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Maria Polinsky<sup>1</sup> and Gregory Scontras<sup>2</sup>

<sup>1</sup>University of Maryland, Department of Linguistics and <sup>2</sup>University of California, Irvine, Department of Language Science

## Keynote Article

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**Address for correspondence:** Maria Polinsky, E-mail: [polinsky@umd.edu](mailto:polinsky@umd.edu)

### Abstract

With a growing interest in heritage languages from researchers of bilingualism and linguistic theory, the field of heritage-language studies has begun to build on its empirical foundations, moving toward a deeper understanding of the nature of language competence under unbalanced bilingualism. In furtherance of this trend, the current work synthesizes pertinent empirical observations and theoretical claims about vulnerable and robust areas of heritage language competence into early steps toward a model of heritage-language grammar. We highlight two key triggers for deviation from the relevant baseline: the quantity and quality of the input from which the heritage grammar is acquired, and the economy of online resources when operating in a less dominant language. In response to these triggers, we identify three outcomes of deviation in the heritage grammar: an avoidance of ambiguity, a resistance to irregularity, and a shrinking of structure. While we are still a ways away from a level of understanding that allows us to predict those aspects of heritage grammar that will be robust and those that will deviate from the relevant baselines, our hope is that the current work will spur the continued development of a predictive model of heritage language competence.

## What are heritage languages and who are their speakers?

Heritage languages feature increasingly in discussions of bilingualism, and with good reason: few cases of bilingualism are truly balanced, with both languages equally dominant. Instead, one language often wins out over the other, owing to the shifting attention that arises from shifting sociolinguistic circumstances. This asymmetric bilingualism results in heritage language, the weaker language of a bilingual dyad.<sup>1</sup> Consider the following definition:

A language qualifies as a heritage language if it is a language spoken at home or otherwise readily available to young children, and crucially this language is not a dominant language of the larger (national) society... [A]n individual qualifies as a heritage speaker if and only if he or she has some command of the heritage language acquired naturalistically... although it is equally expected that such competence will differ from that of native monolinguals of comparable age. (Rothman, 2009: 156)

As with all definitions meant to neatly characterize a heterogeneous group of individuals, this one is an idealization, as is the idealized monolingual (e.g., Chomsky, 1965) or the truly balanced bilingual (Grosjean, 2010). Deviations from this idealization are observed, such that there are cases where the roles of the stronger and weaker language may be reversed, as sometimes happens with returnees (Flores, 2017; Kanno, 2000; Potowski, 2018).

Heritage-language studies have been coming to grips with the tension between recurrent similarities across different heritage languages, which indicate the universality of underlying processes, and the effects of situational factors on the same heritage language. While we focus on the similarities in the current paper, we are cognizant of the need to acknowledge the influence of situational factors, especially in cases where the dominant language exerts influence on the heritage grammar. Readers in search of an introduction to the large and growing literature on heritage languages and their speakers would be better served by a number of recent reviews (Benmamoun, Montrul & Polinsky, 2013a, 2013b; Montrul, 2016; Polinsky, 2018b; Scontras, Fuchs & Polinsky, 2015b). The current work sets as its aim a more specific question: what would it take to develop a model of the nature of heritage-language grammars, and how could such a model inform our general understanding of linguistic competence and the development of this competence? Still, some words by way of introduction to the topic of heritage languages are in order.

Heritage speakers are bilinguals, simultaneous or sequential, who were raised in homes where a language other than the dominant language of the broader community was spoken (Valdés, 2000). In cases of simultaneous bilingualism, heritage speakers begin acquiring the less dominant, heritage language concurrently with the dominant, majority language. In cases of sequential bilingualism, heritage speakers first begin acquiring the heritage language.

<sup>1</sup>Here we use “bilingual” as an umbrella term for multilingualism more generally.

In both cases, the dominant language of the broader speech community eventually becomes the dominant language of the heritage speaker, such that they feel most comfortable using that language to communicate.<sup>2</sup> Abilities in the heritage language persist, but the bilingualism is typically heavily imbalanced in favor of the dominant language.<sup>3</sup> As a result, the heritage language differs from the baseline language that served as the input for acquisition. For many researchers interested in heritage languages, the salient fact is that heritage speakers instantiate cases where the typical acquisition trajectory or outcome is not always observed. Put simply, heritage speakers constitute an outcome often assumed to be impossible outside of pathology or trauma: children exposed to a language from birth who nevertheless appear to deviate from the expected native-like mastery in pronounced and principled ways. In other words, heritage languages show what stays and what undergoes change when a language system is disrupted. Predicting what stays and what goes is one of the main challenges faced by researchers who study heritage systems. By revealing the load-bearing aspects of heritage grammars where baseline features are intact, as well as areas of vulnerability, heritage languages are at least as informative to our understanding of grammar as the monolingual idealizations that dominate linguistic theory.

In this brief introduction, we begin by reviewing the terminology used to discuss heritage-speaker outcomes: transfer, attrition, and divergent attainment. We then consider three populations that share characteristics with heritage speakers and their linguistic abilities: L2 learners, child language (L1) learners, and adult language forgetters. Finally, we consider the appropriate baseline against which to compare heritage-speaker grammatical knowledge: the language that heritage speakers receive as input.

### *How and why heritage languages might differ from the baseline*

When it comes to characterizing the differences between heritage language and the monolingual standard of comparison (a topic that we will take up in the “Some empirical observations” section below), there exist multiple possibilities. Perhaps the most obvious culprit is *TRANSFER* from the dominant language, whereby lexical or grammatical features of the dominant language bleed into the heritage-language grammar so that the heritage language begins to resemble the dominant language. Transfer at the level of individual lexical items or, more generally, lexical semantics is rather well-attested. Although conceptually appealing, empirical evidence for structural transfer can sometimes be hard to come by: we must be sure that the feature of interest is active in the dominant-language grammar of the heritage speakers so that it can be present to transfer; as a result, investigations of transfer cannot focus solely on linguistic behavior in the heritage language (for an extended discussion of these methodological issues, see Scontras, Polinsky, Tsai & Mai, 2017b). As an example, consider the loss of English plural marking in English–Japanese bilinguals for whom Japanese is dominant (Duffield, 2018; Polinsky, 2018b, Ch. 2). Obligatory plural marking in noun phrases is absent in Japanese, so this dominant

language could potentially be the source of transfer. However, the same loss of plural marking occurs in heritage English with dominant languages that mark nominal plural on a regular basis (e.g., French), so the role of transfer in this change is doubtful.

Another candidate for the differences between heritage language and the relevant baseline is language *ATTRITION*: it could be that heritage speakers successfully acquired the phenomenon or feature of interest, but then lost some or all of their abilities in the relevant domain. Attrition evidences the central role of maintenance – a use-it-or-lose-it admonition – in our grammatical knowledge; the extent to which first language skills are lost has a direct relationship to the age of onset of bilingualism (Bylund, 2009; Flores, 2010, 2012; Montrul, 2008, 2011, 2016; Pallier, 2007). In studying attrition, there are two tacks to take: 1) longitudinal studies documenting the loss of linguistic abilities in heritage speakers over their early lifetime (e.g., Anderson, 1999; Merino, 1983; Silva-Corvalán, 2003, 2014), or 2) a comparison of the abilities of heritage-speaker children vs. adults (e.g., Montrul, 2016; Polinsky, 2011, 2018a). In the latter case, the reasoning goes as follows: if heritage-speaker adults are shown to perform differently from the relevant baseline, but heritage-speaker children do not, then the deviation in adults is most likely due to attrition over the lifetime.

Having considered transfer, or change induced by language contact, and attrition, or loss caused by lack of language maintenance, there is one last common culprit for the unique properties of heritage language: *DIVERGENT ATTAINMENT*, a situation where the learner acquires a system different from the baseline. Heritage speakers encounter input that is different both qualitatively and quantitatively from the monolingual learner; as a result, they could arrive at a different mental representation of their linguistic knowledge. Crucially, the systems that ultimately get acquired are not unconstrained, as demonstrated by a number of recent case studies (e.g., Russian relative clauses, Polinsky, 2011, to which we return in the “Vulnerable phenomena” section below; Spanish subject-verb inversion, Cuza, 2016; Cuza & Pérez-Tattam, 2016; Spanish left periphery, Cuza & Frank, 2015; Spanish number and gender agreement, Scontras, Polinsky & Fuchs, 2018; Russian ellipsis, Polinsky, 2016, 2018b, discussed under “Vulnerable phenomena” below). Moreover, in practice, it is often difficult to separate divergent attainment from abstract transfer. For example, if the dominant language does not have negative concord, whereas the baseline does, is the lack of negative concord in the heritage language a result of transfer or an instance of divergent attainment?

