Applied Psycholinguistics (2022), **43**, 463–484
doi:10.1017/S0142716421000618

CAMBRIDGE UNIVERSITY PRESS

ORIGINAL ARTICLE

Acquiring the language of instruction: Effect of home language experience

Sadek Hefni Shorbagi, Claudia Dias Martins and Ellen Bialystok*

York University, Toronto, ON, Canada
*Corresponding author. Email: ellenb@yorku.ca

(Received 8 June 2021; revised 19 November 2021; accepted 30 November 2021; first published online 28 January 2022)

Abstract

The study followed 6-year-old children in Canadian French Immersion for three years to investigate the effect of home language background on acquisition of French, the language of schooling. None of the children knew French before beginning the program. French proficiency was indicated by French vocabulary and verbal fluency tasks. A language background questionnaire was used to (a) assign children to monolingual or bilingual groups and (b) provide a continuous score for degree of bilingual experience. Categorical analyses showed bilingual children had smaller English vocabulary than monolingual children when they entered the program. For French vocabulary, categorical comparisons revealed no language group differences in the first two years but higher French scores for bilingual children in the third year. In contrast, analyses of the continuous scores revealed a relation between more bilingual experience and higher French vocabulary throughout. Similarly, categorical analyses of verbal fluency results indicated no significant language group differences for either semantic or phonological fluency, but continuous analyses of semantic fluency showed an association between more bilingual experience and better outcomes in each year. These results suggest that language experience impacts progress in learning the language of schooling and that different analytic approaches reveal different aspects of the pattern.

Keywords: language development; bilingual education; bilingualism; verbal fluency; vocabulary

For many children, the language of schooling is different from the language of the home and sometimes also different from the language of the community. In these cases, education involves not only the acquisition of the curriculum but also the acquisition of the language through which that curriculum is conveyed. The mismatch between the home or community language and the instructional language in school can arise either through a deliberate choice by parents to expose children to a new language for their education or as a consequence of such factors as immigration. Despite substantial differences across individual children and specific programs, all these situations in which a new language is used for school instruction are consumed under the umbrella of bilingual education (Bialystok, 2018), and in all

cases, children need to learn that new language to progress in school. But to what extent does children's previous experience with learning and using other languages impact that central educational necessity? If such an impact can be observed, it extends beyond successful language learning to potentially influencing academic achievement since proficiency in the language of schooling is prerequisite to mastery of the curriculum (Pace et al., 2019). The results could also have implications for the appropriateness of bilingual education for children with diverse language backgrounds. This is the issue addressed in the present study.

Because of the large number of factors that make bilingual education situations different from each other, it is important to hold constant the program to control the language learning experience. The present study focuses on Canadian French Immersion. These programs are a successful approach to foreign language education and constitute one form of bilingual education. The program was first established in 1962 at the Toronto French School, a private institution (Barik & Swain, 1978), and subsequently expanded into public school systems across Canada. The structure is that English-speaking students who live in an English-speaking community are taught the curriculum entirely in French until later grades, typically Grade 4, when English is introduced. There are different varieties of the program based on various ratios of English and French instruction with different timetables for the introduction of English, but it is the standard version, Early French Immersion, that has been the focus of most research, including the present study. Typically, students in these programs have come from middle-class anglophone families, generally with no exposure to French outside of school.

In the early years of the program, many evaluation studies demonstrated the success of the program in maintaining English language proficiency and academic abilities while instilling high levels of French proficiency (Barik & Swain, 1975, 1976, 1978; Lambert et al., 1993). For these reasons, the programs grew in popularity such that between 1998 and 2018, there was a 41% increase in enrollment nationally, with 61% of the increase accounted by the province of Ontario (Statistics Canada, 2020). Along with this growth in popularity has been a demographic shift in the students that reflects the growing diversity of the Canadian population. Accordingly, students enrolled in French Immersion now are less homogenous than when the program was first established and evaluated (Swain & Lapkin, 2005). All the children are being educated in a language that is different from the community but for some children that language is also different from that in the home. Therefore, children who are initially "monolingual" are becoming bilingual, whereas children who are initially "bilingual" are becoming trilingual. Although some studies have examined the motivation of immigrant parents for choosing these programs (Dagenais & Day, 1998, 1999; Dagenais et al., 2006; Dagenais & Berron, 2001), the educational efficacy of these programs for diverse students who speak a different language at home remains largely unknown. Specifically, progress in French may be different for children with diverse language backgrounds for whom French is a third language than it is for the original population of anglophone children in French Immersion.

Although some previous research has addressed potential differences in language acquisition for monolingual and bilingual groups, the results are inconsistent. Most of this research has been conducted with adults to investigate differences between second- and third-language acquisition (Puig-Mayenco et al., 2020), but the main

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

interest in those studies is in establishing whether acquisition of a new language occurs through holistic transfer or feature-by-feature transfer from the first or second language (White, 2020). Moreover, those studies primarily investigated adults for whom the first (and in some cases, second) language was well established, making the learning conditions substantially different from those encountered by children in bilingual education.

There is some research examining this question with children learning a foreign language in a non-immersion educational context. Lorenz et al. (2020) reported no difference in the acquisition of English by monolingual (second language) and bilingual (third language) adolescents in Germany, but potential cultural and socioeconomic differences may have impacted results. Little information was provided regarding parental education, parental proficiency in English, or interaction with the English language outside of the classroom, and it is possible that there were socioeconomic differences between the language groups. However, other studies with younger children have indicated that bilingual children outperformed monolingual children on various proficiency tests in the target language (Hopp et al., 2019; Lorenz et al., 2019; Siemund & Lechner, 2015; see Hirosh & Degani, 2018 for review). Therefore, the effect of home language experience on language learning for young children remains unclear.

