PERCEPTION OF L1 SPEECH OF LATE CZECH-FRENCH BILINGUALS BY CZECH MONOLINGUALS

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ABSTRACT

This study examines the perception of L1 speech of 14 late Czech-French bilinguals who have been living in France for at least two months by Czech monolinguals. We wanted to know whether native speakers judge the L1 production of late Czech-French bilinguals differently from the L1 production of Czech monolingual. The perceptual experiment involved samples taken from L1 production of the bilinguals and Czech monolinguals in a reading task and a semi-spontaneous speech task and was submitted to 17 Czech students of phonetics in the Charles University in Prague. The results show a significant difference between the perception of L1 speech of bilinguals and monolinguals and between the two production tasks.

Keywords: L1 attrition, cross-linguistic influence, perception, late Czech-French bilinguals

1. INTRODUCTION

In the field of Second Language Acquisition (SLA), Sharwood Smith (1983) introduced the term of cross-linguistic influence (CLI) to refer to the influence of the learner's L1 on the L2 as well as the one of the L2 on the L1. The first case, i.e., CLI of the L1 on the L2, was and remains a topic of numerous studies at the phonetic level (see, e.g., Aoyama & Guion, 2007; Colantoni & Steele, 2007; Curtin, Goad & Pater, 1998; Flege, 1987b; Kijak, 2009; Major, 1986). However, the second case (the influence of the L2 on the L1) has received less attention and is investigated mostly in research on L1 attrition, defined as "the natural consequence of decrease in the use of a language" (Köpke, 2019: 365). Following Major & Baptista (2009), there are now several studies on phonetic language attrition and CLI in L1 production (see, e.g., Bullock, Dalola, & Gerfen, 2006; Chang, 2012; de Leeuw, Mennen & Scobbie, 2012; Stoehr, Benders, Van Hell, & Fikkert, 2018) while studies of L2 impact on L1 perception are less frequent (cf. Cancila, Celata, & Giannini, 2005; Major & Baptista, 2009; Ventureyra, Pallier, & Yoo, 2004).

Moreover, the language combinations investigated are still limited. For example, there is no study on the influence of L2 French on L1 Czech at the phonetic level, although several interesting phonetic contrasts exist between these languages both at segmental and suprasegmental levels (cf. Paillereau, 2015; Skarnitzl, Šturm, & Volín, 2016). Hence, our study focuses on phonetic attrition and CLI of L1 Czech of late Czech-French bilinguals (hereafter CF) living in France. In this paper, we investigate whether there are perceptual differences between the L1 speech produced by CF and Czech monolingual speakers, i.e., Czechs living in Czechia (hereafter C).

Studies on phonetic CLI and attrition are generally based on acoustic measures (cf. Dmitrieva, Jongman, & Sereno, 2010; Lord, 2008; Major, 1992; Mayr, Price & Mennen, 2012; Mennen, 2004, among others) as well as perceptual experiments (e.g., de Leeuw, 2009; Sancier & Fowler, 1997). The latter are often used prior to acoustic analysis in order to test the correspondence between perceptual and acoustic findings (de Leeuw, 2009). Similarly, the present study reports on the results of a Perceptual Test (hereafter PT), which will be enriched by the results of acoustic analyses later on.

2. METHOD

2.1. Material

The speech samples used in the PT have been elicited in a reading task (RT) and in semi-spontaneous speech (SS). In the RT, the speakers read a short paragraph chosen from the book *Jak se co dělá. O*

lidech (Čapek, 1960). In the SS, they talked for one minute and a half in Czech about one or more proposed topics such as plans for holidays or the next weekend, describing a typical day, job, studies, family, hobbies, etc. Bilinguals were asked not to mention that they live in France. Reading and semi-spontaneous speech are commonly used in studies of phonetic CLI and attrition (e.g., Bullock *et al.*, 2006; de Leeuw, 2009; Major, 1992; Mennen, 2004) and their use here will facilitate comparison across studies. It also allows us to examine whether phonetic attrition and CLI are more obvious in semi-spontaneous speech than in reading, as observed by Major (1992).