The difficulty lies in predicting when these cases will obtain (transfer, attrition, and divergent attainment), and for which linguistic domain and which language dyads. For each case, there is insight to be gained from populations beyond heritage speakers. In particular, as we examine transfer, we stand to learn from a comparison between heritage speakers and L2 learners. Divergent attainment compels us to compare heritage speakers with child learners (who go through a number of stages before they reach adult-like grammar). Finally, nowhere is attrition as visible as in the adult forgetter population (Köpke, Schmid, Keijzer & Dostert, 2007; Levine, 2000; Schmid, 2011; Schmid, Köpke, Keijzer & Weilemar, 2004). To that end, we briefly compare and contrast heritage speakers with these three populations.

### *Comparison populations*

We begin with child language learners. It does not take a trained linguist to recognize that young children often use language

<sup>2</sup>The age of onset of bilingualism in the dominant language does play a role in heritage-language grammar: sequential bilinguals are better at maintaining certain aspects of their first language, although the differences are surprisingly fewer than one might expect. For discussion, see Montrul (2016) and references therein.

<sup>3</sup>This imbalance shifts over the lifespan depending on ecological conditions such as the specific language use and environment, migration, or motivation. While we do not question such shifts in language balance, our main concern is the general nature of this imbalance in heritage speakers.

differently from adults: they might struggle with certain sounds, sentence structures, or pragmatic inferences. Curiously enough, many of the areas in which child language learners struggle are also areas in which heritage speakers distance themselves from the relevant baseline. Indeed, it is not uncommon to see the similarities between heritage speakers and child language (L1) learners described as ones of frozen development, such that the linguistic abilities of heritage speakers represent an intermediate stage of linguistic development that got locked in, as it were, when the dominant language began to win out over the heritage language. Even the field's terminology reflects this impression: what we described above as "divergent attainment" has at times been described by some as "incomplete acquisition" – a flawed but not uncommon label.

Despite the impression of striking similarities between child learners and adult heritage speakers, the empirical picture is of course more complicated – often in cases involving language comprehension. There are indeed some areas where the abilities of adult heritage speakers are similar to those of child learners, with both groups differing from the adult baseline. However, in some domains the child learner performs more like the baseline, differently from the adult heritage speakers. And finally, there are some domains where heritage-speaker adults show target-like comprehension, but child learners do not. Some examples are given below.

*Child learner is target-like, adult heritage speaker is not:*

Relative clause interpretation (Polinsky, 2011; "Vulnerable phenomena" section below)

Mandarin classifiers (Polinsky, 2018b)

*Child learner and adult heritage speaker are alike, do not match target:*

Quantifier spreading with 'every' (Sekerina and Saueremann, 2015)

Overmarking in morphology ("Vulnerable phenomena" section below)

*Adult heritage speaker is target-like, child learner is not:*

Understanding of inferential readings (Arslan, Bastiaanse & Felser, 2015)

That we find a mix of outcomes when comparing heritage speakers and child language learners should come as no surprise. Despite superficial similarities, there are also obvious differences between the two populations. Perhaps most obvious is the fact that adult heritage speakers depart from child learners in their general cognitive abilities. In contrast to the mature cognition of heritage-speaker adults, child language learners are still developing their cognitive abilities, in addition to acquiring their first language. Thus, we might expect those aspects of language that rely on sophisticated cognitive abilities – pragmatic reasoning, memory-intensive complex syntax – to give heritage speakers an advantage, assuming they have acquired the relevant grammatical knowledge in the first place.

Just as heritage speakers tend to struggle with aspects of grammar that prove problematic for child language learners, so too do heritage speakers struggle with aspects of grammar that are difficult to master for L2 learners (Sanz & Torres, 2018). Although it is less common to identify heritage speakers with L2 speakers, the tendency does exist. Quite a few parallels between heritage and L2 speakers appear in areas where language transfer is generally the strongest: word order, the use of overt functional elements, particular lexical items (with respect to which both groups use a number of translations and calques from the dominant language), or the absence of structures and forms that are very infrequent. Of

the latter, consider for example the selection of the Spanish subjunctive in so-called "variable contexts", where the indicative and the subjunctive co-vary, which is difficult for L1 learners, heritage speakers, and L2 learners. In particular, Spanish subjunctive is required with deontic predicates, such as desideratives and directives; these contexts are acquired fairly early both in monolingual and bilingual populations (2;5–3;0; see Perez-Cortes, 2016: 6, for discussion and further references). It is likely that the lack of options facilitates target-like acquisition. At the same time, there are a number of contexts where the indicative and the subjunctive are both possible, and the contrast between the two may be quite subtle, relying on pragmatic factors. Such contexts, characterized as variable, include negation, complements of epistemological predicates, complements of communication verbs, and relative clauses, as in the following example (Perez-Cortes, 2016: 27–28).<sup>4</sup>

- (1) a. Busco un diccionario que tenga sinónimos.  
look.1SG.PRS DET dictionary that has.3SG.SUBJ synonyms  
b. Busco un diccionario que tiene sinónimos.  
look.1SG.PRS DET dictionary that has.3SG.IND synonyms  
'I am looking for a dictionary with synonyms.'

Target-like acquisition of the indicative/subjunctive contrast develops only around age 7;0 in monolinguals, and may not arise in heritage language at all (Lustres, 2018; Perez-Cortes, 2016).

With some phenomena, deviation from the baseline may be shared by heritage speakers, child language learners, and L2 learners. However, the cause of the deviation might not be the same across the three groups. Take for example the difficulty observed in interpreting quantifier structures. The phenomenon, known as "quantifier spreading" or "q-spreading", arises in scenarios with a mismatch in the number of relevant objects. Suppose there are three girls and four elephants and each of the three girls is riding a different elephant; one of the elephants does not have a girl riding on it, but this fact is irrelevant to the true claim that *every girl is riding an elephant*. However, children, L2 learners, and heritage speakers will sometimes reject the claim and give as their justification the elephant without a girl on its back; baseline adults accept the claim (see Brooks & Braine, 1996; Crain, Thornton, Boster, Conway, Lillo-Martin & Woodams, 1996; Sekerina & Saueremann, 2017, for child learners; Carpini, 2003; Berent, Kelly & Schueler-Choukairi, 2009, for adult L2 learners, and Sekerina & Saueremann, 2015, for English-dominant heritage speakers of Russian). While in children it might be the case that knowledge of quantification is still developing in tandem with executive function (i.e., the ability to correctly attend to relevant elements of the task), in adults – both L2 learners and heritage speakers – this explanation appears untenable. Rather, in adults these errors are more likely to arise from insufficient online resources deployed in the processing and calculation of quantifier relations.

Finally, the recurring role of attrition in characterizing differences between heritage language and the relevant baseline might lead some to summarize heritage speakers as merely language forgetters, no different from native-speaker adults who

<sup>4</sup>Abbreviations: ACC–accusative; CLF–classifier; COMP–complementizer; COP–copula; DAT–dative; F–feminine; GEN–genitive; IND–indicative; M–masculine; NOM–nominative; NPST–non-past; PERF–perfective; PL–plural; PRS–present; PST–past; SG–singular; SUBJ–subjunctive; TOP–topic.

enter a different speech community later in life and lose proficiency in their native language. While language forgetters encompass a broad and heterogeneous mix of individuals and situations (for discussion, see Köpke et al., 2007; Schmid, 2011; Schmid et al., 2004; Seliger & Vago, 1991), there is an important distinction to be drawn between heritage speakers and adult language forgetters: the former are (asymmetric) bilinguals who (at least partially) acquired two languages in childhood, whereas the latter are adults undergoing attrition of their first language, which they acquired completely, after having acquired a second language later in life. Care should be taken to distinguish between proper attrition, which amounts to loss of features, structures, or individual lexical items, and language change under contact; the latter is very common in the language of first-generation immigrants, but does not always amount to loss (cf., e.g., work on first-generation Spanish in the U.S. by Montrul & Sánchez-Walker, 2013). Currently, the field lacks data on the comparison between heritage speakers and first-language forgetters, a comparison that is complicated by factors like cognitive aging and deficits in memory. Still, it seems likely that heritage speakers and adult language forgetters might exist along a continuum of language contact scenarios leading to first-language weakening. Getting clearer on the boundaries and characteristics of first-language attrition stands to inform the role of memory and maintenance in the development of heritage languages.

