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“THE TROUBLE WITH CLUSTERS”:

Child heritage speakers’ perception of Russian consonant sequences with /j/

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- Proficient **heritage speakers (HSs)** are often reported to have near-native perception skills
- Young speakers of Russian growing up in Italy constitute a relatively large yet understudied population
- We used an **ABX task** to test how they discriminate a notoriously difficult Russian three-way opposition **Ca vs. Cia vs. Cja**
- **HSs performed comparably to monolinguals on singleton contrasts, but near chance level on cluster contrasts**
- Possible explanations include frequency and markedness effects, acoustic salience, and reduced orthographic scaffolding

INTRODUCTION

- **Heritage languages (HLs) are minority languages learned in a bilingual or multilingual environment** [1]
- HLs exist in complex interaction with majority societal languages (SLs) and are characterized by reduced input, interrupted developmental trajectories, limited experience with written and formal registers, and complex language attitudes
- Due to extensive early input, heritage speakers have often been assumed to possess lifelong “native-like” phonetic and phonological abilities [2]
- Recent experimental studies of heritage speech perception demonstrate the complexity of heritage phonological processing [3–6]
- Russian heritage palatalization presents a novel case for investigating heritage speech perception
- In this study, we focus on a notoriously difficult (for L2 learners) ternary **/Ca/ vs. /Cia/ vs. /Cja/** contrast, as in
 - /'kola/ ‘(coca-)cola’
 - vs. /'kolla/ ‘diminutive of Nikolaj’
 - vs. /'kolja/ ‘sticks, poles in the fence’

RESEARCH QUESTIONS

- Are there any signs of differential acquisition in HL Russian phonology? **Do HSs perform differently** from monolingual peers?
- Do heritage speakers demonstrate **specific difficulties in distinguishing cluster (/Cja/, “iotized”) contrasts** compared to singleton contrasts, similarly to L2 learners?
- Do HSs with Italian as SL show an **advantage for stimuli containing consonants /l(i)/ and /n(i)/**, given that Italian has separate categories for the palatal /ʎ/ and /ɲ/?

ANALYSIS

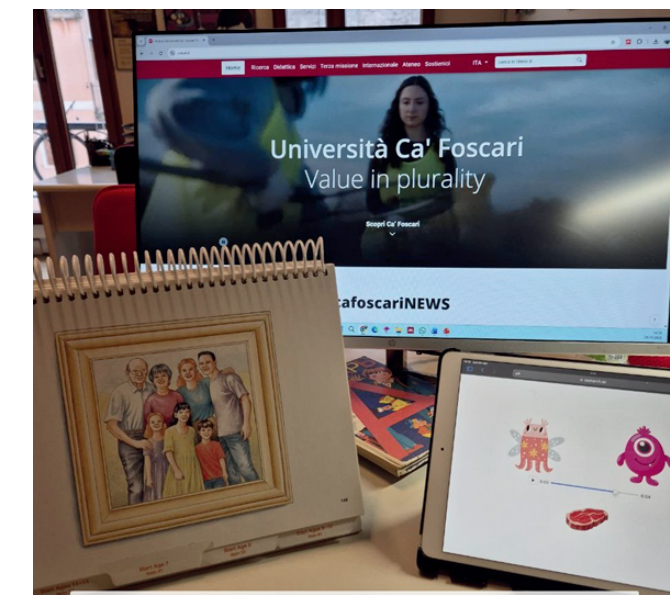
- In **filler items** (contrasts unrelated to palatalization), the effects of SL Italian phonological inventory on the performance of bilingual group are observed (see Fig. 1):
 - lack of velar fricative
 - lack of voiced postalveolar fricative
- For the analysis of target items, a **generalized linear mixed-effects model** (binomial logistic regression) was fitted in R, with Correctness as dependent binary variable and
 - A random intercept for Subject
 - Independent variables:
 - Group (Bilingual vs. Monolingual)
 - Type of contrast (“singleton” /Ca/ vs. /Cia/ or “cluster” /Cia/ vs. /Cja/)
 - Vowel (a vs. u)
 - Consonant (“l and n” vs. “m and v”)
 - Age
 - Order of presentation (whether correct answer was presented first or second)
 - Interactions
 - Group x Consonant
 - Group x Type of contrast

