

Effect of Bilingualism on Speech Rate: the Case of Catalan and Basque Bilinguals in Spain

Yoon Mi Oh, Christophe Coupé & François Pellegrino
Laboratoire Dynamique du Langage, Université de Lyon

yoon-mi.oh@univ-lyon2.fr, christophe.coupe@ish-lyon.cnrs.fr, francois.pellegrino@univ-lyon2.fr

Introduction and Objectives

▷ **Basque, Catalan and Spanish** have distinct phonological systems in terms of phonemes, syllable structures, and prosody. According to our measure of syllable complexity based on Information Theory, **Catalan is the most complex language** and is followed by Spanish and Basque (Catalan > Spanish > Basque). We assume that the more complex a language, the slower its **speech rate (SR)**. Moreover, a language transfer is expected to occur with bilinguals, which could affect their SRs in both L1 and L2.

Questions:

- Do we observe, according to syllable complexities, $SR(\text{Basque}) > SR(\text{Spanish}) > SR(\text{Catalan})$?
- Is there a **convergence** of the SRs in the two languages spoken by bilinguals (with respect to SRs in monolinguals)?
- More specifically and according to the hypothesis that $SR(\text{Basque}) > SR(\text{Spanish}) > SR(\text{Catalan})$, is Catalan-Spanish bilinguals' SR in Spanish lower than, and Basque-Spanish bilinguals' SR in Spanish higher than, Spanish monolinguals' SR?

Methodology

- ▷ **Participants:** 3 male and 5 female **Spanish monolingual** speakers (SM), 5 male and 5 female **Catalan-Spanish bilingual** speakers (CSB) and 5 male and 5 female **Basque-Spanish bilingual** speakers (BSB).
- ▷ **Task:** Participants were asked to read aloud 15 short texts, each one consisting of 3-5 sentences, at normal speech rate. The texts were translated from British English into Basque, Catalan and Spanish with adaptation to the local context when necessary.
- ▷ **Measure of speech rate:** the average number of syllables uttered per second (Silence intervals longer than 150ms were removed).

Example of oral corpus

Spanish

A mi casa se puede ir por un atajo cruzando el bosque.
Los vecinos dicen que el bosque está embrujado.
Nadie quiere pasar por allí cuando oscurece.
Yo, por supuesto, no soy supersticioso.
A mí me encanta ir por ese camino tan pintoresco.

Catalan

En aquell turó hi ha una dreuera cap a casa meua.
Alguns veïns diuen que el turó està embruixat, de fet, a ningú li fa gràcia passar per aquella zona quan s'ha fet fosc.
És clar, jo no em crec aquestes supersticions, i de fet, m'agrada passar per aquella ruta ja que la trobo molt pintoresca.

Basque

Bada bidezidor bat muino hartatik nire etxeraino.
Herriko batzuek diote muinoa sorginduta dagoea.
Inork ez du hortik igaro nahi gaez.
Jakina, nik ez dut horrelako zentzugabekeriarik sinesten.
Gogoko dut hango bide bitxi hura.

Results

- The following order for the **average SR** is observed:
 $SR(\text{Spanish monolingual}, 7.95) > SR(\text{Basque}, 7.37) > SR(\text{Catalan}, 6.85)$
- Comparison of the average SR in Spanish