Flege's study (1984) showed that native speakers are highly accurate at identifying non-natives in segments of only 30ms. Schmid and Hopp (2014) report that full phrases or sentences are usually used for perceptual experiments; however, there seems to be no study investigating whether rating is more accurate in longer samples. Therefore, we used for our PT speech samples containing full sentences or clauses varying in duration from 1.2 to 13.28 seconds (average 5.23s). The samples were extracted from the production of two groups of speakers, C and CF. The distractors were extracted from the production of speech synthesis "Amazon Polly" (Text-to-Speech on AWS, https://aws.amazon.com/polly/) and one female French native speaker who both read a Czech text with segmental characteristics as close as possible to Common Czech but with French prosody.

CF and French native speaker were recorded in a quiet recording studio (PETRA) at University Toulouse Jean-Jaurès using a Neumann TLM 49 microphone and sound card MOTU ULmk3. They received a small reward for participation. Audio files obtained from speech synthesis were played in high-quality loudspeakers in this studio and recorded with the same material. This procedure aimed at reducing the slightly artificial sound background of speech synthesis sound files and rendering these sound files more authentic. C were recorded in a quiet, comfortably furnished office with a low level of ambient noise and short natural reverberation in Prague. A head-mounted condenser microphone (Bayerdynamic Opus 55) was plugged directly into a pocket recorder set to uncompressed 48 kHz 16-bit mode.

All recordings were orthographically transcribed in Praat (Boersma & Weenink, 2019). The original 44 100 kHz recordings of D and CF were resampled to 48 kHz according to the original 48 Hz C' recordings. This resampling was necessary for running the experiment in Praat. We also adjusted the loudness of samples in Audacity in a way that all samples were perceptually similar in loudness.

The PT comprised 77 samples. There were 56 samples from CF (38 samples from SS and 18 from RT), 14 samples from C (9 from SS and 5 from RT), and 7 samples from D (5 from SS and 2 from RT). For each speaker, we extracted at least one sample and at most six samples. From the production of CF, we chose the samples with phonetic phenomena unusual for Common Czech but not rare in the CF' production. To the best of our knowledge, there are no studies investigating whether the proportion of bilinguals' and monolinguals' samples in perceptual experiments influences the perception of phonetic attrition and CLI. For SLA, Flege and Fletcher (1992) showed that, with a higher proportion of native samples, the non-native samples create an impression on the listener to be heavily foreign-accented. This is why the proportion of bilinguals' versus monolinguals' samples in perceptual experiments in studies of phonetic attrition is usually varied although there is no rule indicating the right proportion (cf. de Leeuw, 2009; Schmid & Hopp, 2014). For the present study, we followed Schmid and Hopp (2014), who used four times more bilinguals' than monolinguals' samples.

2.2. Speakers

As shown by Hollien & Ship (1972) and Chevrie-Muller, Dodart, Seguir-Dermier & Salomon (1971), the age from 20 to 50 years matches the period of f0 stability (Chevrie-Muller *et al.*, 1971; Hollien & Ship, 1972). Hence, we included only speakers aged from 20 to 50 years in our study.

2.2.1. Control group

The monolingual group (C) comprised 11 native Common Czech speakers (2 males, 9 females, mean=34.83 years) living in the Central Bohemian region of the Czech Republic.

2.2.2. Experimental group

The bilingual group (CF) included 14 native Common Czech speakers (1 male, 13 females, mean=34.43 years) living in the Toulouse area (*n*=13) or Paris (*n*=1). Following Lang & Davidson (2017), we divided CF speakers into two sub-groups: five of them (E) had a Length of Residence (LOR) in France of less than 5 years (mean=2,32 years) and nine (A) for 5 years and more (mean=14,55 years).

2.3. Listeners

The PT was administered to 17 native speakers of Czech, students at Charles University in Prague. Sixteen of them were students in the first year of the bachelor of phonetics, and one was a Ph.D. student in phonetics. None reported any hearing or speech disorders.

2.4. PT procedure

The total duration of the PT (each sample presented only once) is approximately 25 min. The testing took place in a quiet room using headphones.