RESULTS

- **No significant overall effect of Group was found**
- **A significant interaction between Group and Contrast Type was observed:** heritage speakers performed significantly worse on the “iotized” contrast (Cia vs. Cja) than monolingual peers
- **No evidence was found for facilitation from Italian palatal categories (/ʎ/, /ɲ/)**
- Older children performed significantly better overall
- Accuracy was additionally affected by presentation order (counterbalanced across the task)

METHODOLOGY

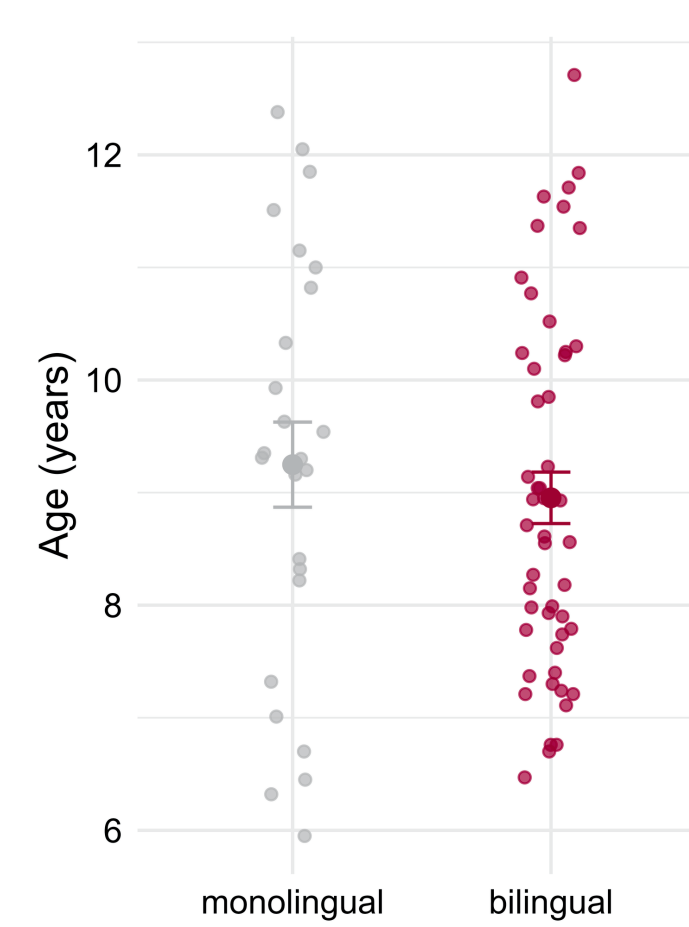
- An **ABX phoneme discrimination task** was designed in *Gorilla* [7]
- Stimuli were produced by a female native Russian speaker (one of the authors)
- Before the task, bilingual children completed a lexical task (picture naming)
- The task included a short training (3 items), followed by the experimental part (40 items) and lasted around 10–12 minutes
- **Pseudoword stimuli were presented as “names of imaginary creatures”, trisyllabic and with Russian-like phonotactics**
 - 24 target items contrasted /l–l–lj/, /n–n–nj/, /m–m–mj/, and /v–v–vj/ as syllable onsets in stressed syllables with [a] or [u] as nuclei
 - 16 fillers contained unrelated phonological contrasts
- Children received feedback (correct vs. incorrect choice) during the training phase, but not during the experimental phase



