypothesis proposed by Gagarina et al. (2020); see Swain & Lapkin (1995) for a similar analysis. Specifically, in language contact situations, the aspectual system seems to undergo restructuring due to a lower amount of input in the heritage language in the daily communication of young children, even though the use of aspect is acquired early in Russian (Cejtlin 2000, Gagarina 2008b, Kistanova & Sekerina 2019). Additionally, the dominance shift from the heritage language to the majority language, which usually occurs when children enter monolingual education institutions, further contributes to the dynamicity of the aspectual category in the linguistic system of an asymmetrically bilingual child.

The aim of Gagarina et al. (2020) was to investigate the productions of aspectual forms in heritage child and adult Russian in Germany and the US by contrasting them to the typical aspectual patterns of monolingual child Russian. More specifically, the study dealt with the question of whether the observed changes in the aspectual system of heritage Russian are unique for heritage speakers or whether they are typical for the acquisitional patterns of aspect in monolingual acquisition. Furthermore, the study attempted to gain insight into the degree of dynamicity of the aspectual system of heritage Russian, i.e., the degree of change in a given time period. To achieve this goal, the study applied the usage-based theory of language acquisition (Tomasello 2003) as well as frequency accounts of (first) language acquisition (Gülzow & Gagarina 2011, Lieven 2010).

The investigation was carried out on longitudinal spontaneous production data collected from two heritage bilingual children in Germany (Russian-German) in Germany and one heritage bilingual child (Russian-English) in the US (age range: 1;6–4;0 years) on the one hand, as well as on semi-spontaneous production data elicited from 128 adolescent and adult heritage Russian speakers (age range: 15–35 years) in Germany and the US on the other hand. Productions of perfective and imperfective verb forms of heritage speakers were compared with the productions of child monolingual speakers of Russian. Monolingual data were taken from studies by Bar-Shalom (2002), Kistanova & Sekerina (2019), Bondarko (2011), and Gagarina (2007). Adult and adolescent heritage data were collected according to the *language situations* approach by Wiese (2020), described earlier in Section 2. In the present study, only Russian heritage data were used, which were drawn from the 0.2.0 version of the RUEG-RU subcorpus (Wiese et al. 2019).[12]

The findings indicate that in young children at the age of around two years, aspect production is very similar in heritage and monolingual Russian. However, with increasing age starting already from three to four years, aspect use of heritage speakers occasionally shows dynamic patterns and innovations, which are not or rarely attested in productions of monolingual peers. These patterns often represent speakers' strong preference for perfective aspectual forms in analytical constructions, and also for the substitution of perfective aspectual forms by imperfective ones in denoting concrete resultative events. In example (13), the verb form *pojti* 'go' is perfective, which is an ungrammatical use in standard Russian. Instead, an imperfective form *idti* 'go' is canonically used here. In (14), the imperfective use of 'brake' is unexpected in the given context, in which the

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[12]Please note that the number of heritage Russian speakers reported in Rizou et al. (2024) slightly differs from the numbers in the current study due to the different corpus versions used.

speaker was looking at the car driver braking suddenly to prevent an accident. The expected perfective verb form is *za-tormozil* 'brake'.

(13)  ne  xoču  **\*pojti**  v  školu
      not want  go.PFV  to school
      '(I) don't want to go to school'

(14)  voditel'  **#tormozil**
      driver  brake.IMPF.PST
      'The car driver was braking'

In adolescent and adult heritage speakers of Russian, those patterns consistently appear in language productions.

Taken together, the results of the study demonstrate that acquisitional patterns in bilingual and monolingually-raised children converge until the age of three, and then rare innovations and dynamic patterns emerge in productions of heritage speakers. Those patterns include the use of perfective aspectual forms and modal verbs in analytical constructions, as well as substitutions of perfective forms by imperfective ones. Such linguistic behavior in heritage speakers might be explained by the *missing sustainability hypothesis*, suggesting that the aspectual system undergoes restructuring caused by a low quantity of input in the heritage language during the daily communication to young children in situations of language contact.

# 7  Processing of verbal aspect in a Visual World eye-tracking paradigm by Özsoy, Büyükyıldırım, et al. (2023)

The study by Özsoy, Büyükyıldırım, et al. (2023) reviewed in this section was conducted with Turkish-speaking groups, and can be thought of as a conceptual replication of two processing studies by Minor et al. (2022) and Minor et al. (2023). Minor et al. (2022) investigated the processing of grammatical aspect in monolingual Russian speakers. Minor et al. (2023) extended this research to monolingual speakers of English and Spanish, comparing the results with the original data from Minor et al. (2022). Minor and colleagues performed an initial picture selection task and a Visual World eye-tracking study focusing on Russian aspectual prefixes, revealing that participants already demonstrated a preference prior to the verb's completion for target images corresponding to either ongoing

or completed events. This suggests incremental processing of grammatical aspect information on a word-internal scale.