A forced-choice identification test (cf. McGuire, 2010), was created in the Praat multiple forced-choice (MFC) environment. Participants had to rate whether the sample seemed to be "absolutely Czech" or "absolutely French" on a 5-degree scale (1="absolutely Czech," 5="absolutely French"). They were allowed to replay each sample five times, pass over to the next sample with the 'Next' button, or correct their response with the 'Oops' button. Samples were randomized and separated by a desensitization beep. Every twenty samples, the participants were invited to take a short break, where they could listen to a short song (approx. 30s).

The PT was preceded by a training session involving seven items in order to check comprehension of the instruction asking them to judge samples of Czech that may be produced either by a French speaker, a Czech living in the Czech Republic or a Czech living in France on a scale of 1 to 5 (see above). If they noticed phenomena unusual for Czech, they were invited to list them in an Excel sheet (only for ratings 2 to 4). These observations helped us enrich the list of phonetic phenomena to be examined in the acoustic study.

2.5. Analysis

The data were analyzed in RStudio (R Core Team, 2019) using the packages *lme4* (Bates, Maechler, Bolker & Walker, 2015), *dplyr* (Wickham, François, Henry & Müller, 2019), *rPraat* (Bořil, & Skarnitzl, 2016), and *ggplot2* (Wickham, 2016). We computed a mean value of the responses provided for each speaker (meanResponse) in one or both tasks as follows taken into account (1) means per item, (2) means per speaker. The significance level was set at $\alpha = 0.05$ (confidence interval=95%).

In order to test our hypothesis, we performed two linear mixed-effects models. In the first model, we analysed the relationship between group and meanResponse and between task and meanResponse. In the second, we analysed the relationship between sub-group and meanResponse and between task and meanResponse. For both models, we had intercepts for speakers and subjects as random effects. As fixed effects, we entered group and task into the first model and sub-group and task into the second model. In both models, the fixed effects were tested with and without interaction.

Visual inspection of residual plots did not reveal any obvious deviations from homoscedasticity or normality. P-values were obtained by likelihood ratio tests of the full model with the effect in question against the model without the effect in question. The distractors were excluded from all analyses.

3. RESULTS

Fig. 1 shows a visible difference in meanResponse depending on the group, task, and sub-group factors confirmed statistically by the two models. In the first model, the analysis showed that meanResponse was affected by group ($x^2(1)=10.644$, $p=0.0011$) and task ($x^2(1)=13.566$, $p=0.0002$), but there was no significant inter-dependence between group and task ($p=0.1385$). In the second model, the analysis

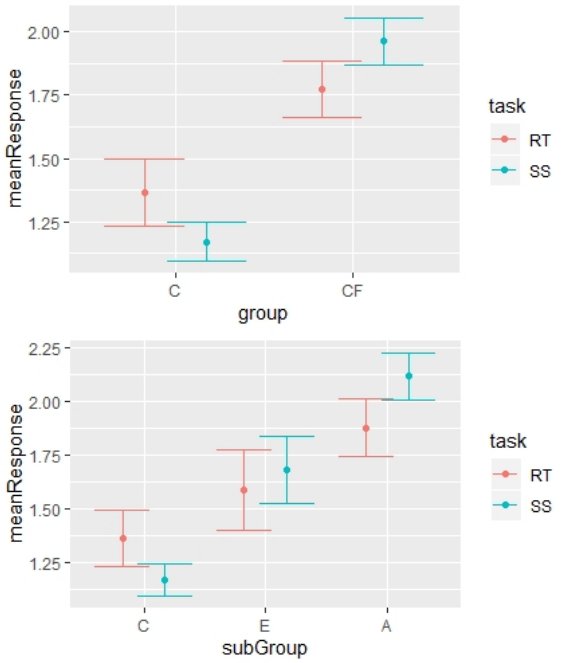

Figure 1: MeanResponse by group and by sub-group. RT=reading task, SS=semi-spontaneous speech, C=Czech monolinguals, CF=late Czech-French bilinguals, E=CF with LOR < 5 years, A=CF with LOR > 5 years.