#### A question of baselines

As the discussion above highlights, heritage languages are often studied because of their differences from so-called “native” grammars, but what constitutes the appropriate baseline for comparison? Establishing the appropriate baseline is crucial for meaningful comparisons, which is why this discussion is increasingly featured in studies of heritage language. Recent work (e.g., Benmamoun et al., 2013a, 2013b; Madsen, 2018; Polinsky, 2018b) emphasizes the need to compare heritage languages to the language that heritage speakers receive as input. A note of caution is in order: just as the notion of a monolingual speaker is conceived as an idealization, so too are the speakers whose language constitutes input for heritage-language acquirers. The difference is that in many monolingual situations, the idealization scopes over a larger population of speakers whose community is more settled and possibly more stable. Heritage speakers receive input from a smaller group of speakers (in the extreme case, just their family members or caretakers), and the community they are exposed to is more in flux and less homogeneous than in the homeland.

Typically, the baseline language is a diasporic variety spoken by first-generation immigrants in their respective communities – as compared to the language spoken in the homeland. But not all heritage languages have a corresponding homeland. Some languages, typically endangered minority languages, do not have a geographically-separate homeland, and their speakers can be characterized as “immigrants in their own country” (Polinsky, 2018b: 15–17). The endangered-language minority speakers are often unbalanced bilinguals, and their minority language may have properties of a heritage language. Crucially, in all of these cases, the input language is likely to deviate already from the standard variety of the homeland (or the lost monolingual variety), so changes present in the heritage language might already have been present in the input from which the heritage language was learned. If distinctive properties of the heritage language are

already in the input, then it is not the heritage language that needs explaining. In this case, heritage speakers will have faithfully acquired (relevant aspects of) their input language, so the burden of explanation shifts from the heritage language to the language of the parents: what aspects of the linguistic circumstances of the parents led to these changes in their language?

Consider the loss of *pro*-drop under language contact. Heritage speakers often have trouble with missing material, *pro*-drop in particular. Looking at the heritage grammar, it may be tempting to hold heritage speakers responsible for this outcome. However, a decrease in *pro*-drop is ubiquitous in cases of language contact, including dyads where both languages allow missing subjects (Italian–Spanish bilinguals, see Sorace & Filiaci, 2006; Sorace, Serratrice, Filiaci & Baldo, 2009; Tsimpli, Sorace, Heycock & Filiaci, 2004). This means that the decrease in *pro*-drop starts well before heritage speakers start deviating from the homeland variety. In other words, lower rates of *pro*-drop were already present in the input to heritage-language learners, so they are not necessarily responsible for the departure from the “gold standard”.<sup>5</sup>

As the discussion above illustrates, studying heritage languages requires studying much more than just the language spoken by heritage speakers. To understand the novel properties of heritage-language grammar, we must get a handle on its relation to the input language, together with the relevant differences between the input language and the language of the homeland. With the advent of large-scale web-based experiment platforms like Amazon.com’s Mechanical Turk, both heritage languages and the relevant input have been made easier to access, especially when investigating heritage languages in the context of American English. Mechanical Turk has a large pool of U.S.-based participants, many of them with diverse linguistic backgrounds. With the appropriate screening techniques (many heritage speakers are not aware that they are heritage speakers), it is now possible to access large samples of English-dominant heritage speakers and speakers of the immigrant baseline (see Scontras et al., 2018, for this method applied to heritage Spanish).

There also exist a number of corpora of immigrant languages, which could provide insight into the relevant heritage-language baselines. For example, the Heritage Language Documentation Corpus systematically targets cross-generational variation in eight different languages ([http://projects.chass.utoronto.ca/ngn/HLVC/0\\_0\\_home.php](http://projects.chass.utoronto.ca/ngn/HLVC/0_0_home.php)). The New England Corpus of Heritage and Second Language Speakers targets populations of Spanish and Portuguese speakers living in New England (<http://digital.humanities.umass.edu/nechsls/>). There are also corpora of Scandinavian languages in the diaspora (Johannessen, 2015; Watson, 1996), as well as several bilingual corpora hosted by the Hamburg Centre for Language Corpora (<https://corpora.uni-hamburg.de/hzsk/en/repository-search>). Still, more data are needed, especially those targeting recent immigrants – the most common source of input for heritage-language learners.

#### Goals of this paper

With a better understanding of what constitutes a heritage language and how its speakers come to be, we turn now to the aim of the current paper: a preliminary model of the nature of heritage-language grammar. Such a model should find its foundations in the empirical generalizations of heritage-language studies; in the “Some empirical observations” section below, we survey

<sup>5</sup>We return to *pro*-drop in the “Vulnerable phenomena” section below.

some of those generalizations, organizing vulnerable phenomena around the common problems they pose for heritage speakers. A successful model should offer insight into the factors that trigger divergence from the baseline, as well as how the deviations observed address the issues heritage speakers face; the “Toward a model” section takes some initial steps toward this model, presenting and analyzing common outcomes under change. A useful model should inform our understanding, not only of heritage-language grammars, but also of linguistic competence and its development more broadly. In “Concluding remarks”, we offer a discussion of how information-sharing between heritage-language study and theoretical linguistics can proceed in both directions.

### Some empirical observations

The first step in modeling heritage-language grammar is an overview of the empirical terrain. To that end, this section offers a high-level summary of what we know about heritage language in the domains of phonetics/phonology, morphology/morphosyntax, syntax, semantics and pragmatics. Rather than running through a list of observations, we organize the findings according to resilient vs. vulnerable domains of language, a distinction we introduced in the “What are heritage languages and who are their speakers?” section above. For a more comprehensive summary, readers should consult Montrul (2016) and Polinsky (2018b).

#### Phenomena that appear to be resilient

Most of heritage research looks at areas of vulnerability and deviation from the baseline. Less noteworthy are those areas where heritage speakers perform well. As a result, the discussion that follows is limited to observations available from specific case studies, many of which set out to find deviations but were surprised by the absence thereof. Without much-needed systematic exploration, most findings on resilient domains are accidental discoveries, which means that the empirical picture is likely fragmented. Still, we do know some things about areas of resilience where heritage language aligns more closely with the relevant baseline. What follows is a summary of that knowledge.

Many aspects of phonetic and phonological competence appear robust in heritage languages. This robustness should come as no surprise, given that this knowledge is often acquired quite early. Heritage speakers are not perfect in their knowledge of sound systems; they are easily identified by monolinguals on the basis of their slight “heritage accent” (Polinsky, 2018b: 116–123). Even as children, heritage learners do not always reach the monolingual baseline, often lacking knowledge of those features that are infrequent in the input or not sufficiently distinct, as shown by Kan and Schmid (2019) for child heritage Cantonese. Nevertheless, heritage speakers’ phonetic discrimination and awareness of phonological categories remain superior to those of even more advanced L2 learners. In other words, heritage speakers consistently outperform L2 learners, demonstrating the clear benefits of early exposure to ultimate attainment. These benefits seem to be tied most closely to segmental elements of sound systems, whereas prosodic features appear to be among the more vulnerable domains.<sup>6</sup>

<sup>6</sup>Evidence for prosodic deficits comes primarily from heritage speakers’ production. As of yet, little is known about their abilities in the comprehension of prosody (but see Laleko & Polinsky, 2017; Sekerina & Trueswell, 2011; Yang, 2015; and the short summary in Polinsky, 2018b: 158–162).

In the lexicon, although heritage speakers will have many gaps – as one would expect given their reduced input and reduced literacy – they are quite confident about and flexible with the vocabulary they do control. This level of comfort leads them to address their lexical gaps in a creative manner, introducing new lexical structures as long as these structures are transparent and compositional (e.g., *turn off the cigar* when meaning ‘extinguish’ in heritage English; see Polinsky, 2018b: 61).