There is, however, some research on this question within French Immersion programs. Au-Yeung et al. (2015) compared children who were English speakers (monolingual) with English learners (bilingual) as determined by language use at home, first language spoken, and parents' country of origin, on English and French proficiency. For English phonological awareness and word reading, both groups performed similarly, but English speakers outperformed English learners on English expressive and receptive vocabulary across Grades 1 to 3 (6–9 years old). Moreover, there was more rapid growth by the English learners over that time. For French phonological awareness, vocabulary, word reading, and reading comprehension, the two groups performed similarly. Overall, despite differences between the two groups in English vocabulary, French Immersion did not hinder language and literacy skill development for English learners.

In contrast to those results, Bild and Swain (1989) reported that bilingual children in a French Immersion program outperformed monolingual children on measures of French proficiency. In a later study, Swain et al. (1990) assessed French proficiency of students enrolled in a program in which English was the primary language of instruction until Grade 5 after which French and English were used equally. Grade 8 students with no heritage language (HL) were compared to those with various degrees of proficiency in a HL, corresponding to the groups of English speakers and English learners in the study by Au-Yeung et al. However, contrary to the results of Au-Yeung et al. (2015) with younger children, these authors reported better French proficiency for children who spoke a HL at home than for those who spoke only English, but only for those who were literate in the HL (discussion in Swain & Lapkin, 2005). Similar results were reported by Bérubé and Marinova-Todd (2012) who also found that the typology and writing system of the home language impacted children's progress in French Immersion such that children who were literate in an alphabetic home language made greater progress in French reading than did children who were monolingual (aside from

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

French) or whose home language was not written alphabetically. In a review of this literature, Cenoz (2013) argues that overall bilinguals learning a third language in various bilingual education programs are more successful than monolinguals.

Aside from any potential impact on learning a new language, it is well established that bilingualism impacts vocabulary size in each language. Bilingual children (Bialystok et al., 2010; Meir & Armon-Lotem, 2017; Oller et al., 2007) and adults (Bialystok & Luk, 2012) have a smaller average vocabulary in each language than monolingual speakers of that language. For example, Bialystok et al. (2010) analyzed the Peabody Picture Vocabulary Test (PPVT-III) scores of 1,738 English monolingual and bilingual children aged 3–10 years old and found significantly larger English vocabulary for monolinguals. However, an analysis of a subset of 6-year-olds indicated that this vocabulary difference was found for words typically used in the home but not for words more likely to be used in school for which children in both groups performed similarly. Vocabulary size contributes to school achievement (Murphy et al., 2016; Kastner et al., 2001; Ouellette, 2006; Rohde & Thompson, 2007; Smith et al., 1991), but more detailed indicators than overall vocabulary size are needed to understand these relations.

An example of the complex relation between vocabulary size and academic uses of language comes from performance on verbal fluency tests. Semantic fluency, in which participants generate words to fit a category, is primarily a measure of vocabulary, whereas phonological fluency, in which participants generate words to conform to an initial sound, additionally requires executive functioning, a more academic ability related to literacy and metalinguistic awareness. Imaging studies of adults performing fluency tests confirm the distinction between semantic and phonological fluency by identifying different brain regions implicated for each (Grogan et al., 2009). Therefore, initial differences in vocabulary size impact both fluency tests but in different ways. In a study of children, 7 to 10 years old, analyses controlling for vocabulary showed that monolinguals and bilinguals performed similarly on both fluency measures (Friesen et al., 2015). These results indicate that the ability to use language to perform tests such as verbal fluency is different from estimates of passive vocabulary and potentially more predictive of academic success.

In all these studies, comparisons were made between children designated as monolingual or bilingual, but the definition of "bilingual" is itself a matter of some controversy. Although the term defies simple classification (Luk & Bialystok, 2013), studies have defined it by referencing such factors as age of acquisition of the second language, method of language acquisition, level of proficiency, contexts of use, and presence of literacy, all of which impact outcomes (Surrain & Luk, 2019). Therefore, more recent studies with both children (Brito & Barr, 2012; Guerrero et al., 2016) and adults (DeLuca et al., 2019; Pot et al., 2018; Xie, 2018) have instead considered the continuous relation between aspects of bilingual experience and specific outcomes.

The continuous nature of bilingual experience is particularly important in a diverse community consisting of many languages and different language use patterns where it is common for children to have some exposure to other languages. Such linguistically diverse contexts have been shown to influence language learning even for monolinguals. Bice and Kroll (2015, 2019) reported that monolinguals in diverse environments produced event-related potentials (ERP) in a language

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

learning task that were more similar to those produced by bilinguals than they were to those of monolinguals from a linguistically homogeneous environment. Further, these ERP patterns were evident early in the language learning process (Bice & Kroll, 2015) and were found despite no differences between groups in behavioral outcomes (Bice & Kroll, 2019). Therefore, the context in which language learning occurs as well as previous experience with other languages impact subsequent language learning.