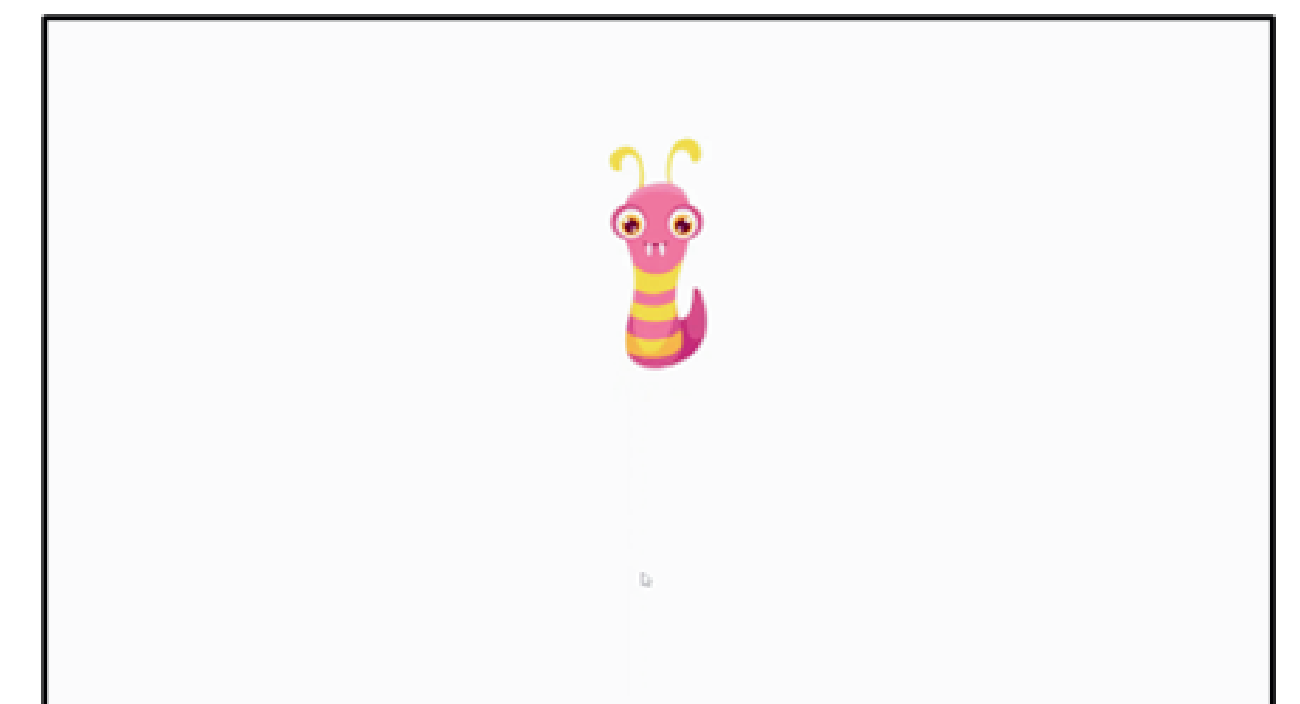
PARTICIPANTS

- Children aged from 5 to 12 were recruited
- **50 bilingual children** (mean age 8.95) residing in Italy and attending Italian schools, with SL Italian and HL Russian
- Bilingual children were recruited through “Saturday schools” and social media
- **25 monolingual children** (mean age 9.25) residing in Russia, did not report extensive daily use of L2
- Bilinguals were tested offline and online, monolinguals were tested exclusively online