In morphosyntax, heritage speakers do not show obvious production or comprehension deficits with respect to tense or determiners, even when the dominant language has a markedly different temporal or determiner system. For instance, Hebrew-dominant speakers of heritage English do not make errors in the production or comprehension of English determiners despite the differences in the determiner systems of the two languages (Polinsky, 2018b; Viswanath, 2013). In the verbal domain, the headline is often that heritage speakers struggle with aspectual morphology; by comparison, difficulty with tense is seldom attested (see Montrul, 2016; Silva-Corvalán, 1994, and further references therein on aspect in heritage Spanish; Laleko, 2010, on aspect in heritage Russian; Jia & Bayley, 2008, on aspect in heritage Mandarin; Albirini, Benmamoun & Saadah, 2011, on aspect in heritage Arabic; Sherkina-Lieber, 2011, 2015, on tense vs. aspect in heritage Inuittitut). What do these phenomena have in common? Both tense and determiners establish direct connections via the conceptual system to the external world. To arrive at any interpretation, however shallow, a speaker will need to know what is involved and when the relevant event took place. This need to interpret determiners and tense as providing direct reference to entities and events in the world might underlie the resilience of the relevant systems. In addition to (and perhaps as a result of) their interpretive prominence, these elements are also structurally prominent. Both tense and determiners serve to delimit the upper bound of the relevant structures in which they participate, be that the clause for tense or the noun phrase for determiners; they also enjoy similar interpretive possibilities (cf. Partee, 1973). That structural prominence, related to their inherently indexical characteristics, could in turn make these elements more salient to a learner and therefore robust in bilingual dyads.

In syntax, certain phenomena appear to be more resilient in bilingual grammars, although speakers might not consistently deploy such knowledge in production. For example, Putnam and Salmons (2013) investigated the German passive as used by heritage speakers in Kansas. While the heritage speakers did not produce passive constructions spontaneously, experimenters were able to elicit some passives in a direct translation task. Interestingly, in comprehension, these speakers accepted the relevant constructions, leading the authors to conclude that knowledge of the passive is present in the heritage grammar (Putnam & Salmons, 2013: 239). This indicates that heritage speakers still maintain the abstract knowledge of passive-formation rules, and possibly A-movement more generally (i.e., movement to positions typically associated with arguments). Heritage speakers also maintain abstract knowledge of A-bar phenomena (i.e., the rest of movement), particularly *wh*-question formation and relativization (although there are clear limitations of this knowledge, as we discuss below).

At the syntax-semantics interface, the field knows relatively little. It has been observed that heritage speakers generally follow binding principles without much deviation from the baseline, although their deployment of binding principles depends to a large degree on the structural and linear distance between the

binder and the anaphor; the greater such a distance, the less target-like their binding (see Polinsky, 2018b: 270–273, for a review of the relevant literature, where most of the work has focused on heritage Korean and heritage Russian; see also “The Distance Problem” section below). This sensitivity to distance has to do with the general vulnerability of long-distance dependencies in heritage grammars, an issue we turn to in the next section.

### Vulnerable phenomena

Rather than attempting to review the vast literature on vulnerable domains in heritage-language grammar, here we structure our discussion around four areas: morphology, relationships at a distance, the interpretation of silence, and ambiguity. For each area, we present a sample of representative case studies.

#### The Morphology Problem: Introduction

Morphology is among the better-described aspects of heritage grammar, possibly for several reasons. First, morphological deficits are easy to notice, and since a great deal of research on heritage languages focuses on what heritage speakers fail to do (rather than do well), this is a prime attraction. In addition, a large body of work documenting heritage languages relies on English-dominant bilinguals. English, with its relatively modest morphology, may be a factor in the loss of overt morphology in heritage languages. Finally – and probably most importantly – a significant component of morphology serves to encode dependency relations, where the features or position of one constituent determine the shape of another constituent. Such relations, established at a distance, are difficult for heritage speakers; we will return to this more general challenge in “The Distance Problem” section below. Both case and agreement encode a relationship between two constituents. These operations are uniformly hard for heritage speakers, although the degree of difficulty varies depending on their proficiency level and the distance between the two constituents. Here we briefly discuss differences between baseline and heritage speakers in the comprehension of agreement, and then turn to another common phenomenon in heritage morphology: overmarking.

#### The Morphology Problem: Spanish agreement

Heritage speakers struggle with agreement morphology, diverging from baseline speakers in both production and comprehension (for an overview, see Benmamoun et al., 2013a, 2013b; Polinsky, 2018b; Scontras et al., 2018). Scontras et al. (2018) investigated agreement in the nominal domain, looking at the number and gender agreement system in the heritage Spanish of English-dominant speakers. The authors were interested in whether any observed differences in behavior (e.g., the use of agreement morphology) were symptomatic of deeper, structural differences between the heritage grammar and the baseline. To appreciate their findings, a brief detour through the morphosyntax of agreement is in order.

Studies of feature geometry aim to determine the structural organization and hierarchical relationships in agreement systems (Harley & Ritter, 2002; Ritter, 1993). When it comes to number and gender, there are two options for their syntactic representation. The first assumes that number and gender features are bundled together (Carstens, 2000; Ritter, 1993), hosted on the head of a single syntactic projection. The other option splits number and gender features such that they get projected

independently (Antón-Méndez, Nicol & Garrett, 2002; Carminati, 2005; Picallo, 1991). Crucially, if number and gender features are bundled together, we expect their valuation to happen as a single process (see Antón-Méndez et al., 2002, for discussion); if the features are split, number and gender agreement should happen independently of each other.

Fuchs, Polinsky and Scontras (2015) used an agreement-attraction paradigm to diagnose the Spanish agreement baseline as a split system wherein number and gender features are projected independently and their valuation involves two separate processes. Scontras et al. (2018) used the same methodology with English-dominant heritage speakers of Spanish, finding that heritage Spanish bundles number and gender features together, treating their valuation as a single process. Behaviorally, baseline speakers treat agreement attraction in two features (i.e., number and gender; (2b)) separately from attraction in only one feature (i.e., number; (2a)), rating the former significantly less acceptable than the latter. Heritage speakers rate the two sorts of attraction the same, suggesting that number and gender agreement are a single process in the heritage grammar.

- (2) a. \*El niño considera la noticia en  
 the.M.SG boy consider.PRS.3SG the.F.SG news.item.F.SG in  
 las revistas terriblemente aburridas.  
 the.F.PL magazine.F.PL terribly boring.F.PL
- b. \*El niño considera la noticia en  
 the.M.SG boy consider.PRS.3SG the.F.SG news.item.F.SG in  
 los periódicos terriblemente aburridos  
 the.M.PL magazine.M.PL terribly boring.M.PL
- Intended: ‘The boy considers the news item in the magazines to be terribly boring.’

Moreover, the heritage grammar appears to be losing sensitivity to specific agreement features, such that the singular number feature is beginning to serve as a default, or unspecified feature value. Thus, the heritage grammar has slimmed down both its feature structure (bundling number and gender features together) and its feature inventory (losing sensitivity to singular number).

#### The Morphology Problem: Overmarking

In cases where a bilingual speaker does not perceive the presence of a particular morphological element, they may want to oversupply it, which results in overmarking. Manifestations of this trend are common in morphology. For example, heritage speakers of English consistently overmark past tense forms in production, which results in creations such as *dresseded* or *sorteded* (Duffield, 2018: 29–30; Polinsky, 2018b, Ch. 2; Viswanath, 2013). As a side effect, we also find that irregular verbs get the regular past tense marking, either attached to the root (*buyed*, *sweeped*, *bringed*) or to the irregular past tense form itself (*wented*); thus, overmarking goes hand in hand with overregularization. In another example, heritage speakers of Russian with different dominant languages (English, German, or Hebrew) overmark genitive plural. In the baseline, there are three allomorphs of genitive plural (including the null suffix) whose distribution is quite complex and is conditioned by the declension type. In heritage Russian, the null ending disappears, which is an expected outcome of the loss of declensional contrasts, and the overt marking is uniformly replaced with the suffix *-ov* (Polinsky, 2018b: 177–179). This suffix appears to be among the more salient suffixes in heritage Russian and expands beyond



symptoms of this broader problem, one which involves the overuse of overt material to avoid silence, and the other a reanalysis of the interpretive possibilities of silent material.