The central question for the present study is whether children's experiences with other languages impact their progress in learning French, the language of instruction in French Immersion programs. Despite mixed evidence from the literature, the prediction was that children entering the program as bilingual will make greater gains in French than children entering the program as monolingual and that this difference will be found for both vocabulary and verbal fluency measures. However, since all children begin the program with no French proficiency, the differences may not emerge until the second year when an adequate base of French has been established. Moreover, because of differences regarding how bilingualism is defined and how progress is measured, the study compared two approaches used in this literature by defining bilingualism both categorically and continuously and evaluating performance outcomes from both approaches; categorical comparisons between groups provide an overview of large patterns and continuous analyses provide a more detailed and nuanced account of small changes in individuals over the continuum. Comparing these approaches may help to resolve some contradictions in the literature.

The study used a 3-year longitudinal design, beginning when children were 6 years old, to evaluate their progress in mastering French and compared results from categorical and continuous approaches to bilingualism. The study was conducted in Toronto, Canada, a majority English-speaking city in which 47% of the households do not use English as the primary or exclusive language of the home (Statistics Canada, 2016). However, because English is the clear majority community language, all children are immersed in English regardless of the home language. Therefore, in this context, the more children are exposed to a non-English heritage language at home, the more bilingual they are because English is the common community language. In all cases, English proficiency is in the normal range for all children.

Although the study was conducted in a specific context defined by one type of bilingual education program in a linguistically diverse community, the results have implications for understanding the relation between language background and learning the language of instruction more broadly. Academic progress requires mastery of the language of instruction, so it is imperative to understand factors that potentially impact that mastery.

Method

Participants

All the children began instruction in the Early French Immersion program in Senior Kindergarten when they were 5 years old so were in their second year of the program when this study began. The initial sample included 234 children (95 boys and

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

139 girls; 117 monolinguals and 117 bilinguals) in first grade who were 6.5 years old ($M = 80.3$ months, $SD = 3.5$, range = 73–87 months) and were recruited from 18 public schools in Toronto. All children were following the same Early French Immersion curriculum that was regulated by the School Board. Between Grades 1 and 3, instruction is carried out completely in French, and English is introduced in Grade 4, so the study was conducted while French was the only language of instruction. Between Year 1 and Year 2 of the study, there was an attrition of 40 children (17%) due to switching schools, switching programs, or non-renewal of participation, leaving a sample of 96 monolinguals and 98 bilinguals. However, between Year 2 and Year 3, there was an attrition of 85 children (44%) because the COVID-19 pandemic closed schools in March 2020 when we were about halfway through testing, resulting in a final sample of 54 monolingual and 55 bilingual children. Note that we refer to the Year of data collection as 1, 2, or 3 to emphasize the timeline of the longitudinal study but these years correspond to the Grade that children were in at each year of testing.

Language and Social Background Questionnaire (LSBQ)

Parents of participating children completed the LSBQ (Anderson et al., 2020) to provide demographic information about the family and information about the child's linguistic experiences in the home and community. Ninety-three percent of children were born in Canada, with the remaining 7% born in one of ten countries: China, Costa Rica, India, Iran, Israel, Mexico, Nepal, Oman, South Korea, and the USA. Just more than half of the parents (n = 122, 52%) reported that their child understood and/or spoke one of forty-one languages other than English or French, with the most prevalent being Spanish (18), Cantonese (10), Mandarin (10), Russian (9), and Tagalog (7). Children's proficiency in these languages varied greatly, with some children having reasonable comprehension but essentially no production of that language and others who actively used the language. Therefore, despite all of these children having bilingual experience, those experiences were very different in ways not captured by categorical assignment to language groups.

Questions about the child's linguistic experiences included the language(s) the child understood and spoke, the degree to which they spoke and were spoken to by members of the family and the community, and the language(s) used by the family and child for reading and other activities (e.g., watching television, listening to music). Parents used a 7-point scale to indicate the degree of linguistic experience for each activity with 1 representing only in English and 7 representing only in the non-English language. Because of the English community context described above, the higher the score for non-English activities, the greater the child's bilingual experience. The questionnaire asks parents to enter all languages used in the home, and none of the parents included French in the list. Children whose home language is French do not attend French Immersion programs but have the option of attending a parallel French language public education system.

To obtain a continuous measure of bilingual experience, these responses were used to calculate an overall score as described by Anderson et al. (2020). A factor analysis computed a series of correlations and derived 18 of the 37 questions clustering into three factors: adult language use in the home, child's non-English use

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

for media, and child's non-English use with siblings. Scores for each factor were calculated using the Thurstone method in the *factor.score* function from the *psych* package (Revelle, 2020) in RStudio (RStudio Team, 2020). A weighted sum of these factors based on their contribution to the variance of the overall composite was calculated to reflect overall bilingual experience by means of a composite factor score. This composite score accounts for 74% of the variance in the experiences reported on the questionnaire. The most influential component in this bilingualism factor score was adult language use in the home. The overall factor scores reflect a continuum of monolingual-to-bilingual experience for the whole sample and were standardized to a scale ranging from 0 to 8, with lower scores indicating more monolingualism and higher scores indicating more bilingualism. The composite scores were used as an independent variable in multiple linear regression analyses investigating outcomes as a function of degree of bilingual experience.

For the categorical classification of language groups, the composite score was used to create a median split (median = 2.41) producing two groups designated as monolingual or bilingual when they began the study. Thus, the terms "monolingual" and "bilingual" are relative designations rather than absolute ones; given the range of bilingual experiences in the sample and the pervasiveness of diverse languages in the environment, an absolute designation of monolingual or bilingual would not be meaningful. Both categorical (ANOVA) and continuous (multiple linear regression) analyses were used to evaluate the effect of linguistic experience on the outcome measures. Assumptions for multiple linear regression procedures were met, including normal distribution of the dependent variable, absence of outliers, absence of homoscedasticity violation, independence and normality of errors, and absence of multicollinearity between the independent variables.