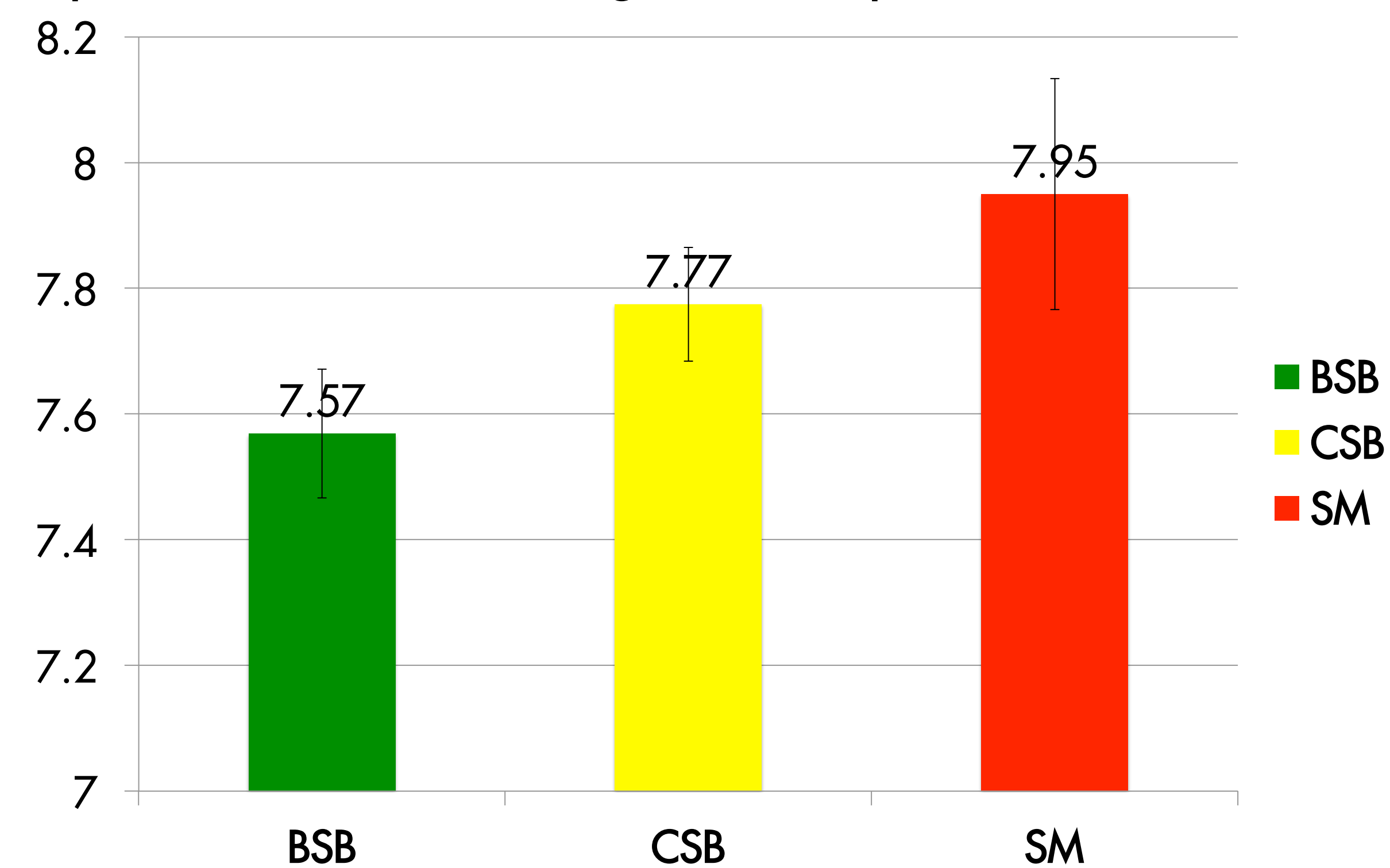


Figure 1: The average SR in Spanish for BSBs, CSBs and SMs. (Error bars display the 95% confidence intervals.)

- ▷ The average SR in Spanish produced by both **BSBs** and **CSBs** is **significantly lower** than that of SMs (Kruskal-Wallis test, p-value = 0.00057).