The study reviewed here, Özsoy, Büyükyıldırım, et al. (2023), extended the aforementioned aspect processing paradigm to bilingual heritage speakers of Turkish. In doing so, this study aims to fill the gap in the literature on heritage Turkish concerning the comprehension of grammatical aspect and contributes to a paradigm shift towards online psycholinguistic investigations of heritage languages (Bayram et al. 2021). Specifically, the researchers aimed to investigate the extent to which the preference for the perfective aspect in processing completed events and the imperfective aspect for ongoing events would be displayed by Turkish heritage speakers in Germany and Turkish monolingually-raised speakers. They tested this distinction using two different suffixes in item pairs such as in (15) and (16).

(15) Temiz gömleğini ütüle-di      yaşlı amca özene bezene.
clean  shirt       iron-PST.PFV old   uncle properly
'The elderly uncle carefully ironed his clean shirt.'

(16) Temiz gömleğini ütülü-yor-du       yaşlı amca özene bezene.
clean  shirt       iron-IMPFV.PROG-PST old   uncle properly
'The elderly uncle was carefully ironing his clean shirt.'

One of the questions that the study explored is whether aspectual distinctions would be recognized by heritage speakers of Turkish. These speakers have shown reduced sensitivity to TAM morphology in previous studies (Arslan et al. 2017, Coşkun Kunduz 2018), which could lead to a reduced effect (i.e., slower processing of aspectual distinctions) in the processing patterns of heritage speakers of Turkish when compared to monolingually-raised speakers. Another related research question is whether aspectual distinctions would be processed incrementally as the sentence unfolds. Additionally, the study explored driving factors of individual differences in processing by examining individual cognitive skills (processing speed) and language proficiency (C-test scores).

A statistical analysis of the eye-tracking results focused on eye gaze preferences and the accuracy of picture selection. With regard to the overarching research question of this review chapter, the results indicate that heritage speakers recognize aspectual distinctions between the perfective and the imperfective aspect. The results also suggested that heritage speakers and monolingual speakers of Turkish indeed processed aspectual distinctions incrementally (see also Büyükyıldırım et al. in preparation). However, the researchers found that incremental processing is delayed in heritage speakers compared to monolingually-

raised speakers. The effect of the incremental processing of aspectual distinctions arises shortly after the offset of the verb and most closely patterns with the findings on Spanish, which seems to be due to similar morphological characteristics. Both Turkish and Spanish mark grammatical aspect using suffixes after the verb stem.

Additionally, within the group of heritage speakers, the findings showed small significant effects of individual cognitive abilities (processing speed) and language proficiency, indicating that speakers with higher cognitive abilities and language proficiency recognized aspectual distinctions faster. An effect of language proficiency was also observed in the results of the picture selection task, showing that speakers with higher C-test scores reached higher accuracy.

Overall, this study replicates the findings of Minor et al. (2022, 2023) for Turkish, which is typologically different from languages in the Indo-European language family, such as English, Russian, and Spanish, which were investigated by the aforementioned researchers. Considering the aim to extend (aspect) processing studies to bilingual populations (Bayram et al. 2021), this study took a successful first step. Turkish heritage speakers were able to process aspectual marking and its distinctions incrementally. These findings contrast with previous studies, such as those by Karaca et al. (2024) and Özsoy, Çiçek, et al. (2023), which found that heritage speakers show no or only marginal effects in processing grammatical factors such as case and aspect. This new study demonstrates that heritage speakers do engage in grammatical processing and this is modulated by individual differences factors. The authors offer valuable insights into the interplay of linguistic and cognitive factors in the processing of aspectual distinctions among Turkish heritage speakers, shedding light on potential effects of heritage language bilingualism and accounting for individual differences.

## 8 Discussion

This chapter provides reviews of six studies focusing on aspect in heritage and monolingual varieties of Greek, Russian, and Turkish that were conducted as part of the Research Unit *Emerging Grammars*. The cross-linguistic study evaluates the use of perfective and imperfective aspectual forms among the aforementioned population in narrative tasks, while the rest of the studies provide different foci on the exploration of grammatical aspect in each language separately analyzed with different methods. Some of the studies investigate the influence of formality and mode variation on the expression of aspect forms as well. Analyzing large-scale data for each language with different statistical methods, we

reveal interesting insights into the dynamicity of phenomena related to grammatical aspect that undergo systematic changes. Different factors that affect the acquisition, the preservation, and the production of aspect are analyzed in each study, offering different perspectives regarding the phenomenon of aspect.