The LSBQ also asked about parents' education level which was used as a proxy for socioeconomic status (SES). Parents indicated their highest level of education on a 5-point Likert scale in which 1 represented no high school diploma, 2 represented high school graduate, 3 represented some college or college diploma, 4 represented bachelor or first academic degree, and 5 represented graduate or professional degree. An average parental education score was calculated and subsequently used to determine mean level of education. Parents' education is considered to be a more sensitive measure of SES than income (Pollak & Wolfe, 2020). The SES level was relatively high and not different between language groups, but the continuous scores for SES were included in the regression analyses to investigate potential subtle influences.

Procedures

Approval to conduct research was given annually by the University and School Board Ethics Committees. School principals and teachers agreed to participate, and children in those classes were given recruitment packages for their parents/guardians to complete that included a consent form and LSBQ. All children who returned completed consent forms and questionnaires were included in the study. Children provided verbal assent prior to testing.

The tasks reported here were part of a larger battery that included a different set of cognitive measures in each testing year. Children were tested individually in a quiet space in their school for two sessions, typically separated by one week, with each

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 1. French verbal fluency trials (and examples) by condition (semantic and phonology) and year

	Year 1	Year 2	Year 3
Semantic	1. Animaux (Grenouille) 2. Vêtements (Chapeau)	1. Mode de transportation (Voiture) 2. Des choses à manger et boire (bœuf)	1. Des choses qu'on trouve dans la cuisine (Bol) 2. Occupation ou une sorte de travail (Professeure)
Phonological	1. P (Pomme) 2. T (Tête)	1. M (Mère) 2. S (Soleil)	1. B (Bijoux) 2. D (Décorer)

session lasting around 30 minutes. English tasks were always presented in the first session and French in the second. All testers were native or near-native speakers of the language of testing, and the target language of testing was the only language used with the child in each session. The tasks were presented in a fixed order as part of the larger battery.

Tasks

Raven's standard progressive matrices (Raven et al., 2003)

In this standardized test of non-verbal spatial reasoning, children select one of six options to complete a complex pattern. Raw scores were converted to standard scores based on age ($\mu = 100$, $SD = 15$).

Peabody picture vocabulary test (PPVT-4; Form A; Dunn & Dunn, 2007)

This test assesses English receptive vocabulary. Children selected one of four pictures to match a word they heard. Following standard testing procedures, raw scores were converted to standardized scores ($\mu = 100$, $SD = 15$).

Échelle de vocabulaire en images Peabody (EVIP; Dunn et al., 1993)

This test of French receptive vocabulary includes two forms, A and B, each containing 170 items arranged in order of increasing difficulty. Form A was used in the Years 1 and 3 and Form B in Year 2. The task was normed on Francophone Canadians, a group whose French experience and proficiency is different from the current sample, so administration began for the youngest standardized group, ages 2½ to 3 years rather than establishing a basal starting point as described in the scoring manual. Data were recorded simply as total correct trials.

Verbal fluency

This task was administered annually in French in both semantic and phonological fluency conditions with two trials for each. Before each trial, the instruction was given with an example. Children were asked to produce as many words as they could in 60 seconds for each trial. Responses were digitally recorded, and a timer determined the end of the trial. The instructions for each year with the provided example are shown in Table 1. For phonological fluency, responses that began with the correct sound despite being written with a different letter, for example, "cent" or

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 2. Mean scores (and standard deviation) for background variables by categorical language group divisions for full sample in Year 1

	Monolingual	Bilingual
n	117 (68 girls)	117 (71 girls)
Average parents' education	3.83 (0.84)	3.98 (0.90)
Bilingualism factor score	1.40 (0.40)	4.65 (1.54)
Raven's fluid intelligence	103.16 (14.12)	101.37 (16.28)
PPVT English vocabulary	113.45 (14.67)	104.08 (14.18)

"certain," for "S," were counted as correct. Trained research assistants who were native or near-native French speakers and blind to participants' groups scored the digital recordings using the audio recording and editing software Audacity® (Version 2.3.0). The score was the number of correct words produced for each condition. Errors such as set loss and repetition were recorded but not analyzed. The difficulty of semantic categories varied over the years, and the implications of this for results are discussed below.

Results

Categorical analyses for differences between language groups

Background measures

Mean scores for background variables and non-verbal intelligence by language group are presented in Table 2. Chi-square test of independence demonstrated no difference in the ratio of girls and boys by language group, $\chi^2(1) = 0.07$, $p = .79$. One-way ANOVAs indicated no group difference for SES (parental education), $F(1,232) = 1.84$, $p = .18$, with the majority of participants having parents that attained a college diploma or higher level of education. Higher composite scores were observed for bilingual children than monolinguals, $F(1,232) = 491.63$, $p < .0001$, reflecting the way the groups were created. Non-verbal intelligence (Raven's) and English vocabulary (PPVT) were initially analyzed by 2-way ANOVA for language group and sex. There were no main effects of sex or interaction with language group, Fs$(1,230) < 1.35$, ps $> .24$, so subsequent analyses collapsed across this variable. There was no significant difference between language groups on Raven's, $F < 1$, but consistent with previous research, monolinguals had significantly higher PPVT English vocabulary scores than bilinguals, $F(1,232) = 24.71$, $p < .0001$, $\eta^2 = .10$.