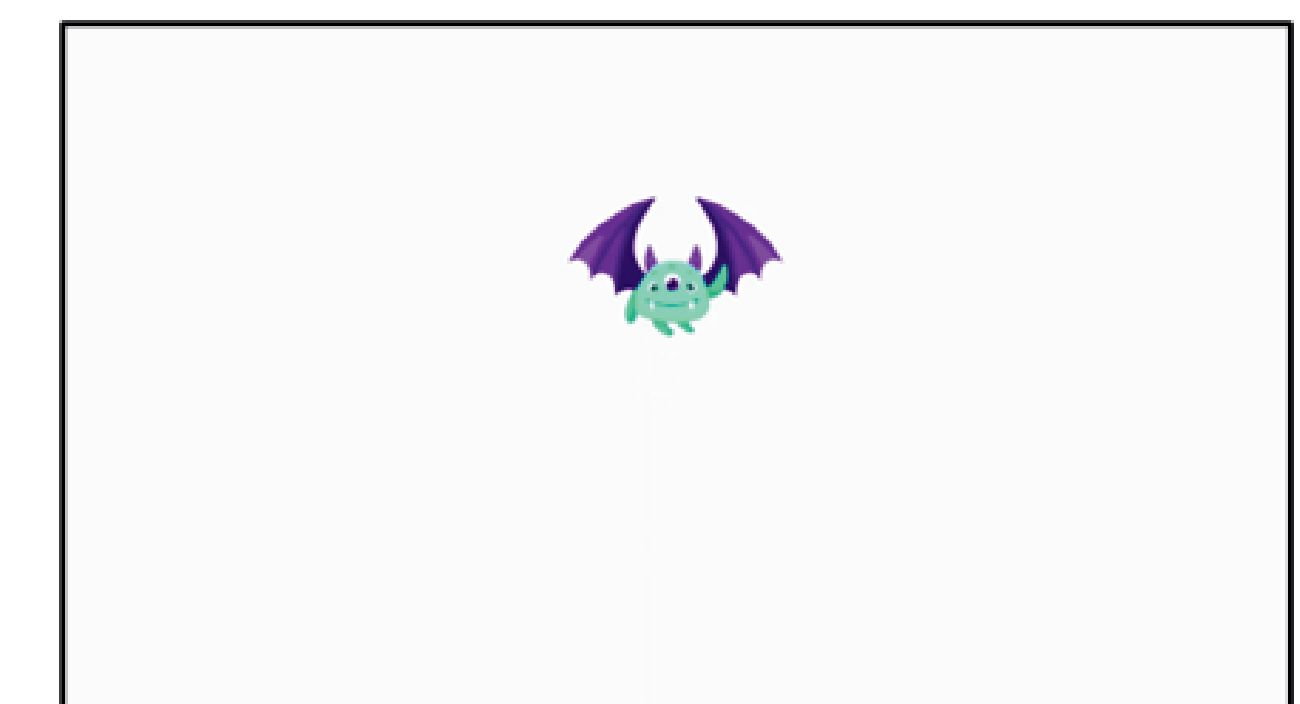
Figure 1. Age by group



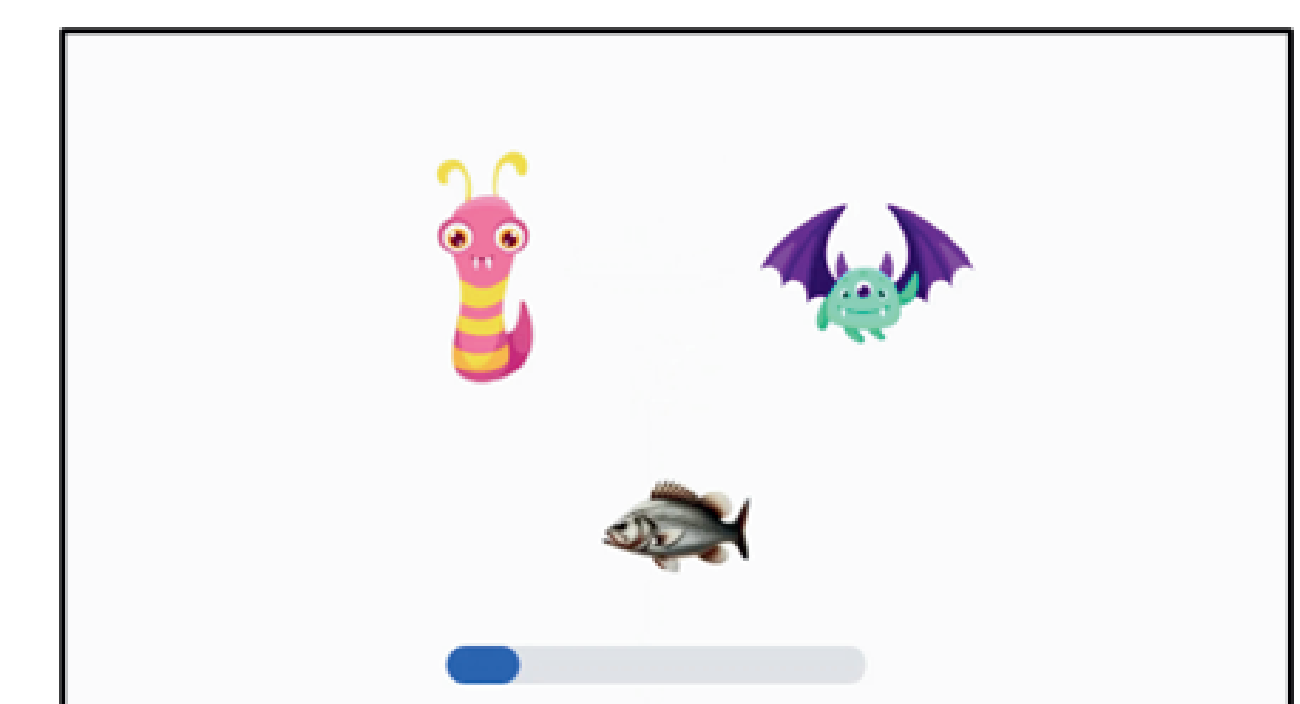
ABX TASK EXAMPLE