Aspect was one of the first phenomena addressed in heritage language research (Montrul 2002, Kagan 2005, Laleko 2008). However, no previous research has used a comparative approach to explore the realization of aspect in heritage speakers of typologically distinct languages. The comparative approach in Rizou et al. (2024) reveals that heritage speakers are influenced by the morphological marking of aspect in the majority language in language contact situations. We expected the notion of morphological markedness as described by Comrie (1976) to affect heritage speakers' preferences with regard to grammatical aspect. On the one hand, we expected the speakers of the heritage languages in contact with majority German to opt for the simpler and morphologically unmarked forms, as German does not have grammatical aspect; on the other hand, we expected heritage speakers to opt for the marked forms due to contact with majority English, which marks grammatical aspect. These predictions were confirmed for Russian heritage speakers in Germany and for Greek heritage speakers residing in the US, respectively. The findings speak in favor of the markedness account (Comrie 1976), although it is not uniform for all languages under the scope of this study. For Turkish, no group effects were found, which is probably connected to the typologically different way of aspect marking, which is provided by the prominent markers *-iyor* and *-(y)di*. As the study by Özsoy, Büyükyıldırım, et al. (2023) revealed, the processing of the aspectual distinctions begins shortly after the offset of the verb and is incremental. Although heritage speakers perform slower compared to monolingually-raised speakers, this does not seem to be related to the salient aspectual markers in Turkish and rather might be explained by language use effects.

Another factor considered in the studies by Rizou et al. (2024) and Alexiadou & Rizou (2023) is the communicative setting. The factors of formality and mode variation affect the realization of grammatical aspect in different ways in the languages discussed in this chapter. By mixing various levels of formality and mode, one can get varied results across different languages, as demonstrated in the study by Pescuma et al. (2023). Thus, in the study by Rizou et al. (2024), mode effects were detected in both Turkish and Russian speakers, who tended to produce more imperfectives in the spoken mode. Additionally, formality effects were reported only for Turkish, manifested in more imperfective forms in the formal setting. In the study by Alexiadou & Rizou (2023) it was found that both heritage and monolingually-raised speakers clearly favor periphrastic constructions in

the oral mode, but there was a tendency by Greek heritage speakers in the US to use these analytic structures more often than monolingually-raised speakers. Since there are no studies correlating the different formality levels and modes with the phenomenon of grammatical aspect, we approached mode and formality variation in an exploratory way. The non-uniformity of the results regarding the factors of formality and mode in the different languages is probably due to the fact that extra-linguistic situational-functional parameters which influence intra-individual variation (cf. Lüdeling et al. 2022) do not uniformly determine the distribution of linguistic means across different language communities, even if the phenomena involved are comparable.

A further factor taken into consideration in the studies investigating verbal aspect is the age factor. In the study by Rizou (2021), different communities of Greek heritage speakers exhibit a divergent performance on production tasks concerning the phenomenon of verbal aspect. The Greek adolescent heritage group in Germany performed more accurately in the task compared to the adult group. However, the opposite pattern was detected in the US: Greek adult heritage speakers performed more accurately compared to the adolescent heritage group. The explanation of this finding might be hidden in community characteristics such as past and current input and literacy practices, which seem to be different in heritage Greek communities in Germany and the US.

The study by Gagarina et al. (2020) provides an overview of the use of aspect in L1 and heritage Russian, spanning from the initial occurrence of verb form production in child L1 to adulthood. The findings indicate a resemblance in the early acquisition and production of aspectual forms between monolinguals and bilinguals, while notable differences in aspect use between the two populations emerge systematically around the age of three to four. Differences in aspect usage from monolingually-raised speakers, such as the substitution of perfective with imperfective in analytical future constructions, as well as the use of imperfective in resultative contexts by heritage Russian speakers, are attributed to the lack of a sustainable input. In their adulthood, even fluent and proficient Russian heritage speakers overlook formal restrictions aligning with the prototypical semantics of aspect. These systematic patterns are in line with previous literature reporting a spread of non-canonical patterns in the aspectual system of Russian heritage speakers (Polinsky 2000).

The study by Rizou et al. (2025) highlights the challenges that heritage speakers face in encoding all verbal features within and outside the stem boundaries in a language with concatenate morphology, such as Greek. The features most susceptible to change seem to be the $\phi$-features and aspect. At the same time,

stem alternations that involve an allomorphic vocalic element and morpho-phonological adjustments seem to pose difficulties for heritage speakers' productions even in experiments without time constraints. Thus, heritage speakers resort to morphologically novel patterns with simplified and even default verbal features. This is in line with the theory of representational economy proposed by Scontras et al. (2015). Another strategy followed by heritage speakers is revealed in the study by Alexiadou & Rizou (2023), which is a preference for analytic verbal forms. This periphrasis contains a light verb and either a noun or a code-switched phrase. Heritage speakers tend to resort to morphologically less complex verbs, as is the case with light verbs. Thus, they avoid difficulties with morpho-phonological changes that come with aspect formation of lexical verbs.