French language measures

Table 3 presents mean scores for the full sample by language group over the three years. Separate analyses were conducted for each year because of the change in sample size. One-way ANOVAs for French receptive vocabulary (EVIP) revealed no language group differences in Year 1 or Year 2, Fs < 1, but in Year 3 the bilinguals obtained higher scores than monolinguals, $F(1,108) = 5.62$, $p = .02$, $\eta^2 = .05$. For semantic and phonological fluency, there were no language group differences in

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 3. French verbal measures by year of testing for each language group for the whole sample (ML: Monolingual; BL: Bilingual). Scores are the mean scores (and SD) for French receptive vocabulary (EVIP) and mean number of correct words (and SD) produced in each of the verbal fluency tests

	Year 1		Year 2		Year 3	
	ML (n = 117)	BL (n = 117)	ML (n = 96)	BL (n = 98)	ML (n = 55)	BL (n = 54)
Receptive vocabulary	31.38 (15.32)	31.05 (14.87)	41.67 (18.02)	42.11 (19.00)	52.56 (24.84)	63.00 (20.93)
Semantic fluency	10.02 (4.72)	10.88 (4.81)	9.46 (3.67)	10.03 (3.79)	5.12 (3.10)	5.68 (3.24)
Phonological fluency	6.98 (3.93)	7.16 (3.80)	9.72 (3.91)	10.48 (4.50)	10.90 (4.19)	10.85 (4.24)

Year 1, $Fs(1,231) < 1.91$, $ps > .16$, Year 2, $Fs(1,192) < 1.14$, $ps > .21$, or Year 3, $Fs(1,103) < 0.83$, $ps > .36$. Because there was a positive correlation between French vocabulary and semantic, $r(233) = 0.47$, $p < .0001$ and phonological fluency, $r(233) = 0.27$, $p < .0001$, ANCOVAs were conducted with EVIP score from each year as a covariate. The results confirmed no significant group effects, all $Fs < 2.74$, all $ps > .10$.

Longitudinal change

To examine trends across the three years of the study, children who participated in all three years were extracted from the full sample. Figure 1 reports the French vocabulary scores over the three years for this subset (n = 109) of participants. The data were analyzed with a 2-way repeated-measures ANOVA for language group and year. There was no main effect of language group, $F(1,107) = 1.23$, $p = .27$, but there was a main effect of year, $F(2,214) = 97.38$, $p < .0001$, $\eta^2 = .48$, showing improvement across the course of the study, and a significant interaction of year and language group, $F(2,214) = 5.64$, $p = .004$, $\eta^2 = .05$. A Tukey's HSD post hoc test of multiple comparisons revealed the effect of year was significant for all successive years, adjusted $ps < .0001$, but that the improvement for bilinguals was significantly greater than for monolinguals in Year 3, adjusted $p = .03$, $\eta^2 = .04$. Therefore, both language groups developed French vocabulary at a similar rate in the first two years, but by the third year, bilinguals improved significantly more than their monolingual peers.

A similar analysis was calculated for verbal fluency scores for children who completed the three years. These data are presented in Table 4. In this case, however, the evaluation of year is less reliable than in the previous analysis because task difficulty changed each year depending on the cues given – some semantic categories or sounds were simply easier to generate exemplars – so these results are more suggestive than conclusive. Each task was analyzed using a repeated-measures ANOVA for language group and year. For semantic fluency, there was no effect of language group, $F < 1$, but a significant effect of year, $F(2,204) = 132.32$, $p < .0001$, $\eta^2 = .56$, with no interaction between language group and year, $F < 1$. Similarly for phonological fluency, there was no effect of language group, $F < 1$, a significant effect of year,

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 4. French verbal fluency measures showing mean number of correct words generated (and standard deviation) for the subset of participants who completed all three years of testing (n = 109) by language group (ML: Monolingual, BL: Bilingual)

	Year 1		Year 2		Year 3	
	ML (n = 55)	BL (n = 54)	ML (n = 55)	BL (n = 54)	ML (n = 55)	BL (n = 54)
Semantic fluency	10.85 (3.91)	10.81 (4.10)	10.44 (3.57)	10.08 (3.87)	5.12 (3.10)	5.68 (3.24)
Phonological fluency	7.90 (4.26)	7.17 (3.94)	10.48 (3.82)	10.75 (4.58)	10.90 (4.19)	10.85 (4.24)

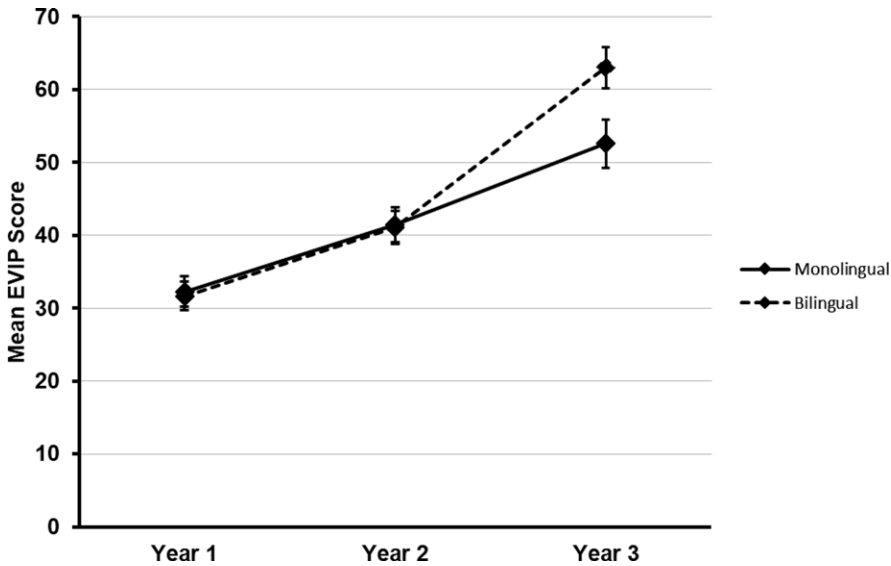

Figure 1. Mean EVIP Score (and Standard Error) for Children who Completed All Three Testing Sessions by Year and Language Group.