A. This is Kalijatka



B. This is Kalijatka



X. Give the fish to Kalijatka

Figure 2. Accuracy in fillers

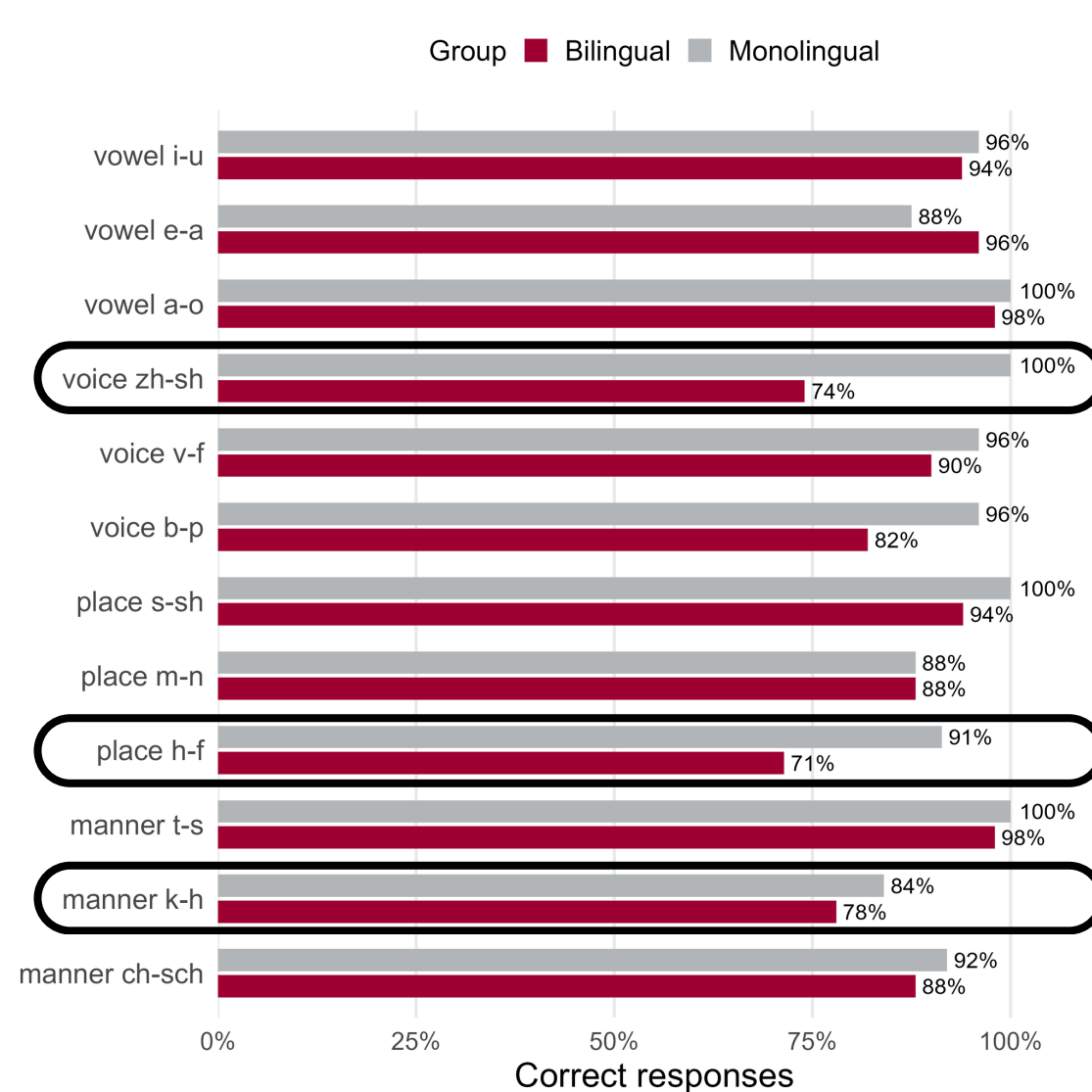