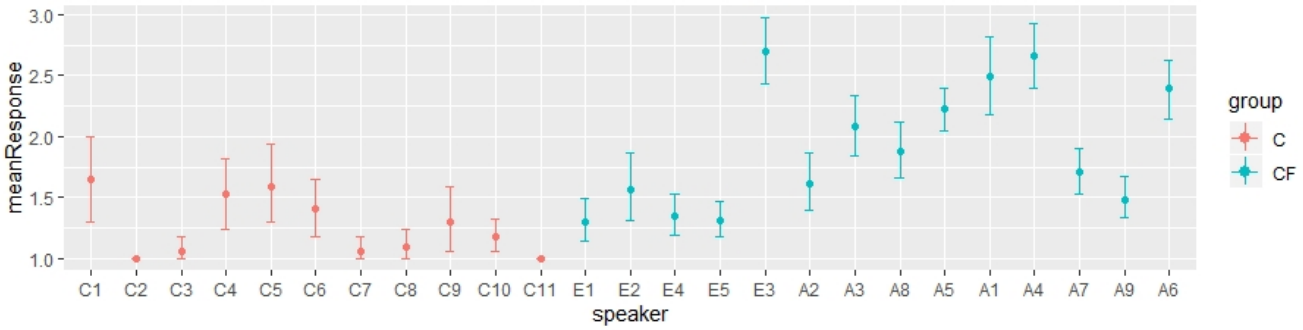

Figure 2: MeanResponse by speaker. CF are ordered from left to right with increasing LOR. C=Czech monolinguals, CF=late Czech-French bilinguals, E=CF with LOR < 5 years, A=CF with LOR > 5 years.

showed that meanResponse was affected by sub-group (x2(2)=13.219, p=0.0013), and task (x2(1)=13.401, p=0.0003), but there was no significant inter-dependence between sub-group and task (p=0.1027).

In brief, as expected, monolinguals speakers (C) were evaluated as speakers whose production was closest to typical Czech pronunciation, then came the bilingual Czechs with LOR < 5 years (E), and then the bilingual Czechs with LOR > 5 years (A). The distractors' production was evaluated as "absolutely French" with meanResponse of 4.91 ± 0.10 for RT and of 4.93 ± 0.06 for SS. Moreover, CF were better evaluated in the RT than SS. Interestingly, the contrary was observed for the control group: monolinguals were rated less native-like in the RT than in SS.

Results per speaker detailed in fig. 2 show that inter-speaker variation is higher in CF speakers than in C speakers. Ordering speakers by LOR suggests no linear relation between LOR and meanResponse.

4. DISCUSSION AND CONCLUSIONS

The present study showed that production in Czech of Czechs living in France is perceived by native speakers of Czech with experience in phonetics as deviating from the usual pronunciation of the Czech language. The study also demonstrated that in the bilinguals' groups, the influence of French is more perceptible in semi-spontaneous speech than in the reading task. These two main results confirm our initial hypothesis based on previous studies (de Leeuw, 2009; Major, 1992; Schmid & Hopp, 2014).

This study showed the important inter-speaker variation in both bilinguals' sub-group and no linear relation between LOR and perceived phonetic CLI. Indeed, to the best of our knowledge, no study in phonetic CLI and attrition proved any universal LOR since which phonetic CLI appears in L1 production. It was shown that phonetic drift may appear after 5 weeks of L2 intensive classes (cf. Chang, 2010, 2012) or one hour of intensive training of target vowels (cf. Kartushina, Hervais-Adelman, Frauenfelder & Golestani, 2016). Nevertheless, other studies did not confirm such a rapid shift (see "Study Abroad group" in Lang & Davidson, 2017). Likewise, Chang (2013) showed that phonetic drift occurs more in novice learners than in experienced learners. Conversely, other studies found more drift in graduate learners' (Herd, Walden, Knight & Alexander, 2015) or in attriters' production (Lang & Davidson, 2017) than in beginning learners, and that the better speakers' mastery of L2 is, the more L2-like their L1 production (Major, 1992). Because of the discrepancy of these results and missing linear relation between LOR and meanResponse in fig. 2, we suppose that perceived phonetic CLI is due to multiple sociolinguistic factors such as speaker's language use, proficiency, and others, and not only to LOR.

Finally, the results of PT merits to be verified by acoustic analysis. The listeners' observations invite us to explore, namely vowels' quantity and quality, intonation, accent, the pronunciation of /r/, /r̠/, and /r̥̠/ sound, and fricative consonants. In the oncoming study, we will compare the results of acoustic analysis with the results of PT and explore them in relation to sociolinguistic factors.

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