$F(1,102) = 41.99$, $p < .0001$, $\eta^2 = .29$, and no interaction, $F(1,102) = 1.01$, $p = .37$. The important outcome is that the relation between the language groups does not change with task difficulty in that children in both language groups are affected similarly.

Continuous analyses of bilingual experience for the whole sample

To examine the continuous effect of degree of bilingual experience on the outcome measures, multiple linear regression analyses were conducted for each dependent variable. Although SES was not included as a grouping variable in the categorical analyses, it was added to the regression models for completeness. The analyses were conducted separately for each year of testing. The models included the following

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 5. Regression models for French receptive vocabulary (EVIP) in each year based on full sample using bilingualism as a continuous variable

Variable	B	SE B	β	R^2	F
Year 1: $R^2 = 26.74\%$, $F(5,227) = 16.57$, $p < .0001$					
Sex	−0.11	1.78	−0.02	0.00%	0.01
Raven's score	0.09	0.06	0.10	6.03%	14.75**
PPVT score	0.49	0.07	0.49	23.55%	52.49***
SES	1.14	1.05	0.07	24.37%	2.49
Bilingualism	1.29	0.48	0.17	26.74%	7.33**
Year 2: $R^2 = 30.07\%$, $F(5,188) = 16.17$, $p < .0001$					
Sex	−3.81	2.37	−0.10	0.45%	0.86
Raven's score	0.13	0.08	0.11	7.05%	13.57**
PPVT score	0.62	0.08	0.51	25.79%	48.00***
SES	1.85	1.34	0.09	27.06%	3.27
Bilingualism	1.79	0.63	0.19	30.07%	8.10**
Year 3: $R^2 = 28.67\%$, $F(5,103) = 8.28$, $p < .0001$					
Sex	4.45	4.27	0.09	1.26%	1.37
Raven's score	0.04	0.14	0.03	2.52%	1.37
PPVT score	0.69	0.14	0.48	17.48%	19.03***
SES	4.2	2.28	0.16	21.48%	5.30
Bilingualism	3.50	1.08	0.30	28.67%	10.38**

Each variable is provided with its parameter estimate (B), standard error (SE) of B, standardized estimate (β), cumulative R-square (R^2), and the F-value with a symbol denoting whether the estimate is significant in the fitted model: ***< .0001, **< .01, *< .05, ~ < .1.

terms: sex, non-verbal intelligence (Raven's Progressive Matrices), English receptive vocabulary (Peabody Picture and Vocabulary Test), SES (parents' education), and bilingualism (composite factor score).

French vocabulary

Regression models for French receptive vocabulary in each year are shown in Table 5. All three models were significant. Significant contributions to EVIP scores came from Raven's scores, PPVT scores, and bilingualism in Years 1 and 2 and PPVT scores and bilingualism in Year 3, with Raven's losing its effect in the final year. The contribution of bilingualism to all three models contrasts with the categorical analyses of EVIP scores for which language group was only significant in Year 3. Instead, the continuous regression models indicate a constant and increasing effect of bilingualism on French vocabulary development over time. This increasing effect of bilingualism can be seen in the increase in slope of the regression line each year shown in Figure 2.

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

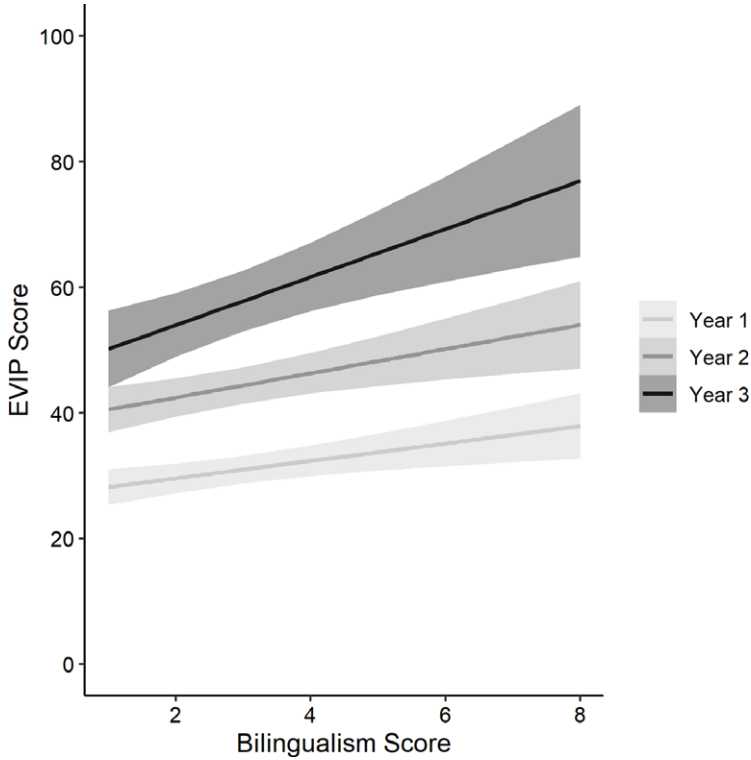

Figure 2. Regression Lines for Relation Between EVIP Score and Degree of Bilingualism for Each of the Three Years Based on the Full Sample.