Figure 3. Accuracy in targets

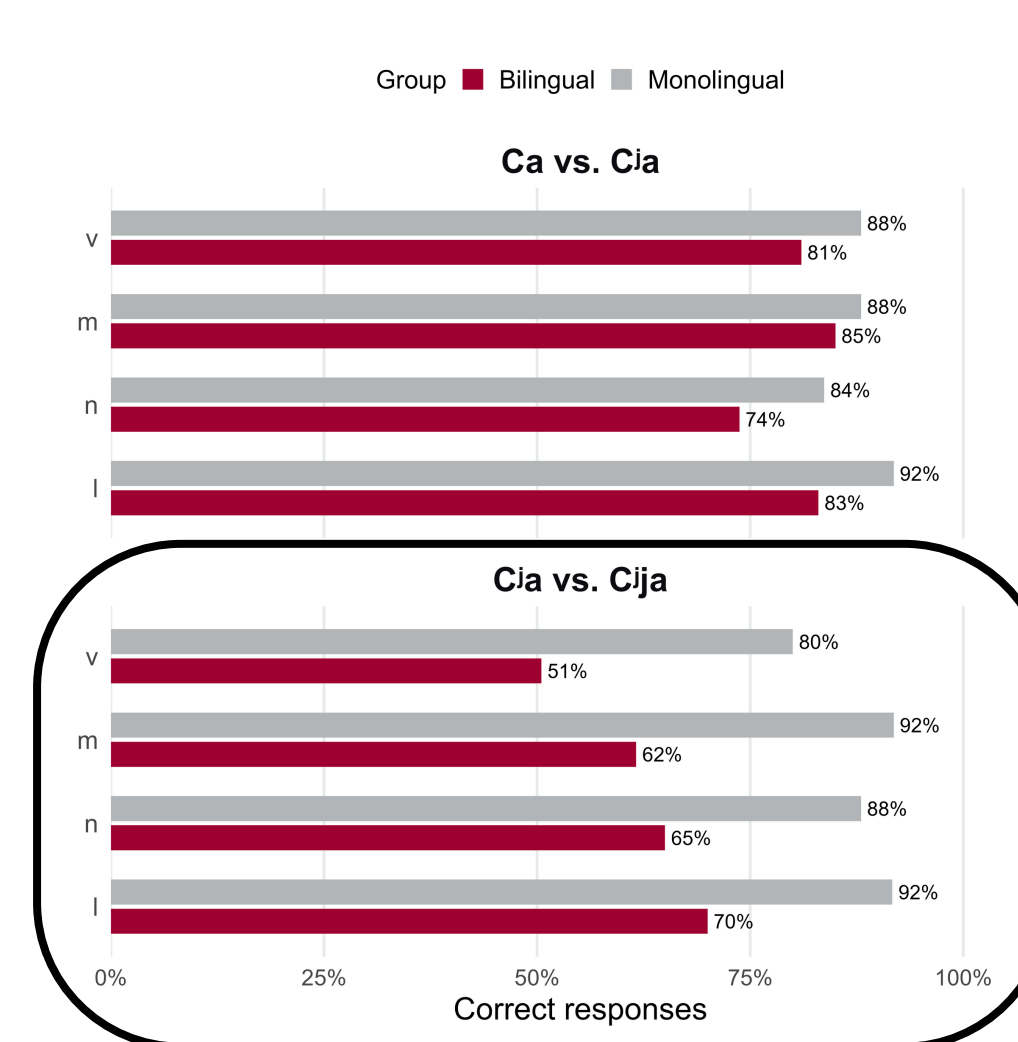
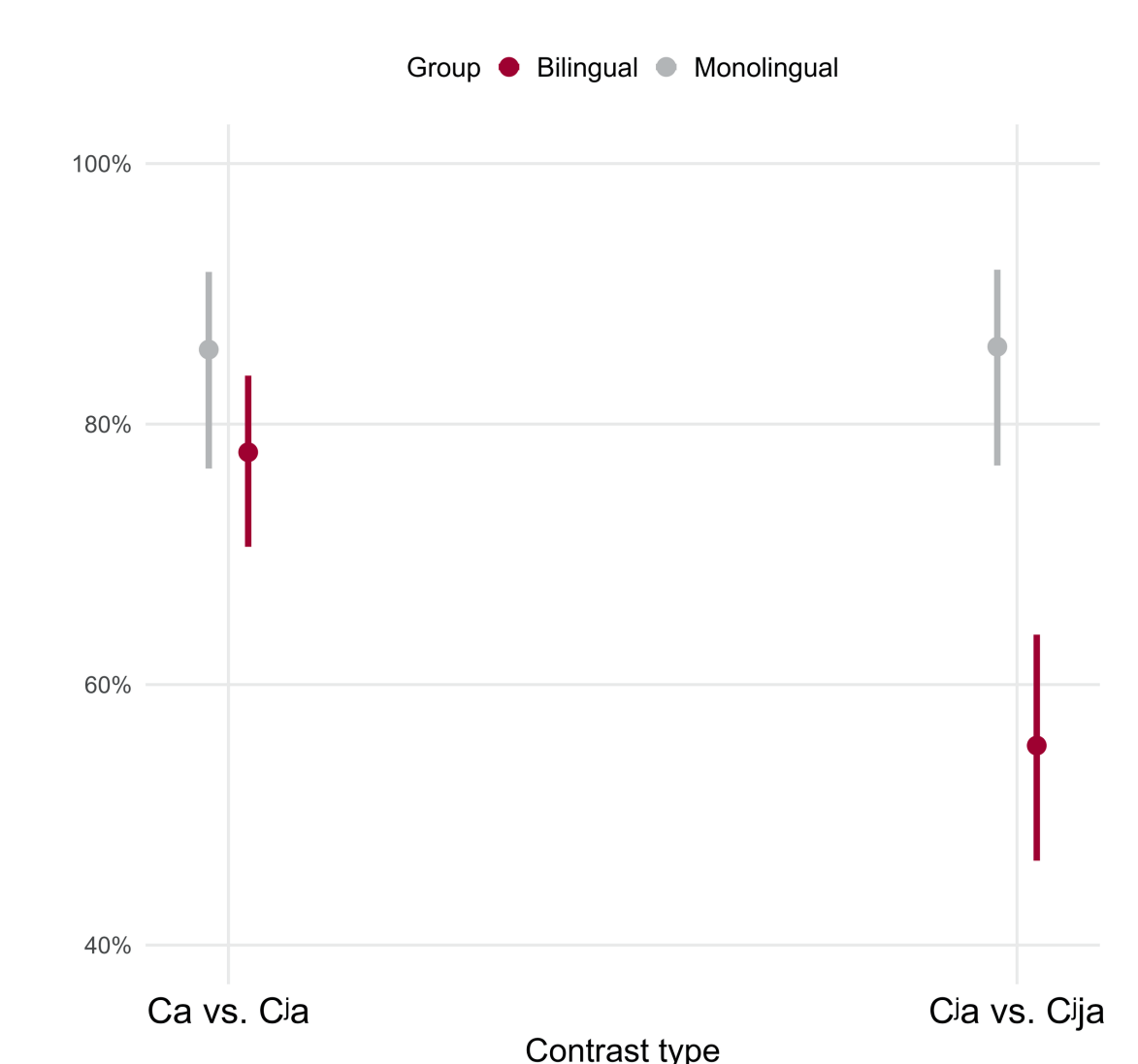