The aspectual preference observed in our speakers is not determined solely by one factor; rather, it is influenced by a complex interaction of both language-internal and language-external factors in addition to other background factors. The findings suggest that internal grammatical properties of languages in a contact situation, such as the typology of each language, affect bilingual speakers' selection of aspectual forms in language contact situations.

This review chapter confirms the necessity of adopting a multifaceted approach to elucidate phenomena of the core grammatical system, like grammatical aspect. The methodologies and analyses outlined here underscore the importance of conducting further research to comprehensively explore grammatical aspect across various languages and populations in diverse situational contexts. By conducting experiments that account for the aforementioned factors, researchers can assess whether and to which degree these factors impact the processing and production of grammatical aspect.

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# References

Acarlar, Funda, Ayhan Aksu-Koç, Aylin C. Küntay, İlknur Maviş, Hatice Sofu, Seyhun Topbaş & Figen Turan. 2008. Adapting MB-CDI to Turkish: The first phase. In Sila Ay, Özgür Aydin, Iclal Ergenc, Seda Gökmen, Selcuk Issever & Dilek Pecenek (eds.), *Essays on Turkish linguistics: Proceedings of the 14th International Conference on Turkish Linguistics* (Turcologica 79), 313–320. Wiesbaden: Harrassowitz.

Agathopoulou, Eleni & Despina Papadopoulou. 2009. Morphological dissociations in the L2 acquisition of an inflectionally rich language. *EuroSLA Yearbook* 9(1). 107–131. DOI: 10.1075/eurosla.9.07aga.

Aksu-Koç, Ayhan. 1988. *The acquisition of aspect and modality: The case of past reference in Turkish* (Cambridge Studies in Linguistics). Cambridge: Cambridge University Press. DOI: 10.1017/CBO9780511554353.

Alexiadou, Artemis, Giana Iordăchioaia & Elena Soare. 2010. Number/aspect interactions in the syntax of nominalizations: A distributed approach. *Journal of Linguistics* 46(3). 537–574. DOI: 10.1017/S0022226710000058.

Alexiadou, Artemis & Terje Lohndal. 2018. Units of language mixing: A cross-linguistic perspective. *Frontiers in Psychology* 9. 1719. DOI: 10.3389/fpsyg.2018.01719.

Alexiadou, Artemis & Vasiliki Rizou. 2023. The use of periphrasis for the expression of aspect by Greek heritage speakers: A case study of register variation narrowing. *Register Studies* 5(1). 82–110. DOI: 10.1075/rs.20022.ale.

Andersen, Roger W. & Yasuhiro Shirai. 1994. Discourse motivations for some cognitive acquisition principles. *Studies in Second Language Acquisition* 16(2). 133–156.

Antonova-Ünlü, Elena & Li Wei. 2016. Aspect acquisition in Russian as the weaker language: Evidence from a Turkish–Russian child. *International Journal of Bilingualism* 20(2). 210–228. DOI: 10.1177/1367006914552.

Arslan, Seçkin, Doerte De Kok & Roelien Bastiaanse. 2017. Processing grammatical evidentiality and time reference in Turkish heritage and monolingual speakers. *Bilingualism: Language and Cognition* 20(3). 457–472.

Bar-Shalom, Eva. 2002. Tense and aspect in early child Russian. *Language Acquisition* 10(4). 321–337. DOI: 10.1207/S15327817LA1004_2.

Bayram, Fatih, Grazia Di Pisa, Jason Rothman & Roumyana Slabakova. 2021. Current trends and emerging methodologies in charting heritage language grammars. In Silvina Montrul & Maria Polinsky (eds.), *The Cambridge handbook of heritage languages and linguistics* (Cambridge Handbooks in Language and Linguistics), 545–578. Cambridge: Cambridge University Press. DOI: 10.1017/9781108766340.025.

Benmamoun, Elabbas, Silvina Montrul & Maria Polinsky. 2013. Heritage languages and their speakers: Opportunities and challenges for linguistics. *Theoretical Linguistics* 39(3-4). 129–181. DOI: 10.1515/tl-2013-0009.

Bondarko, Aleksandr V. 2011. *Kategorizacija v sisteme grammatiki [Categorisation of grammatical systems].* Moscow: Jazyki slavjanskich kul'tur.

Boon, Erin Diane. 2014. *Heritage Welsh: A study of heritage language as the outcome of minority language acquisition and bilingualism.* Harvard University. (Doctoral dissertation).

Büyükyıldırım, Nisa, Özce Özceçelik, Serkan Uygun & Onur Özsoy. In preparation. *Verb aspect processing and production in mono- and bilingual Turkish speakers.*

Cejtlin, Stella N. 2000. Jazyk i rebenok: Lingvistika detskoj reči [The language and the child: Language acquisition]. *Vlados.*

Chevalier, Joan F. 2004. Heritage language literacy: Theory and practice. *Heritage Language Journal* 2(1). 26–44.