French verbal fluency

The regression models for verbal fluency included EVIP scores to control for French vocabulary. The results for semantic fluency are presented in Table 6. The model was significant in all three years. The significant factors in Years 1 and 2 were Raven's scores, PPVT scores, EVIP scores, and degree of bilingualism, in all cases showing that higher values on these factors were associated with higher scores for semantic fluency. In Year 3, PPVT no longer provided significant explanation of the results, possibly indicating that the two languages were becoming more independent for these children; children's proficiency in French was less tied to their proficiency in English. The regression lines displaying the relation between semantic fluency and degree of bilingualism are presented in Figure 3. Unlike the EVIP scores, there is not a general increase across the years, and in fact, the scores are lowest for Year 3, presumably because the categories that year were simply more difficult. Despite no language group difference in the categorical analyses for the first two years, the continuous analyses indicate that bilingualism positively contributed to performance in each year.

The results of the multiple linear regression analyses for phonological fluency are shown in Table 7. The model was significant in Years 1 and 2 but not in Year 3. SES

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 6. Regression models for French semantic fluency in each year based on full sample using bilingualism as a continuous variable

Variable	B	SE B	β	R^2	F
Year 1: $R^2 = 27.01\%$, $F(6,226) = 13.94$, $p < .0001$					
Sex	−0.87	0.56	−0.09	0.60%	1.40
Raven's score	0.02	0.02	0.06	4.16%	8.54**
PPVT score	0.04	0.02	0.12	9.49%	13.49**
EVIP score	0.12	0.02	0.39	23.74%	42.60***
SES	0.45	0.33	0.08	24.80%	3.21
Bilingualism	0.44	0.15	0.17	27.01%	6.81**
Year 2: $R^2 = 18.87\%$, $F(6,187) = 7.25$, $p < .0001$					
Sex	−0.76	0.52	−0.09	0.48%	0.93
Raven's score	0.01	0.02	0.05	3.48%	5.93*
PPVT score	0.06	0.02	0.26	10.43%	14.74**
EVIP score	0.05	0.02	0.22	15.71%	11.84**
SES	−0.28	0.30	−0.06	15.84%	0.29
Bilingualism	0.37	0.14	0.19	18.87%	6.99**
Year 3: $R^2 = 21.46\%$, $F(6,87) = 3.96$, $p = .0015$					
Sex	0.05	0.67	0.007	1.18%	1.10
Raven's score	0.04	0.02	0.17	5.85%	4.52*
PPVT score	0.03	0.02	0.14	7.69%	1.79
EVIP score	0.04	0.02	0.28	17.68%	10.81**
SES	−0.05	0.37	−0.01	17.68%	0.0
Bilingualism	0.38	0.18	0.23	21.46%	4.19*

Each variable is provided with its parameter estimate (B), standard error (SE) of B, standardized estimate (β), cumulative R-square (R^2), and the F-value with a symbol denoting whether the estimate is significant in the fitted model: ***< .0001, **< .01, *< .05, ∼ < .1.

significantly contributed to performance in Year 1 in that children produced more words as a function of their parents' education, but none of the analyses indicated a significant contribution from degree of bilingualism and the entire model in Year 3 was not significant.

Discussion

All the children in the study entered a French Immersion program the year before the study began; none of the children knew any French at that time. Over the course of the study, children gained proficiency in French both in terms of vocabulary knowledge and more academic uses of French as evident in the verbal fluency tests.

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

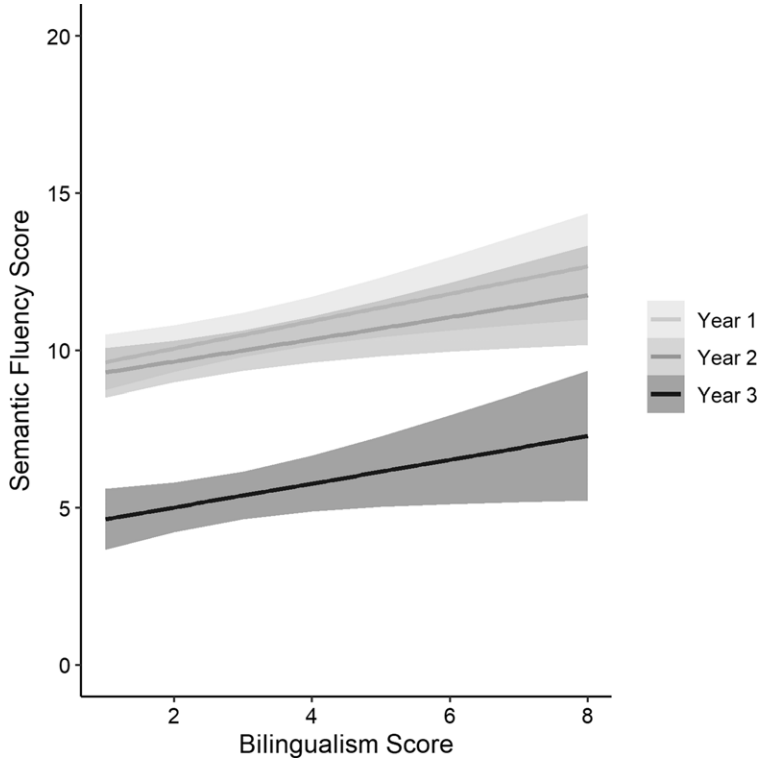

Figure 3. Regression Lines for Relation Between French Semantic Fluency Scores and Degree of Bilingualism for Each of the Three Years Based on the Full Sample.