Figure 4. Predicted probabilities of accurate responses in targets



DISCUSSION

- The results suggest that heritage speakers can show “close to native” performance in the discrimination of palatalization contrasts in singleton consonants
- However, heritage speakers struggled to distinguish contrasts between palatalized consonants and sequences of a palatalized consonant followed by /j/
- Possible explanations for the relative ease and difficulty of acquisition [8]
 - **Frequency/markedness effects:** singleton contrasts are vastly more frequent than clusters
 - **Lower acoustic salience** of the /Cia/ vs. /Cja/ contrast
 - **Lack of scaffolding from written registers for heritage speakers:** Russian orthography uses specific graphemes to mark “iotized” clusters, and these conventions are explicitly taught in elementary school

CONCLUSION

- Our study adds to the growing body of experimental research **challenging the assumption that heritage speakers’ perception is always close to that of monolingual peers**
- Although heritage-language speech is generally highly intelligible to heritage speakers, their phonological representations may nevertheless differ from those of monolinguals
- Beyond contributing theoretical insights into bilingual phonological systems, studies of heritage speech perception also have **important implications for biliteracy acquisition**
- In particular, the present study suggests that the errors in marking palatalization and iotization widely observed in heritage speakers of Russian may reflect not only limited experience with Russian orthography, but also deeper perceptual differences

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