Comrie, Bernard. 1976. *Aspect: An introduction to the study of verbal aspect and related problems* (Cambridge Textbooks in Linguistics). Cambridge: Cambridge University Press.

Coşkun Kunduz, Aylin. 2018. *The second language acquisition of inflectional morphology in Turkish.* Boğaziçi University. (Doctoral dissertation).

Cuza, Alejandro, Rocío Pérez-Tattam, Elizabeth Barajas, Lauren Miller & Claudia Sadowski. 2013. The development of tense and aspect morphology in child and adult heritage speakers. In John W. Schwieter (ed.), *Innovative research and practices in second language acquisition and bilingualism* (Language Learning & Language Teaching 38), 193–220. Amsterdam: John Benjamins. DOI: 10.1075/lllt.38.12cuz.

Delidaki, Sophia. 2006. *The acquisition of tense and aspect in child Greek.* University of Reading. (Doctoral dissertation).

Dressler, Wolfgang U. 1991. The sociolinguistic and patholinguistic attrition of Breton phonology, morphology, and morphonology. In Herbert W. Seliger & Robert M. Vago (eds.), *First language attrition*, 99–112. Cambridge: Cambridge University Press.

Fernández-Dobao, Ana & Julia Herschensohn. 2021. Acquisition of Spanish verbal morphology by child bilinguals: Overregularization by heritage speakers and second language learners. *Bilingualism: Language and Cognition* 24(1). 56–68. DOI: 10.1017/S1366728920000310.

Gagarina, Natalia. 2000. The acquisition of aspectuality by Russian children: The early stages. *ZAS Papers in Linguistics* 15. 232–246.

Gagarina, Natalia. 2007. Stanovlenie funkcional'no-semantičeskogo polja aspektual'nosti v detskoj reči [The functional-semantic field of aspect in language acquisition]. In Yana Akhapkina, Maria Voeikova & Stella N. Cejtlin (eds.), *Semantičeskie kategorii v detskoj reči [Semantic categories in language acquisition]*, 18–40. Nestor-Istorija.

Gagarina, Natalia. 2008a. Anaphoric pronominal reference in Russian and German narratives: Bilingual and monolingual settings. *Zeitschrift für Slawistik* 53(3). 326–338.

Gagarina, Natalia. 2008b. *First language acquisition of verb categories in Russian*. St. Petersburg: Nauka.

Gagarina, Natalia. 2011. Acquisition and loss of L1 in a Russian-German bilingual child: A case study. In S. Cejtlin (ed.), *Monolingual and bilingual path to language*, 137–163. Moscow: Jazyki slavjanskoj kul'tury.

Gagarina, Natalia, Maria Martynova, Irina A. Sekerina & Luka Szucsich. 2020. From first verbs to adulthood: Aspect in heritage Russian in the US and Germany. In Yevgeny Golovko, Elena Gorbova, Petr Kocharov, Viktor Khrakovsky & Oksana Chuikova (eds.), *Vzaimodejstvie aspekta so smežnymi kategorijami [Interaction of aspect with related categories]*, 112–117. St. Petersburg: RGPU imeni A. I. Gercena.

Gelman, Andrew, John B. Carlin, Hal S. Stern, David B. Dunson, Aki Vehtari & Donald B. Rubin. 2013. *Bayesian data analysis*. CRC press.

Guijarro-Fuentes, Pedro & Katrin Schmitz. 2015. The nature and nurture of heritage language acquisition. *Lingua* 164. 239–250. DOI: 10.1016/j.lingua.2015.05.008.

Gülzow, Insa & Natalia Gagarina. 2011. *Frequency effects in language acquisition: Defining the limits of frequency as an explanatory concept* (Studies on Language Acquisition 32). Walter de Gruyter. DOI: 10.1515/9783110977905.

Haspelmath, Martin. 2000. Periphrasis. In G. E. Booij, C. Lehmann & J. Mug-dan (eds.), *Morphology: A handbook on inflection and word formation*, 654–664. Berlin: de Gruyter. DOI: 10.1515/9783110111286.1.9.654.

Holton, David, Peter Mackridge & Irene Philippaki-Warburton. 1997. *Greek: A comprehensive grammar of the modern language.* Psychology Press.

Jóhannsdóttir, Kristín M. 2023. "And the dog is sleeping too": The use of the progressive in North American Icelandic. In Birna Arnbjörnsdóttir, Höskuldur Thráinsson & Úlfar Bragason (eds.), *Icelandic Heritage in North America*, 252–270. Manitoba: Univ. of Manitoba Press.

