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Speech Production of French Immersion Children

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INTRODUCTION

To date, limited research, especially at the phonetic level, has been conducted to examine L2 acquisition in French immersion students living in an L2 minority environment.

Previous Research

o Sancier & Fowler (1997) suggest that across a number of years phonological learning can influence production of native L1 and the less established L2.

o Flege (1995) suggests that early L2 exposure promotes the organization of two separate language systems. In contrast, late L2 learning may lead to an undifferentiated system.

o Factors shown to influence L2 acquisition: age of learning (Guion, 2003), quality of the L2 input (Mackay, Flege, Piske, & Schirru, 2001), length of exposure (Bohn & Flege, 1992), daily use of L1 and L2 (Flege, Bohn & Jang, 1997), status of L1 and L2 in the society (Mougeon & Beniak, 1991), and speakers' motivation and attitudes (Oxford & Shearin, 1994).

The Current Study

o Voice onset time (VOT) refers to the time elapse between the release of the stop occlusion and the onset of vocal cord vibration in the subsequent vowel.

o We assessed VOT in French immersion students.

o French immersion is a form of bilingual education for L1 English speakers. These children are immersed in an artificial L2 French environment for 35 hours per week.

o The stop consonants of focus were labial /p/ and /b/, alveolar /t/ and /d/, and velar /k/ and /g/.

o In English:
- voiceless stops [/p/,/t/,/k/] in word initial position are aspirated and have long-lag VOT values
- voiced stops [/b/,/d/,/g/] are unaspirated and have short lag VOT values

o In French:
- voiceless stops [/p/,/t/,/k/] are unaspirated and have short lag VOT values
- voiced stops [/b/,/d/,/g/] consist of prevoicing resulting in lead (negative) VOT values.

RESEARCH QUESTIONS

1. What is the developmental pattern of the French voicing contrast in children of different grades and do children achieve a more native-like proficiency as the amount of exposure increases?

2. Are children able to maintain two separate language systems at different stages of learning?

METHODS

Participants

o 42 French immersion students in Alberta (6-10 years of age); see Table 1.

o All native English speakers enrolled in French Immersion.

o Started learning French prior to the age of 6 and speak no other languages.

	Grade 1	Grade 3	Grade 5
Males	N = 3 M = 6.42 SD = 3.61	N = 5 M = 8.56 SD = 4.81	N = 7 M = 10.44 SD = 2.90
Females	N = 8 M = 6.45 SD = 3.71	N = 9 M = 8.65 SD = 1.49	N = 10 M = 10.46 SD = 3.92
Total	N = 11 M = 6.44 SD = 3.48	N = 14 M = 8.61 SD = 2.96	N = 17 M = 10.45 SD = 3.44

Table 1; Mean Age & Standard Deviation Breakdown of Participants

Task & Sample Materials

o Word repetition task – repeating each word after viewing a visual stimulus (image) accompanied by an auditory stimulus (voice recording).

o English/French tasks performed on different days; words pre-recorded from an English/French native speaker (see Table 2).

Initial target stops	Number of tokens	English target words	French targets words
/p/	9	peacock; paddle; pool	piger; panier; pousser
/b/	9	bee; bat; boot	bijoux; banane; bouton
/t/	9	teeth; tattoo; two	tissu; table; toucher
/d/	9	deer; dad; dude	diner; date; douze
/k/	9	kiwi; cat; cougar	kilomètre; cage; cou
/g/	9	geek; gas; goose	guitare; garage; goût

Table 2; Target Stops & Stimuli Breakdown Examples

Acoustic Parameters

Using *Praat* software for sound spectrogram & VOT extraction:

o Burst: release of oral constriction

o Voicing bar: onset of vocal cord vibration

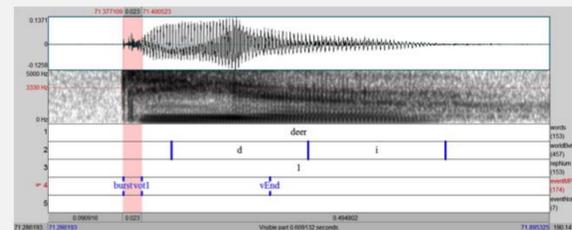o VOT: Measured the distance between *burst* and *voicing bar*

Figure 1. Target English /d/ production example of Spectrogram from Praat
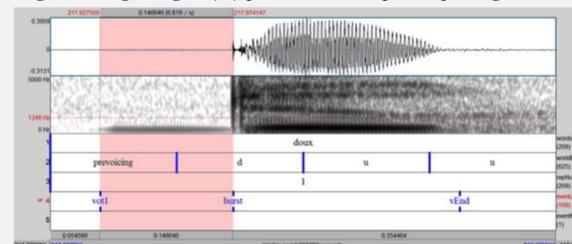

Figure 2. Target French /d/ production example of Spectrogram from Praat

RESULTS

o Analysis: Repeated measures ANOVA, Dependent variable: VOT, Independent variables: Grade, Language.

o Findings revealed a significant main effect of language for all voiceless stops:
For /p/, ($F_{(1,39)} = 47.89$, $p < 0.01$), for /t/, ($F_{(1,39)} = 71.24$, $p < 0.01$), and for /k/, ($F_{(1,39)} = 26.79$, $p < 0.01$).

o Follow-up pairwise comparisons revealed a significant difference between English and French VOT values within each grade for /p/ (see Figure 1), /t/ (see Figure 2), and /k/ (see Figure 3).

o No significant differences between the two languages in the production of voiced stops.
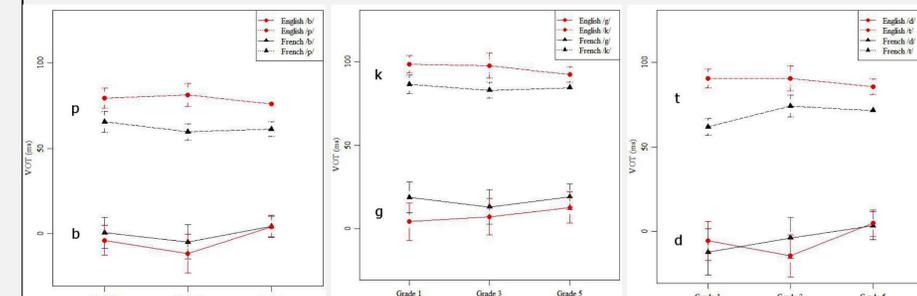
o No significant differences across grades.

Figure 1: French immersion children's production of word-initial /b/ and /p/ in both English and French. For each grade, the symbol represents the mean VOT values, and the bars indicate 95% confidence interval.

Figure 2: French immersion children's production of word-initial /k/ and /g/ in both English and French. For each grade, the symbol represents the mean VOT values, and the bars indicate 95% confidence interval.

Figure 3: French immersion children's production of word-initial /t/ and /d/ in both English and French. For each grade, the symbol represents the mean VOT values, and the bars indicate 95% confidence interval.

DISCUSSION

o No developmental trend was observed across grades.

o Early French immersion children are maintaining two separate language sound systems in the production of voiceless stops.

o An interaction between the two language systems is occurring in the production of voiced stops.

o Native-like French VOT production patterns were not attained.