3. Comparison of the average SR for Catalan-Spanish bilinguals

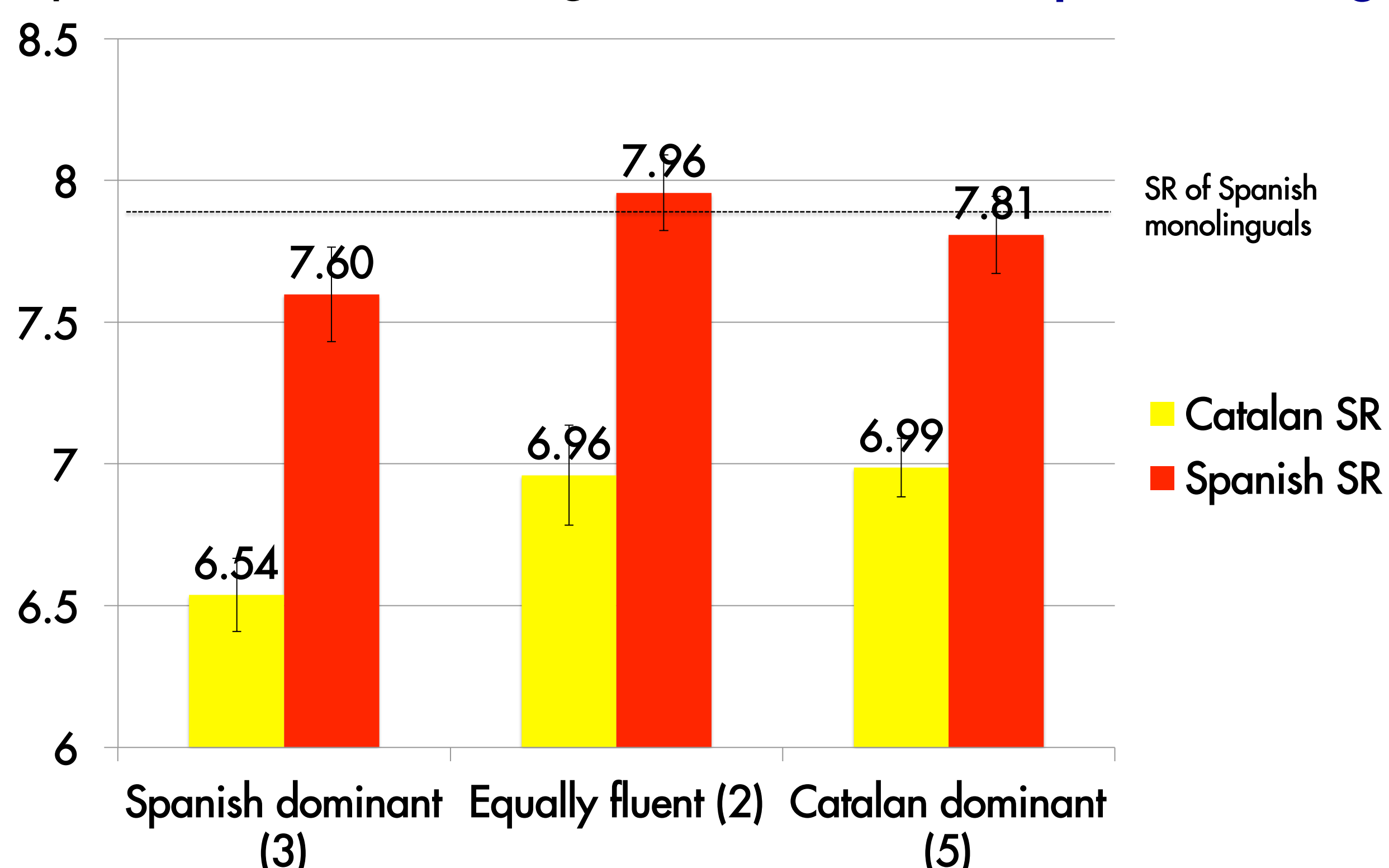


Figure 2: The average speech rate in Catalan and Spanish for CSBs divided into three groups (The number of speakers belonging to each group is indicated in brackets).

- ▷ The **equally fluent** group shows the highest SR of Spanish, which is as high as that of SMs in Fig 1. The Catalan dominant group exhibits the highest SR in Catalan and interestingly, a higher SR in Spanish than the Spanish dominant group. (N.B. Groups are too small for statistical analysis.)