#### *The Silent Problem: Pro-drop*

The Silent Problem is well-instantiated in the domain of null pronouns, whose attrition in heritage and near-native grammars has been one of the most popular topics in research on bilingualism (Ivanova-Sullivan, 2014; Montrul, 2004; Pérez-Leroux & Glass, 1999; Quesada, 2015; Rothman, 2007b, 2009; Serratrice, Sorace & Paoli, 2004; Sorace, 2011; Sorace & Filiaci, 2006; Tsimpli, 2007, 2014; Tsimpli, Sorace, Heycock, Filiaci & Bouba, 2003; White, 1985, among many others); see Keating, Jegerski and VanPatten (2016) and Keating, VanPatten and Jegerski (2011) for helpful summaries. Bilinguals of all stripes show an overuse of overt pronouns in contexts that normally call for a null form (Lipski, 1996; Montrul, 2002, 2008, 2016; Otheguy, Zentella & Livert, 2007; Serratrice, 2007; Serratrice et al., 2004; Silva-Corvalán, 1994; Sorace et al., 2009; Sorace & Filiaci, 2006; Tsimpli et al., 2003, 2004, among others). As we mentioned in the section “A question of baselines” above, the decrease in use of null pronouns begins already in the language of first-generation immigrants, whose language serves as input for heritage-language learners (Dubinina & Polinsky, 2013; Montrul, 2016; Otheguy et al., 2007). These incipient changes in the input get amplified by heritage speakers, who further decrease their use of null pronouns. The oversuppliance of overt pronouns is even observed in bilingual environments where both the dominant and baseline language allow null arguments. Spanish–Catalan presents such a case: de Prada Pérez (2009) examined the contact between these two languages in Minorca and found a high rate of overt subjects among Spanish-dominant bilinguals and Catalan-dominant bilinguals, suggesting that the increased use of overt pronouns is a side-effect of language contact rather than just transfer from a language that lacks *pro-drop*.

Not only does the Silent Problem manifest itself in production, it is also found in the comprehension of null elements. In general terms, this amounts to a more limited range of options in interpreting a particular null element, for example, in identifying the antecedent of a null pronoun. Interpretive biases with null and overt pronouns have been explored extensively, in both theoretical and psycholinguistic literature (see Keating et al., 2016, for an overview), although most of the research so far has been limited to null-subject languages such as Spanish or Italian.<sup>8</sup> The overall conclusion is that monolinguals preferentially link null pronouns to antecedents in the subject position, and overt pronouns to antecedents in lower structural positions (Carminati, 2002, 2005; Keating et al., 2011, 2016). However, this null-subject-antecedent trend in the baseline is only a preference, observed in 50 to 75 percent of cases (Carminati, 2005; Keating et al., 2016, and further references therein). For heritage speakers, this gradience has hardened. Researchers working on Spanish note that heritage speakers tend to interpret all pronouns, null or overt, as co-referential with the subject antecedent. This is where the Silent Problem and the Distance Problem intersect:

<sup>8</sup>The syntactic status and interpretative possibilities of null objects in languages such as Korean or Mandarin Chinese are still awaiting investigation. Preliminary evidence suggests that these null elements instantiate a different category/type than null subjects, but neither the range of data nor their theoretical account are yet definitive.

heritage speakers need to interpret a silent or underspecified argument (null or overt pronoun, respectively), and, in doing so, aim for the subject (i.e., the highest structural position).

#### *The Silent Problem: Russian ellipsis*

Another instantiation of the Silent Problem can be found in the reanalysis of verb-phrase ellipsis (VPE) in heritage Russian. Russian has a particular type of VPE, verb-stranding verb-phrase ellipsis, where all the contents of a verb phrase – with the exception of the verb – go unpronounced, as in (6).

- (6) A: Ty pokazal gostjam ix komnatu?  
 2SG showed.M guests.DAT their room.ACC  
 ‘Did you show the guests their room?’  
 B: Konečno pokazal [gostjam—ix—komnatu]!  
 of course showed.M guests.DAT their room.ACC  
 ‘Of course I did!’ (lit.: showed (the guests their room))

In those contexts where the ellipsis site includes a possessive pronoun, the structure becomes ambiguous, allowing for both a strict and sloppy reading of the possessive expression, as in (7).<sup>9</sup>

- (7) Ty pokazal gostjam ix komnatu, a Petja sosedjam  
 2SG showed.M guests.DAT their room.ACC but Peter neighbors.DAT  
 ne pokazal [ix komnatu].  
 not showed.M their room.ACC  
 ‘You showed their room to the guests, but Peter did not show their room to the neighbors.’

Under the sloppy reading, the guests and the neighbors see two different rooms, one designated for the guests, and the other for the neighbors. Under the strict reading, everybody gets shown the same room, the one belonging to the guests. Whenever such ambiguity is present – in VPE in general and verb-stranding VPE in particular – language users favor the sloppy reading. This tendency has been demonstrated for VPE in English and Dutch (Koorneef, Avrutin, Wijnen & Reuland, 2011), as well as in Russian (Polinsky, 2016, 2018b). In order to construct the sloppy interpretation, the parser needs to scan just the clause that contains the ellipsis site; upon finding the local antecedent, the parser constructs a bound-variable dependency. Given that different clauses involve different antecedents, what results is the sloppy reading. By contrast, the strict reading is based on co-reference: the parser must maintain the unique referent from the higher clause in memory so that it can be integrated at the ellipsis site in the lower clause. Thus, memory pressures favor the sloppy reading, which stands to explain its prevalence in baseline speakers.

Curiously, heritage speakers exhibit a different tendency. Despite memory pressures and the convergent preference for the sloppy reading in the baseline and in their dominant language, English-dominant heritage speakers of Russian strongly prefer the strict reading (Polinsky, 2016, 2018b). This preference leads heritage speakers to interpret (7) as meaning that both the guests and the neighbors saw the guests’ room. But why would heritage speakers deviate from the baseline in a way that eschews memory considerations? This puzzle disappears once

<sup>9</sup>In this example, the dative object ‘neighbors’ undergoes scrambling to a preverbal position prior to ellipsis.

we recognize that heritage speakers have fundamentally reanalyzed the underlying structure of these sentences.

Analyses of verb-stranding VPE involve moving the verb to a higher position before eliding the VP – hence the “verb stranding”. If this position is unavailable as a landing site, verb-stranding VPE is no longer an option. In Russian, the landing site for verb stranding is often assumed to be the projection hosting verbal aspect (Kallestinova, 2007). However, as we mentioned above, aspect is a true bane of the heritage speaker’s existence. So, verb-stranding VPE might not be a viable option for speakers of heritage Russian when it comes to analyzing sentences like (7). Heritage speakers would then be forced to reanalyze sentences like (7) using a different strategy: object drop.

It is not surprising that these two constructions, verb-stranding VPE and object drop, would get confused in the heritage grammar, given that they often appear identical on the surface (Goldberg, 2005; Gribova, 2013). However, rather than eliding the verb-free VP, with object drop speakers elide the verbal arguments directly. Crucially, this sort of argument drop is known to correlate with strict readings (e.g., Jackendoff, 1971; Ko & Seo, 2012; Saito, Lin & Murasugi, 2008; Watanabe, 2010). Thus, heritage speakers’ defective morphology may have forced them into a structural analysis different from the baseline, one that prioritizes a different interpretation of the silent material.<sup>10</sup>

### The Ambiguity Problem: Introduction

Similar to the interpretation of silence, where the surface form underspecifies the intended interpretation, another area known to suffer in heritage grammars concerns phenomena involving ambiguity. Successfully navigating ambiguity is a hallmark of baseline competence, yet heritage speakers struggle with one-to-many mappings between form and meaning. Here we consider two case studies concerning the effects of bilingualism on ambiguity: first, scope-taking, and second, topic-marking.

### The Ambiguity Problem: Chinese scope

In their investigation of quantifier scope ambiguities in doubly-quantified sentences, Scontras et al. (2017b) showed that English-dominant heritage speakers of Mandarin lack scope ambiguities in their Mandarin grammar, aligning with the scope-freezing monolingual baseline.<sup>11</sup> Whereas baseline English speakers allow both surface and inverse interpretations of doubly-quantified sentences as in (8), baseline and heritage Mandarin speakers allow only the surface interpretation for the Mandarin equivalent in (9).