Kagan, Olga. 2005. In support of a proficiency-based definition of heritage language learners: The case of Russian. *International Journal of Bilingual Education and Bilingualism* 8(2-3). 213–221. DOI: 10.1080/13670050508668608.

Karaca, Figen, Susanne Brouwer, Sharon Unsworth & Falk Huettig. 2024. Morphosyntactic predictive processing in adult heritage speakers: Effects of cue availability and spoken and written language experience. *Language, Cognition and Neuroscience* 39(1). 118–135. DOI: 10.1080/23273798.2023.2254424.

Kistanova, Ekaterina V. & Irina A. Sekerina. 2019. Acquisition of the grammatical categories of Russian verbs in a heritage Russian-English child: A case study. In Megan M. Brown & Brady Dailey (eds.), *Proceedings of the 43rd Boston University Conference on Language Development*, 324–337. Cascadilla Press.

Kiyota, Masaru. 2008. *Situation aspect and viewpoint aspect: From Salish to Japanese.* University of British Columbia. (Doctoral dissertation).

Konstantzou, Katerina, Angeliek Van Hout, Spyridoula Varlokosta & Maria Vlassopoulos. 2013. Perfective–imperfective: Development of aspectual distinctions in Greek specific language impairment. *Linguistic Variation* 13(2). 187–216. DOI: 10.1075/lv.13.2.03kon.

Kruschke, John. 2014. *Doing Bayesian data analysis: A tutorial with R, JAGS, and Stan.* Academic Press.

Kruschke, John & Wolf Vanpaemel. 2015. Bayesian estimation in hierarchical models. In Jerome R. Busemeyer, Zheng Wang, James T. Townsend & Ami Eidels (eds.), *The Oxford handbook of computational and mathematical psychology*, 279–299. Oxford: Oxford University Press. DOI: 10.1093/oxfordhb/9780199957996.013.13.

Laleko, Oksana. 2008. Compositional telicity and heritage Russian aspect. In *Proceedings of the thirty-eighth Western Conference on Linguistics (WECOL)*, 150–160. Davis, CA: Department of Linguistics, University of California, Davis.

Laleko, Oksana. 2010. *The syntax-pragmatics interface in language loss: Covert restructuring of aspect in heritage Russian.* University of Minnesota. (Doctoral dissertation). https://hdl.handle.net/11299/92219.

Lieven, Elena. 2010. Input and first language acquisition: Evaluating the role of frequency. *Lingua* 120(11). 2546–2556. DOI: 10.1016/j.lingua.2010.06.005.

Lüdeling, Anke, Artemis Alexiadou, Aria Adli, Karin Donhauser, Malte Dreyer, Markus Egg, Anna Helene Feulner, Natalia Gagarina, Wolfgang Hock, Stefanie Jannedy, Frank Kammerzell, Pia Knoeferle, Thomas Krause, Manfred Krifka, Silvia Kutscher, Beate Lütke, Thomas McFadden, Roland Meyer, Christine Mooshammer, Stefan Müller, Katja Maquate, Muriel Norde, Uli Sauerland, Stephanie Solt, Luka Szucsich, Elisabeth Verhoeven, Richard Waltereit, Anne Wolfsgruber & Lars Erik Zeige. 2022. Register: Language users' knowledge of situational-functional variation. *Register Aspects of Language in Situation* 1(1). 1–58. DOI: 10.18452/24901.

Mikhaylova, Anna. 2018. Morphological bottleneck: The case of Russian heritage speakers. *Journal of Language Contact* 11(2). 268–303.

Minor, Serge, Natalia Mitrofanova, Gustavo Guajardo, Myrte Vos & Gillian Ramchand. 2023. Aspect processing across languages: A visual world eye-tracking study. *Frontiers in Language Sciences* 1. 1052205. DOI: 10.3389/flang.2022.1052205.

Minor, Serge, Natalia Mitrofanova & Gillian Ramchand. 2022. Fine-grained time course of verb aspect processing. *PLoS ONE* 17(2). e0264132. DOI: 10.1371/journal.pone.0264132.

Montrul, Silvina. 2002. Incomplete acquisition and attrition of Spanish tense/aspect distinctions in adult bilinguals. *Bilingualism: Language and Cognition* 5(1). 39–68. DOI: 10.1017/S1366728902000135.

Montrul, Silvina. 2015. *The acquisition of heritage languages*. Cambridge: Cambridge University Press. DOI: 10.1017/CBO9781139030502.

Montrul, Silvina & Silvia Perpiñán. 2011. Assessing differences and similarities between instructed heritage language learners and L2 learners in their knowledge of Spanish tense-aspect and mood (TAM) morphology. *Heritage Language Journal* 8(1). 90–133. DOI: 10.46538/hlj.8.1.5.

