The manner of language acquisition matters for lexical but not morphosyntactic prediction

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Previous findings suggest that when monolingual adults read, they can successfully generate both *lexical* (i.e., activation of a specific lexical item) and *morphosyntactic* (i.e., activation of morphosyntactic features such as noun gender) predictions from the context of the sentence. However, the question to what extent the bilingual comprehenders engage in either type of prediction is debated (e.g., Foote, 2011; Foucart et al., 2014; Kaan, 2014; Siyanova-Chanturia et. al., 2011). In this study we are asking whether the manner of acquisition (heritage language or second language) creates differential ability/sensitivity for lexical and/or morphosyntactic prediction. We compared heritage L1 English-Russian adults with early exposure to spoken Russian (HSs, N=31) , L1 English-L2 Russian learners with late classroom exposure (L2ers, N=32), and monolingual Russian controls (N=63) (Table 1) in a cloze experiment (lexical prediction, Exp. 1) and an eye-tracking reading experiment (morphosyntactic prediction, Exp. 2).

Experiment 1. Participants read 48 sentences with high- or low-constraining context and completed the sentence with one final (target) word (see p. 3 for examples). Target words were matched in frequency and varied in part-of-speech and length. Table 2 shows that while HSs do not predict at the same rate as monolinguals, they were significantly better ($p<.001$) compared to L2ers suggesting that manner of acquisition, with earlier exposure and higher proficiency in the spoken L1, boosts predictive abilities in heritage bilinguals at the lexical level.

Experiment 2. The same participants read 32 sentences involving gender agreement violations (grammatical vs. ungrammatical presented in 2 blocks for within-subjects design) between a noun and an adjective (see p. 3 for examples). We focused on the *early* reading time measures on the target noun (FFD, first fixation duration; SFD, single fixation duration; GD, gaze duration; probability of skipping) that capture the early-lexical processing stages (Rayner et al., 1989). All three groups were sensitive to the word length, frequency, and the experimental Block. In contrast to Exp. 1, (generalized) linear mixed-effects models revealed that only monolingual speakers were sensitive to agreement violations in SFD and GD measures. We did not observe any effects in HSs or L2ers: manner of acquisition did not make a difference in predictive abilities at the morphosyntactic level as both groups failed to predict the upcoming noun based on the gender cue of the adjective.

Discussion. Our findings show differential predictive abilities in bilinguals with the different manner of language acquisition: In reading simple Russian sentences, HSs were able to anticipate specific lexical items, likely due to the increased amount and time of exposure to the spoken language compared to L2ers. The morphosyntactic prediction, however, was absent in both bilingual groups. In general, we suggest that while the manner of acquisition (i.e., the early and naturalistic exposure to the language as in HSs) matter for lexical prediction, morphosyntactic prediction in bilingual sentence comprehension is dependent on either the status of grammatical representation of the specific feature in the bilinguals' grammar (e.g., the absence of gender feature matching in English-Russian bilinguals) or on the task demands with reading being too costly for bilingual prediction (Kaan & Grüter, 2021).

Table 1. *Bilingual participant characteristics.*

	HSs: Mean (*SD*)	L2ers: Mean (*SD*)
Age (y.o)	19.87 (2.9)	24.5 (5.9)
Gender (women:men)	17:14	13:19
Age of Arrival to USA (years)	3.5 (5.4)	0.39 (1.7)
Vocabulary size (word count in thousands)	23,1 (13,1)	28,8 (23,0)
Daily Russian language exposure (%)	27.6 (25.6)	16.5 (21.8)
Daily reading exposure to Russian (min)	30–60	30–60
Age when started reading (years)	7.2 (5.1)	19.6 (4.5)

Table 2. *Means and standard deviations for cloze probability (Exp. 1) and eye movement measures (Exp. 2) across all groups. The cells with p-values from the (g)LMMs models in which there is a significant effect of a condition are in bold.*

	Monolinguals			HSs			L2ers		
Exp. 1	*high*	*low*	*p*	*high*	*low*	*p*	*high*	*low*	*p*
context	.91 (11)	.25 (.08)	***<.001***	.55 (.24)	.15 (.15)	***<.001***	.43 (.22)	.10 (.08)	***<.001***
Exp. 2	*Gram*	*Ungram*	*p*	*Gram*	*Ungram*	*p*	*Gram*	*Ungram*	*p*
FFD (ms)	227 (58)	220 (73)	*1.00*	363 (132)	362 (138)	*1.00*	335 (80)	346 (133)	*1.00*
SFD (ms)	226 (39)	246 (48)	***.001.***	371 (152)	391 (124)	*1.00*	390 (107)	414 (125)	*1.00*
GD (ms)	260 (64)	277 (65)	***.016***	830 (447)	767 (332)	*1.00*	659 (233)	634 (187)	*1.00*
Skip (%)	21 (17)	18 (18)	*.603*	3 (7)	6 (7)	*1.00*	5 (9)	6 (9)	*1.00*

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Examples of the sentences in the Exp. 1:

(1). Highly constraining:
Мария недавно вышла замуж. Вчера она познакомила всех со своим __(мужем).
'Maria recently got married. Yesterday she introduced everyone to her new__(husband).'

(2). Low constraining:
Мария недавно переехала в США. Вчера она познакомила всех со своим __(мужем)
'Maria recently moved to the USA. Yesterday she introduced everyone to her new__(husband).'

Examples of the sentences in the Exp. 2:

(3) Grammatical:

В дом	ведет	*больш**ая***	с	синей ручкой	*дверь*
To house	leads	big/FEM	with blue	handle	doorFEM

'The big door with the blue handle leads to the house.'

(3) Ungrammatical:

В дом	ведет	**больш**ой***	с	синей ручкой	*дверь*
To house	leads	*bigMASC	with blue	handle	doorFEM

'The big door with the blue handle leads to the house.'