- (8) A shark attacked every pirate.
- SURFACE SCOPE ( $\exists > \forall$ ):  
There was a single shark that attacked multiple pirates.
  - INVERSE SCOPE ( $\forall > \exists$ ):  
For each pirate, there was a (different) shark that attacked him.

<sup>10</sup>The reanalysis presented here is based on just one language. Meanwhile, verb-stranding VPE has been documented in quite a number of languages other than Russian (Goldberg, 2005; Santos, 2009), so it would be fruitful to examine its fate in other heritage languages. Santos (2009) documents the acquisition of VPE in European Portuguese, which makes her data a valuable point of comparison with patterns that could be observed in heritage European Portuguese.

<sup>11</sup>These claims are limited to simple unembedded transitive clauses. The status of inverse scope in embedded structures and passives continues to be debated (cf. Aoun & Li, 1989; Lin, 2013).

- (9) You yi-tiao shayu gongji-le mei-yi-ge haidao.  
exist one-CLF shark attack-PERF every-one-CLF pirate  
‘A/one shark attacked every pirate.’

Importantly, the heritage speakers also lack scope ambiguities in their dominant language, English, a marked departure from the ambiguity-allowing baseline. Scontras et al. interpreted these findings as evidence for the idea that in situations of language contact, speakers lose the ability to successfully generate and resolve ambiguities. In other words, heritage speakers prefer grammars with one-to-one mappings from surface structures to interpretations.

In further support of this hypothesis, Scontras et al. presented early results from a handful of Japanese-dominant heritage speakers of English who also lack inverse scope in English – another case where languages under contact lose ambiguity. Ronai (2018) followed up on this finding by more systematically exploring scope ambiguities in Hungarian-dominant heritage speakers of English. Hungarian, like Mandarin, does not allow inverse scope in doubly-quantified sentences. Also like Mandarin, English-dominant heritage speakers of Hungarian pattern with the baseline in disallowing inverse scope in Hungarian. Crucially, in the English of the heritage English speakers, inverse scope is also disallowed. Thus, there appears to be mounting evidence supporting the simplification of the grammar of scope in heritage speakers, and, in particular, the elimination of ambiguity even when the baseline grammar makes it available.

### The Ambiguity Problem: Japanese topics

The Japanese topic-marker *-wa* has long puzzled researchers working on syntax, semantics, and information structure (see Heycock, 2008, for an overview). Unsurprisingly, *-wa* also puzzles child language learners and heritage speakers. Simplifying things quite a bit, *-wa* identifies two classes of topics: CONTRASTIVE and THEMATIC (Kuno, 1973; Kuroda, 1970). Contrastive topics are typically realized with prosodic prominence (Büring, 2003; Jackendoff, 1972); they relate the theme to its alternatives in discourse, implying the negation of at least one of those alternatives (Büring, 2003; Tomioka, 2010; Vermeulen, 2011). Thematic topics likewise identify the theme of the utterance, but unlike the specific contribution of contrastive topics, they enjoy a much more varied range of uses – more ambiguity, as it were. Thematic topics may be either GENERIC, referring to a class of entities not explicitly linked to prior discourse, or ANAPHORIC, referring to entities previously mentioned in the discourse; based on the type of prior mention, even further divisions are made within the class of anaphoric topics. The following examples illustrate the different types of topic introduced here. For ease of exposition, in each example we start with the relevant context presented in English.<sup>12</sup>

- (10) *Contrastive topic*
- Context: A family moved into the apartment next to mine. They have a 10-year-old girl and a 6-year-old boy. The girl usually stays inside and rarely comes out, and I have never heard her talk.
  - Otoko-no ko-wa totemo genki-da.  
man-GEN child-TOP very healthy-COP.NPST  
‘THE BOY is very active.’

<sup>12</sup>We are grateful to Shin Fukuda (p.c.) for help constructing these examples.

(11) *Generic topic*

a. Context: A family moved into the apartment next to mine. They have two boys, a 10 year old and a 6 year old. They are always running around the apartment complex, doing all sorts of things. Whenever I hear them chasing each other outside of the apartment, I say to myself:

b. Otoko-no ko-wa totemo genki-da.  
man-GEN child-TOP very healthy-COP.NPST  
'Boys are very active.'

(12) *Anaphoric topic*

a. Context: A family moved into the apartment next to mine. They have two children.

b. Otoko-no ko-wa totemo genki-da.  
man-GEN child-TOP very healthy-COP.NPST  
'The(ir) boy is very active.'

Laleko and Polinsky (2013, 2016, 2017) examined the production and comprehension of different types of *wa*-topics in baseline and heritage Japanese. The crucial finding is that heritage speakers are native-like in their production and comprehension of the contrastive topic, but perform essentially at chance when it comes to identifying the proper role of thematic topics. A similar finding has been reported for the Korean topic marker *-nun*. It seems, then, that heritage speakers struggle to develop and/or maintain baseline knowledge of the many nuanced interpretations of the thematic topics.

**Toward a model**

Having briefly surveyed those phenomena where heritage speakers align with the baseline, together with phenomena where they do not, the question now shifts to what motivates the empirical picture: what triggers divergence, which sorts of phenomena are vulnerable to change, and what are the implications of the outcomes? Providing satisfactory answers to these questions brings us closer toward an initial model of the nature of heritage languages – in other words, closer toward a model of language competence under unbalanced bilingualism. Our strategy will be to try to squeeze as much explanatory power as we can out of a small set of concepts, which would then serve as the starting point for further inquiry.

**Triggers**

The first question to address concerns the triggers of divergence between heritage speakers and the relevant baseline. We consider two sorts of triggers: the first having to do with the data from which heritage speakers learn their language (i.e., the quantity and quality of their input), and the second having to do with the economy of online resources (i.e., demands on processing and memory).

**Input**

There are only so many hours in a day. If a bilingual speaker splits his or her time between two languages, the math is clear: less time will be spent on each individual language. As the time balance shifts in favor of one language (i.e., the dominant language of the broader speech community), the other language (i.e., the heritage language) will receive even less time. Here we set aside the sociolinguistic factors that can lead to this imbalance (but see, e.g., Gathercole & Thomas, 2007; Kasstan, Auer & Salmons, 2018; Lynch, 2014) and focus instead on its implications: less time leads to reduced input, which is likely to be a primary trigger for the divergences observed between baseline and heritage

grammars. That input matters to language-learning outcomes is by now uncontroversial: however much innate, domain-specific knowledge we might want to posit for language, nobody will argue that children born in Moscow come pre-wired for Russian and those born on the coast of Maine come pre-wired for English. We learn the language we are exposed to as children; the question is what sort of exposure and how much of it is necessary to acquire the baseline grammar.

Several studies have documented an effect of QUANTITY of input on heritage-language outcomes (see Unsworth, 2016, for a recent overview). To summarize the general findings, greater exposure to the heritage language over a longer period of time leads to more balanced bilingualism. Moreover, the recency of that exposure appears to play a crucial role: both cumulative exposure over the lifespan and current exposure in daily life are predictive of grammatical outcomes (e.g., Unsworth, 2015, *in press*). It also appears that different grammatical phenomena are more or less sensitive to input quantity. Of note are those phenomena that are exceedingly rare, or specific to certain (adult, professional, literary) registers: if the phenomenon is rare and not reinforced by schooling or frequency, a heritage speaker will never encounter the input necessary to successfully learn it (e.g., the Spanish absolute construction, which is characteristic of literary language – cf. Bruno, 2011; Hernanz, 1991, and references therein).<sup>13</sup>

As a result of their reduced input, we find that bilingual children, at least up to age 5–6, follow the developmental trajectory of monolingual learners, but often with a delay (see Austin, 2009; De Houwer, 1990; Gathercole, 2007; Meisel, 1986, 1990, 2007; Müller, 1998; Schlyter, 1993; Schwartz & Minkov, 2014; Schwartz, Minkov, Dieser, Protassova, Moin & Polinsky, 2014, among many others). While the empirical documentation of delays is quite rich, we echo Austin's (2007; 2009) observation that it is not always easy to separate delay from interference from the dominant language – keep in mind that input is reduced because it gets displaced by input from the dominant language.