Moser, Amalia. 1994. The interaction of lexical and grammatical aspect in Modern Greek. In Irene Philippaki-Warburton, Katerina Nicolaidis & Maria Sifianou (eds.), *Themes in Greek linguistics*, 137–144. Amsterdam: John Benjamins. DOI: 10.1075/cilt.117.20mos.

Oikonomou, Despina & Artemis Alexiadou. 2022. Voice syncretism crosslinguistically: The view from minimalism. *Philosophies* 7(1). 19. DOI: 10.3390/philosophies7010019.

Özsoy, Onur, Nisa Büyükyıldırım, Özce Özceçelik, Ulaş Aşkın & Serkan Uygun. 2023. Verb aspect processing and production in mono- and bilingual Turkish.

In *Words in the World conference*. Poster. https://wordsintheworld.ca/wow-conference/conference-schedule-wow2023/.

Özsoy, Onur, Büsra Çiçek, Zeynep Özal, Natalia Gagarina & Irina A. Sekerina. 2023. Turkish-German heritage speakers' predictive use of case: Webcam-based vs. in-lab eye-tracking. *Frontiers in Psychology* 14. 1155585. DOI: 10.3389/fpsyg.2023.1155585.

Panitsa, Georgia. 2010. *Aspects of Aspect: The acquisition of viewpoint and situation aspect in Modern Greek*. University College London. (Doctoral dissertation).

Pereltsvaig, Asya. 2004. Immigrant Russian: Factors in the restructuring of the aspectual system under attrition. In Corey Yoquelet (ed.), *Proceedings of the 29th Annual Meeting of the Berkeley Linguistics Society*, 107–119. Berkeley: Berkeley Linguistics Society.

Perez-Cortes, Silvia, Michael T Putnam & Liliana Sánchez. 2019. Differential access: Asymmetries in accessing features and building representations in heritage language grammars. *Languages* 4(4). 81. DOI: 10.3390/languages4040081.

Pescuma, Valentina N, Dina Serova, Julia Lukassek, Antje Sauermann, Roland Schäfer, Aria Adli, Felix Bildhauer, Markus Egg, Kristina Hülk, Aine Ito, et al. 2023. Situating language register across the ages, languages, modalities, and cultural aspects: Evidence from complementary methods. *Frontiers in Psychology* 13. 964658. DOI: 10.3389/fpsyg.2022.964658.

Polinsky, Maria. 2000. A composite linguistic profile of a speaker of Russian in the US. In Olga Kagan & Benjamin Rifkin (eds.), *The learning and teaching of Slavic languages and cultures*, 437–465. Bloomington, IN: Slavica.

Polinsky, Maria. 2015. Heritage languages and their speakers: State of the field, challenges, perspectives for future work, and methodologies. *Zeitschrift für Fremdsprachwissenschaft* 26. 7–27.

Polinsky, Maria. 2018. *Heritage languages and their speakers* (Cambridge Studies in Linguistics 159). Cambridge: Cambridge University Press. DOI: 10.1017/9781107252349.

R Core Team. 2021. *R: A Language and environment for statistical computing*. Version 4.3.0. Vienna: R Foundation for Statistical Computing. https://www.R-project.org/.

Revithiadou, Anthi, Giorgos Markopoulos & Vassilios Spyropoulos. 2019. Changing shape according to strength: Evidence from root allomorphy in Greek. *The Linguistic Review* 36(3). 553–574. DOI: 10.1515/tlr-2019-2029.

Rizou, Vasiliki. 2021. Verbal aspect in heritage Greek across majority languages: A preliminary study. In Arnstein Hjelde & Åshild Søfteland (eds.), *Selected pro-*

*ceedings of the 10th Workshop on Immigrant Languages in the Americas (WILA 10)*, 39–48. Sommerville, MA: Cascadilla Proceedings Project.

Rizou, Vasiliki, Onur Özsoy, Maria Martynova, Luka Szucsich, Artemis Alexiadou & Natalia Gagarina. 2024. Grammatical aspect in heritage and monolingual Greek, Russian and Turkish. *Register Aspects of Language in Situation* 3(3). DOI: 10.18452/29345.

Rizou, Vasiliki, Despina Papadopoulou & Artemis Alexiadou. 2025. *Novel forms for the expression of aspect in heritage Greek.*

Romanova, Natalia. 2008. Mechanisms of verbal morphology processing in heritage speakers of Russian. *Heritage Language Journal* 6(1). 105–127. DOI: 10.46538/hlj.6.1.5.

Rothman, Jason. 2009. Understanding the nature and outcomes of early bilingualism: Romance languages as heritage languages. *International Journal of Bilingualism* 13(2). 155–163. DOI: 10.1177/1367006909339814.