4. Comparison of the average SR for Basque-Spanish bilinguals

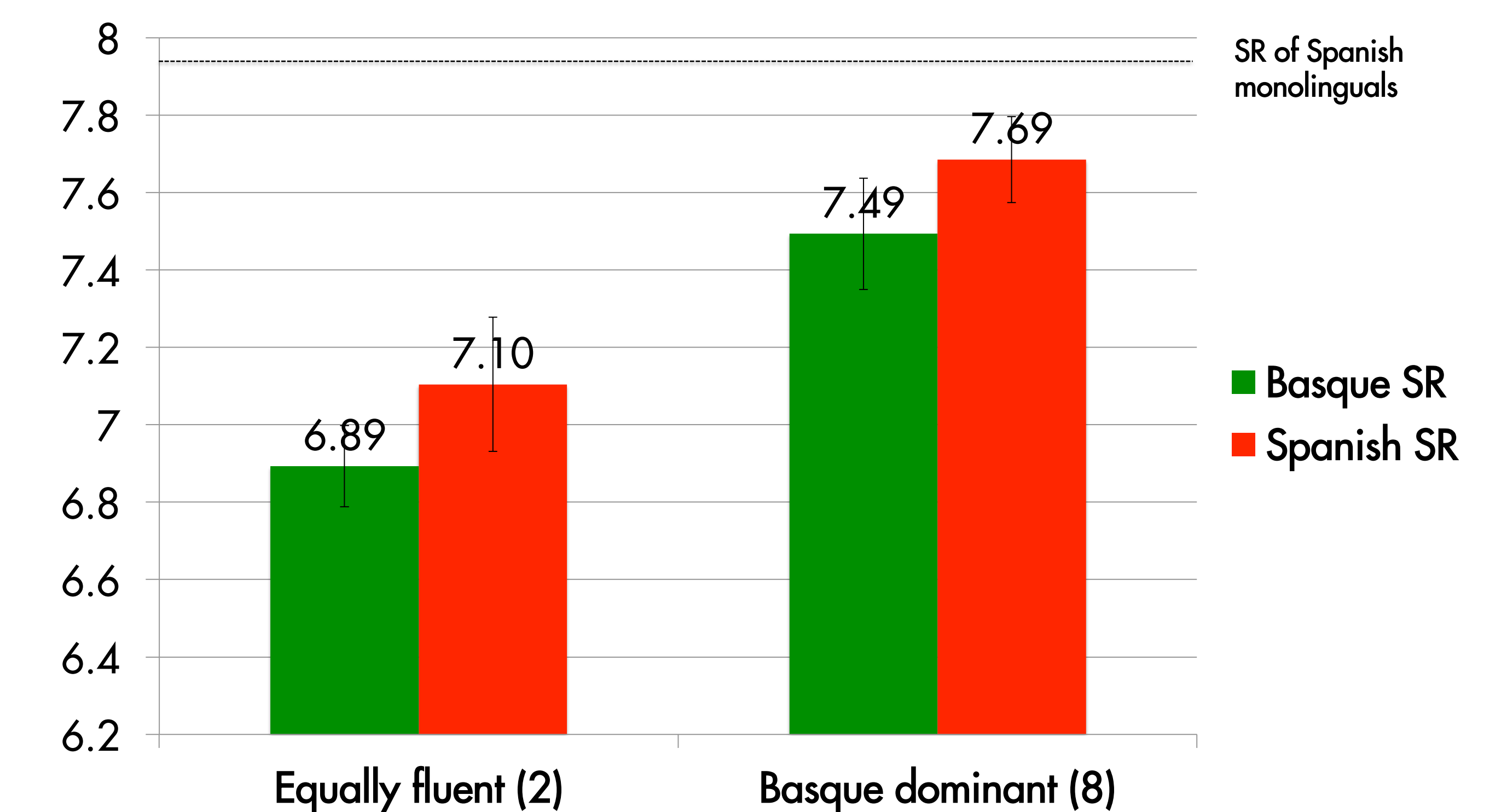


Figure 3: The average speech rate in Basque and Spanish for BSBs divided into two groups. (The number of speakers belonging to each group is indicated in brackets.)

- ▷ The Basque dominant group shows a speech rhythm more similar to Spanish monolinguals than the group equally fluent in both languages. Contrary to Catalan, none of the Basque-Spanish bilingual participants was Spanish dominant.

Conclusions

- ▷ The result on the average SR does not validate our hypothesis according to which Basque exhibits the highest SR followed by Spanish and Catalan.
- ▷ The SR of bilinguals is generally **influenced by their bilingualism** (Fig 1).
- ▷ A convergence of the SRs in L1 and L2 of bilinguals do not exist, as CSBs have shown a higher SR in Spanish than BSBs. If the convergence occurred, the Spanish SR of CSB would be lower than that of BSBs. Furthermore, the degree of dominance in bilinguals does not seem to be related to the convergence (Fig 2 & 3).
- ▷ However, our current data is insufficient to conduct statistical tests with small groups of bilinguals and more data is needed. In addition, there are no monolingual speakers of Catalan and Basque to examine the effect of bilingualism on the SRs in Catalan and Basque more accurately.

References

- Bhatia, T. K., & Ritchie, W. C. (Eds.). (2006). *The handbook of bilingualism*. Wiley-Blackwell.
- Bosch, L., Costa, A., & Sebastián-Gallés, N. (2000). First and second language vowel perception in early bilinguals. *European Journal of Cognitive Psychology*, 12, 189-221.
- Cutler, A., Mehler, J., Norris, D., & Segui, J. (1992). The monolingual nature of speech segmentation by bilinguals. *Cognitive psychology*, 24(3), 381-410.
- Hualde, J. I. (2005). *Catalan*. Routledge.
- Hualde, J. I., & Jon Ortiz de Urbina (Eds.). (2003). *Grammar of Basque*. Mouton De Gruyter.
- Miley, T. (2006). The constitutional politics of language policy in Catalonia, Spain. *Adalahs newsletter*, 29.
- Pellegrino, F., Coupé, C & Marsico, E. (2011). A cross-language Perspective on Speech Information Rate. *Language*, 87(3), 539-558.
- Skerrett, D. M. (2010). Language & authoritarianism in the 20th century: the cases of Estonia and Catalonia. *Eesti Rakenduslingvistika Ühingu Aastaraamat (Estonian Papers in Applied Linguistics)*, 6, 261-276.
- Yeni-Komshian, G. H., Flege, J. E., & Liu, S. (2000). Pronunciation proficiency in the first and second languages of Korean-English bilinguals. *Bilingualism Language and Cognition*, 3(2), 131-150.