Curiously, interference between two systems can be mitigated when those systems are sufficiently distinct, sometimes to the extent that acquisition is actually accelerated. For example, Kupisch (2007) found acceleration in the acquisition of German determiners (as compared to monolingual controls) in her study of four German–Italian bilingual children. It is possible that the difference between the Germanic and Romance systems – in particular, the use of determiner-less nouns in the bare-subject position in German but not Italian – may have contributed to the accelerated acquisition. Sufficient difference between two sources of input could thus focus attention on the relevant properties to be learned. Although our interpretation of these findings might differ from the author's, if this reasoning is on the right track, we would be able to expect more efficient and faster acquisition of those phenomena where the two languages in the bilingual dyad are sufficiently different, and, conversely, slow-downs in those domains where the two languages are similar. Of course, this expectation is useful and testable to the extent that we have a metric of what counts as sufficiently different vs. sufficiently similar.

<sup>13</sup>Researchers should take care when it comes to assigning explanatory force to the role of formal education in heritage-speaker outcomes. While many heritage speakers lack the literacy exposure that is common for an idealized monolingual speaker, many languages do not come with formal education, yet the contrast between baseline and heritage speakers is relevant for those languages as well.

The role of dominant-language interference in triggering heritage-language outcomes brings into focus the crucial role of input QUALITY in heritage-language development. Consider the daily life of a heritage speaker: at work, at the store, on television or the internet, the speaker operates mainly in the dominant language of the speech community; it is primarily at home with family that the heritage language gets used. This situation will become more extreme as the heritage-language community shrinks in size and prominence. What results are very different types of exposure to the two languages. The heritage speaker is likely to encounter much greater variety in the dominant language: more speakers, different accents, more topics, etc. In contrast, the heritage speaker's input in the heritage language is circumscribed to a small set of speakers (e.g., their immediate family) and the topics common to the situations in which the heritage language is used.

We therefore expect a more robust heritage language to the extent that it enjoys a more varied and flexible existence, and indeed the empirical picture appears consistent with this expectation. Heritage-language proficiency depends on the size of the heritage-language community: more heritage speakers leads to increased proficiency (Gathercole & Thomas, 2007). Crucially, Gollan, Starr and Ferreira (2015) demonstrate that the effect of community size (i.e., quality of input) is independent from the effect of heritage-language exposure (i.e., quantity of input). In other words, increased exposure to the heritage language will only get heritage speakers so far; they also need exposure from a variety of sources. Thus, reduced input quality – in addition to reduced quantity – appears to play a central role in the unique outcomes of heritage speakers. The causes behind this effect remain to be explored, but Gollan et al. suggest that richer variety in the input could lead to a more robust encoding of the relevant representations.

#### *Economy of online resources*

Maintaining one grammar is hard enough, but maintaining two grammars in parallel creates an additional challenge. Faced with a limited processing budget with which to balance and inhibit the relevant grammars, those resources are further taxed and potentially over-extended in bilinguals. As a result, heritage speakers are likely to face difficulty with phenomena that impose relatively high cognitive demands. Confronted with this difficulty, heritage speakers could face pressure to restructure their grammar in a way that frees up processing resources. Those areas that pose the most difficulty would be ripe for change in heritage grammars. This idea is not novel, and has been explored under the auspices of the Interface Hypothesis (Sorace, 2011; Sorace & Filiaci, 2006): phenomena at the intersection of language domains (e.g., *pro*-drop at the juncture of syntax and discourse) require more processing resources to manage than phenomena within a single domain (e.g., the licensing of a null pronoun within narrow syntax). Those costly interface phenomena are thus most likely to undergo change in heritage grammars.

For our purposes, we identify this pressure from online resources as a trigger that leads to principled changes in the respective grammars. We treat processing pressures as an initiator of change, rather than an explanation of the observed outcomes, for two important reasons. First, there are a number of phenomena in narrow syntax (i.e., non-interface phenomena), agreement in particular (see Kramer, 2015; Preminger, 2014, for more on the nature of agreement), which suffer in heritage languages (Montrul, 2016; Polinsky, 2018b). Second, the prevalence of change in these interface areas does not always correlate with

independent measures of cognitive control, which index the availability of processing resources (Sorace, 2011; Sorace & Filiaci, 2006; Sorace & Serratrice, 2009; Valian, 2015). Still, the limited nature of processing resources, combined with the added cost of operating in a non-dominant language, forces heritage speakers to draw on knowledge from other domains as they optimize their resource use.

When it comes to making predictions about those domains in which change is most likely to initiate as a result of these processing pressures, we can draw on our understanding of language processing in monolinguals, both adults and child language learners. A good deal of language-science research maps out areas of relative difficulty in production and comprehension in monolingual populations, and heritage-language research can build on these findings. The literature is enormous; here we highlight three relevant generalizations. First, long-distance dependencies are harder to produce and understand (e.g., Gibson, 1998; Grodner & Gibson, 2005; Hawkins, 1999, 2003; Scontras, Badecker & Fedorenko, 2017a; Scontras, Badecker, Shank, Lim & Fedorenko, 2015a). Second, recovery of missing information also imposes additional cognitive demands, as indicated in a number of phenomena: the processing of ellipsis (e.g., Koornneef et al., 2011; Reuland, 2011), pronoun ambiguity resolution (e.g., Arnold, Eisenband, Brown-Schmidt & Trueswell, 2000), or speech recognition in noisy environments (e.g., the cocktail party effect; Bronkhorst, 2000; Treisman, 1969). Third, low-frequency or unexpected material takes longer to process than predicted material; we know this from studies of surprisal (e.g., Hale, 2001; Levy, 2008) and garden-path effects (e.g., Christianson, Hollingworth, Halliwell & Ferreira, 2001; Ferreira & Henderson, 1991; Frazier & Rayner, 1982; Pickering & Traxler, 1998). Having documented difficulty with these phenomena in monolinguals, we may then predict difficulty with heritage speakers, especially in their less-dominant language. Thus, when it comes to initiating grammatical changes, these areas are prime suspects.

#### *Outcomes*

Given the potential triggers of divergence, we turn now to the possible outcomes that address these triggers. We classify the outcomes into three broad classes: the avoidance of ambiguity, a resistance to irregularity, and the shrinking of structure. Although these labels suggest that the outcomes result from agency on the part of heritage speakers, it remains an open question whether and to what extent heritage speakers actively shape their grammars to address the relevant triggers (e.g., by actively avoiding ambiguity, irregularity, and complex structure); in what follows, phrases that are suggestive of speakers' agency are used as metaphors.

#### *Avoidance of ambiguity*

One hypothesis is that heritage speakers seek to reduce ambiguity, perhaps owing to cognitive pressures that get amplified in situations of language contact. Reduced experience with the full range of baseline meaning options could also trigger a reduction in ambiguity. This hypothesis would help to explain some of the areas of vulnerability discussed above. In particular, a preference for one-to-one mapping from surface structures to interpretations could account for the facts from quantifier scope, extraction, and topics. With quantifier scope freezing, we saw that heritage speakers resist inverse interpretations of scopally-ambiguous utterances. With extraction, we saw that heritage speakers adopt a single

strategy of associating gaps with subject antecedents. In both cases, the outcome is reduced ambiguity: where the baseline allows for multiple mappings from surface structure to interpretation, the heritage grammar reduces the number of possible mappings (sometimes to just one). We observe the same tendency with other phenomena, for example in the division of labor between plural definites and bare plurals in Romance generics (Kupisch, 2012; Montrul & Ionin, 2010), or at the lexical level, where heritage speakers resist synonymy (Rakhilina, Vyrenkova & Polinsky, 2016). In Japanese, heritage speakers' difficulty with ambiguity manifests in the inability to successfully navigate the multiple interpretations of topics, reducing them instead to the contrastive reading (see "The Ambiguity Problem" section above).

However, the ambiguity-avoidance strategy that heritage speakers employ appears at times to be curiously shortsighted. In particular, the avoidance of null subject pronouns in heritage varieties of *pro*-drop languages evidences pressures at the level of the sentence: an overt pronoun reduces (rather than removes) ambiguity by constraining the possible referents on the basis of interpretable phi-features. Nonetheless, the benefits at the sentence level carry a systemwide cost. By increasing the rate of overt pronouns, speakers reduce the ambiguity of the sentences in which they appear. Yet the interpretation strategy of mapping null vs. overt pronouns to subjects vs. objects, respectively, becomes increasingly less effective as the rate of overt pronouns increases. In other words, ambiguity avoidance at the syntagmatic level can lead to increased ambiguity at the paradigmatic level. To deal with the increased paradigmatic ambiguity, heritage speakers will need to introduce new mapping rules from syntax to interpretation.