Rothman, Jason, Fatih Bayram, Vincent DeLuca, Grazia Di Pisa, Jon Andoni Duñabeitia, Khadij Gharibi, Jiuzhou Hao, Nadine Kolb, Maki Kubota, Tanja Kupisch, Tim Laméris, Alicia Luque, Brechje van Osch, Sergio Miguel Pereira Soares, Yanina Prystauka, Deniz Tat, Aleksandra Tomić, Toms Voits & Stefanie Wulff. 2023. Monolingual comparative normativity in bilingualism research is out of "control": Arguments and alternatives. *Applied Psycholinguistics* 44(3). 316–329. DOI: 10.1017/S0142716422000315.

Sauer, Simon & Anke Lüdeling. 2016. Flexible multi-layer spoken dialogue corpora. *International Journal of Corpus Linguistics* 21(3). 419–438. DOI: 10.1075/ijcl.21.3.06sau.

Schmid, Helmut. 2008. Tokenizing and part-of-speech tagging. In Anke Lüdeling & Merja Kytö (eds.), *Corpus linguistics: An international handbook*, vol. 1, 527–551. Berlin: Walter de Gruyter.

Schmidt, Thomas & Kai Wörner. 2014. EXMARaLDA. In Jacques Durand, Ulrike Gut & Gjert Kristoffersen (eds.), *Handbook on corpus phonology*, 402–419. Oxford: Oxford University Press. DOI: 10.1093/oxfordhb/9780199571932.013.030.

Scontras, Gregory, Zuzanna Fuchs & Maria Polinsky. 2015. Heritage language and linguistic theory. *Frontiers in Psychology* 6. 1545. DOI: 10.3389/fpsyg.2015.01545.

Seaman, P. David. 1972. *Modern Greek and American English in contact.* The Hague/Paris: Mouton.

Slabakova, Roumyana. 2014. The bottleneck of second language acquisition. *Foreign Language Teaching and Research* 46(4). 543–559.

Spyropoulos, Vassilios, Anthi Revithiadou & Giorgos Markopoulos. 2017. *Root strength as (under)specification: Evidence from root allomorphy in Greek.* Talk presented at Strength in Grammar workshop, November 10–11, 2017. Leipzig University.

Stephany, Ursula. 1997. The acquisition of Greek. In Dan I. Slobin (ed.), *The crosslinguistic study of language acquisition*, 183–333. Hillsdale, NJ: Erlbaum.

Swain, Merrill & Sharon Lapkin. 1995. Problems in output and the cognitive processes they generate: A step towards second language learning. *Applied linguistics* 16(3). 371–391.

Tomasello, Michael. 2003. *Constructing a language: A usage-based theory of language acquisition.* Harvard University Press.

Valdés, Guadelupe. 2005. Bilingualism, heritage language learners, and SLA research: Opportunities lost or seized? *The Modern Language Journal* 89(3). 410–426. DOI: 10.1111/j.1540-4781.2005.00314.x.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, Alex Hayes, Lionel Henry, Jim Hester, Max Kuhn, Thomas Lin Pedersen, Evan Miller, Stephan Milton Bache, Kirill Müller, Jeroen Ooms, David Robinson, Dana Paige Seidel, Vitalie Spinu, Kohske Takahashi, Davis Vaughan, Claus Wilke, Kara Woo & Hiroaki Yutani. 2019. Welcome to the tidyverse. *Journal of Open Source Software* 4(43). DOI: 10.21105/joss.01686.

Wiese, Heike. 2020. Language situations: A method for capturing variation within speakers' repertoires. In Yoshiyuki Asahi (ed.), *Methods in dialectology XVI* (Bamberg Studies in English Linguistics 59), 105–117. Frankfurt am Main: Peter Lang.

Wiese, Heike, Artemis Alexiadou, Shanley E. M. Allen, Oliver Bunk, Natalia Gagarina, Katerina Iefremenko, Maria Martynova, Tatiana Pashkova, Vicky Rizou, Christoph Schroeder, Anna Shadrova, Luka Szucsich, Rosemarie Tracy, Wintai Tsehaye, Sabine Zerbian & Yulia Zuban. 2022. Heritage speakers as part of the native language continuum. *Frontiers in Psychology* 12. 5982. DOI: 10.3389/fpsyg.2021.717973.

Wiese, Heike, Artemis Alexiadou, Shanley E. M. Allen, Oliver Bunk, Natalia Gagarina, Kateryna Iefremenko, Esther Jahns, Martin Klotz, Thomas Krause, Annika Labrenz, Anke Lüdeling, Maria Martynova, Katrin Neuhaus, Tatiana Pashkova, Vicky Rizou, Tracy Rosemarie, Christoph Schroeder, Luka Szucsich, Wintai Tsehaye, Sabine Zerbian & Yulia Zuban. 2019. *RUEG Corpus.* Version 0.2.0. Zenodo. DOI: 10.5281/zenodo.3236069.