#### *Resistance to irregularity*

Avoiding ambiguity will only get us so far in accounting for the outcomes in heritage-language divergence. In addition to a desire for regular and direct mappings between form and meaning, we saw with the Morphology Problem that heritage speakers reshape the forms themselves in an attempt to limit idiosyncratic knowledge and increase the rule-governed nature of the system – doing so reduces demands on memory while also addressing the problem of insufficient input. In this regard, the behavior of heritage speakers is particularly similar to what is observed under L1 acquisition, as children overregularize the input. The resistance to irregularity of forms is primarily manifested in morphology, where irregular forms are replaced by regular ones, and multiple allomorphs are reduced to one. Resistance to irregularity offers a straightforward explanation for overmarking of tense in heritage English: rather than remembering specialized forms for irregular verbs, heritage speakers overextend regular tense morphology (Duffield, 2018: 29–30; Polinsky, 2018b, Ch. 2).

#### *Shrinking of structure*

In addition to shrinking their inventory of mapping rules from surface structure to interpretation, resulting in ambiguity avoidance, as well as shrinking the amount of idiosyncratic morphological information they need to keep track of, resulting in a resistance to irregularity, heritage speakers also reduce the overall hierarchical structure available in their language. Such reduction of structure results in representational differences between the heritage grammar and the baseline. These differences often only become apparent in subtle comprehension studies. In the case of agreement in Spanish, we see that heritage speakers prefer a more economical representation with less structure (and fewer

features). In Russian, heritage speakers lose or abandon the structure associated with aspect, which has a downstream effect on the interpretation of ellipsis. Also in Russian, heritage speakers lose the ability to relativize non-subject arguments. In each case, the initiator of the structural reanalysis appears to be a reduced sensitivity to morphological cues, be they for gender, number, aspect, or case. While input and maintenance (or the lack thereof) likely leads to the issues with morphology, the economy of online resources likely leads to the structural consequences: heritage speakers diverge from the baseline with a grammar that has less structure. The outcome is similar with Korean anaphors: heritage speakers prefer shorter, local dependencies. There is a lesson to be learned here: connecting elements at a distance may start out as a genuine memory problem, one that is not domain-specific to grammar. However, the workarounds for this problem are subject to grammatical principles and have far-reaching consequences for the architecture of the heritage grammar. These consequences become apparent in the consistent and systematic changes that are found in heritage grammars. In particular, these consequences include the elimination of some components of structure or the fusion of separate structural nodes into one. We have proposed such a fusion for the gender and number heads in Spanish (Scontras et al., 2018). Crucially, the fusion was not accidental or random; it followed from the adjacency of the relevant functional heads in the nominal domain. Thus, principled changes in heritage grammars follow from the more general grammatical architecture and can in turn be used to reveal this architecture. Furthermore, principled changes include the privileging of shorter dependencies, such that distance is reduced relative to the baseline.

#### *Implications*

With a clearer understanding of the outcomes and their triggers, we turn briefly to the implications of these outcomes for heritage-language grammar. With less ambiguity, more regularity, and less structure, the heritage grammar appears more economical, thus addressing the issues from processing by unburdening the online resources that are already taxed by operating in a less-dominant language. The heritage grammar also appears to be more learner-friendly, or robust to reduced input. Those phenomena that can be learned on the basis of reduced input feature prominently, while those involving nuance and indeterminacy – especially when they are infrequent – seem to slip away. One might view this consequence of the heritage-grammar outcomes as a natural milestone of language evolution, where the heritage grammar has been optimized under pressures from processing and learnability. Viewed in this way, heritage grammars offer a window onto language diachrony (e.g., Pires & Rothman, 2009; Rothman, 2007a): perhaps the special circumstances leading to the observed outcomes in heritage grammars serve as an accelerator of sorts for diachronic change. That heritage speakers share much in common with child learners would seem to support this speculation, but more work must be done on the particular properties of heritage languages before we can advance such a claim.

#### *Concluding remarks*

We set as our aim a preliminary model of the nature of heritage-language grammars, together with a better understanding of how such a model could inform linguistic competence and its development more broadly. Laying the groundwork for such a model, we considered the ways that heritage languages could differ from the

baseline, together with what it means to be a heritage speaker and which populations serve as the relevant baseline. We then surveyed some empirical observations about the abilities of heritage speakers, organizing vulnerable language phenomena around the problems they evidence. This survey set the stage for our synthesis, which brought into focus the roles of input and online resources in triggering the observed deviations from the baseline; we then discussed how these triggers could lead to three broad outcomes: the avoidance of ambiguity, the resistance to irregularity, and the shrinking of structure.

We have barely scraped the surface of the rich empirical landscape of heritage languages, which means there are surely many other outcomes triggered by factors that we lacked the space to discuss. Still, our hope is that this discussion will serve as a jumping-off point for further progress toward a model of heritage-language grammar. In particular, it can lead to specific empirical predictions about the ways in which heritage languages will (and will not) deviate from their respective baselines. The true test of our theories is predicting those aspects of grammar that are going to be robust and those that will break. Making these predictions necessitates a close connection between heritage-language study and linguistic theory more broadly, such that we arrive at a working model of the nature of heritage language. But the information-sharing happens in both directions: just as linguistic theory informs the study of heritage languages, so too can the study of heritage languages inform our general theories, either supporting or refuting them.

To underscore the idea that the relationship between heritage-language study and theoretical linguistics is a two-way street, we close by offering an example of how heritage-language study can contribute to issues in theoretical linguistics. One of the crucial mechanisms in linguistic theory is agreement: the situation when two constituents co-vary in the features of number, person, or gender. This co-variance can be encoded either by agreement morphology or by a clitic – an element that has the syntactic characteristics of a word, but depends phonologically on another word or phrase, in particular by never bearing its own stress. In linguistic analysis, the distinction between agreement morphemes and clitics is often quite subtle and requires a careful differentiation of various morphological and syntactic properties. As a result of this subtlety, this distinction has engendered a lively debate in recent theoretical literature (e.g., Harizanov, 2014; Kramer, 2014; Preminger, 2009). Moreover, the list of cases where analytical arguments fail to distinguish between clitics and agreement morphology is quite extensive (see Kramer, 2014, for Amharic; Pye & Pfeiler, 2017, for Mayan; Henderson, 2006; Marlo, 2014; Zeller, 2015, for Bantu).

A comparison between clitics and object agreement in L1 acquisition suggests that clitics are acquired earlier, with less effort and fewer errors than agreement, especially agreement with objects (Deen, 2005; Pye & Pfeiler, 2017; Radeva-Bork, 2012; Varlokosta, Belletti, Costa, Friedmann, Gavarró, Grohmann, Guasti, Tuller, Lobo, Anđelković, Argemí, Avram, Berends, Brunetto, Delage, Ezeizabarrena, Fattal, Haman, van Hout, de López, Katsos, Kologranic, Krstić, Kraljević, Miękisz, Nerantzini, Queraltó, Radic, Ruiz, Sauerland, Sevcenco, Smoczyńska, Theodorou, van der Lely, Veenstra, Weston, Yachini & Yatsushiro, 2016). The information concerning clitics in heritage languages, based primarily on heritage Portuguese, suggests that speakers use clitics correctly and do not omit them. However, their placement may differ from the baseline, with heritage speakers preferring enclisis (clitics attaching to the end of a word; see Rinke & Flores, 2014). In the meantime, as we have

mentioned above and as is well-known in heritage-language study, agreement is among the most vulnerable domains in heritage languages; heritage speakers fail to produce agreement and often overlook agreement mismatches (Polinsky, 2018b, Ch. 5; Scontras et al., 2018). In cases where the identification of clitics vs. agreement morphology is not straightforward, the fate of the relevant exponent in a heritage language may be telling. If an exponent is resilient in a heritage language, chances are that it is a clitic rather than an agreement marker; the former are robust, whereas the latter are more vulnerable. Accordingly, data from heritage varieties of languages with controversial agreement systems may offer strong evidence in the clitic-vs.-agreement-marker debate. By expanding our sights beyond baseline language data, we can access new evidence that contributes to the construction and refinement of our theories.

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