Previous evaluation studies of children in these programs had reported successful learning of French and normal academic achievement, but the children in those studies were typically monolingual English speakers learning French as a second language. The question for the present study was whether home language background impacted children's success.

Three types of analyses were applied to the data. The first was to compare children classified as monolingual or bilingual by means of a median split on a continuous measure of language experience for their performance on the French tasks. Although the creation of these groups from continuous scores is novel, the comparison of outcome measures between two groups designated as monolingual or bilingual is the method most commonly used in the literature. The second was to evaluate the longitudinal aspect of the study by conducting these categorical analyses across three years of data to evaluate the trajectories of children in each language group. Third, the full range of bilingual experience was used as a continuous independent variable in multiple linear regression along with other background variables to assess its role in outcomes. All three methods revealed somewhat different information that together provides a more detailed description of children's progress than could be obtained from only one of them.

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

Table 7. Regression models for French phonological fluency in each year based on full sample using bilingualism as a continuous variable

Variable	B	SE B	β	R^2	F
Year 1: $R^2 = 10.50\%$, $F(6,226) = 4.42$, $p = .0003$					
Sex	−0.03	0.51	−0.00	0.00%	0.02
Raven's score	0.01	0.02	0.06	2.06%	4.83*
PPVT score	0.02	0.02	0.09	4.78%	6.53*
EVIP score	0.05	0.02	0.19	8.55%	9.40**
SES	0.54	0.30	0.12	10.13%	3.98*
Bilingualism	0.13	0.14	0.07	10.50%	0.95
Year 2: $R^2 = 10.45\%$, $F(6,187) = 3.64$, $p = .002$					
Sex	−0.72	0.62	−0.08	0.42%	0.81
Raven's score	0.02	0.02	0.07	2.71%	4.48*
PPVT score	0.04	0.03	0.16	5.63%	5.88*
EVIP score	0.04	0.02	0.17	8.64%	6.24*
SES	−0.08	0.36	−0.02	8.64%	0.0
Bilingualism	0.32	0.16	0.15	10.45%	3.77
Year 3: $R^2 = 2.45\%$, $F(6,87) = 0.36$, $p = .90$					
Sex	0.65	0.98	0.08	0.81%	0.75
Raven's score	0.006	0.03	0.02	1.09%	0.26
PPVT score	0.03	0.03	0.12	2.27%	1.08
EVIP score	0.004	0.02	0.02	2.33%	0.06
SES	−0.16	0.54	−0.03	2.42%	0.09
Bilingualism	0.04	0.27	0.02	2.45%	0.03

Each variable is provided with its parameter estimate (B), standard error (SE) of B, standardized estimate (β), cumulative R-square (R^2), and the F-value with a symbol denoting whether the estimate is significant in the fitted model: ***< .0001, **< .01, *< .05, ∼ < .1.

Considering first the group comparisons, at the beginning of the study the children in the groups designated as monolingual or bilingual were equivalent in most measures but, consistent with previous research, monolinguals had higher English receptive vocabulary scores than bilinguals (cf. Bialystok et al., 2010). Moreover, the scores were comparable to those found in previous research. In the study by Bialystok et al. (2010), the average PPVT scores for 6-year-olds (the age of children in Year 1 in the present study) for the monolingual children (n = 272) were 106 and for the bilingual children (n = 458) were 96. These scores were both in the normal range, did not exceed one standard deviation (SD = 15) from the population mean (μ = 100), and were separated by 10 points. In the current study, the average PPVT score in Year 1 for the monolingual children was 113 and for the bilingual children

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

was 104. Again, these scores are within one standard deviation of the population mean and, in this case, were separated by 9 points. Thus, the relation between English receptive vocabulary for 6-year-olds who were designated as monolingual or bilingual was similar to that found in previous research and importantly, all in the range expected for native English speakers of that age. The scores in the current study were somewhat higher than the earlier study, possibly because French Immersion is a choice, and parents may have been more willing to enroll their children if they believed them to have high verbal ability. Similarly, Au-Yeung et al. (2015) reported that PPVT scores in their study using a similar population of 6-year-old French Immersion students were 111 for monolingual children and 100 for bilingual children, similar to the results in the present study.

Unlike the development of English proficiency, all the children had the same opportunity to learn French; they all encountered French only in school and had been exposed to French for the same amount of time. Therefore, the question is whether language background affected progress in acquiring French as a second (monolingual children) or third (bilingual children) language. The issue is important because proficiency in French is essential to academic success in this program. The prediction was that bilingual children will make better progress than monolingual children in French, possibly beginning in the second year. The results from group comparisons showed no difference between language groups for French vocabulary for the first two years but significantly higher scores and greater improvement by bilinguals in the final year. Regrettably, the third-year data were based on a smaller sample than Years 1 and 2.

Similarly, group comparisons of verbal fluency indicated no significant group difference in any of the years. Verbal fluency assessments go beyond simple vocabulary and require children to use that vocabulary to generate words either in a meaningful (semantic fluency) or unusual (phonological fluency) manner. In this sense, fluency performance may be more closely aligned to academic ability than vocabulary scores. It is important to note, however, that the actual test varied over the years because the cue words used were not equivalent in difficulty. Therefore, the important measure is not absolute performance but rather relative performance by monolingual and bilingual children performing the same task. These analyses indicated no such group differences.

The second analytic approach examined trajectories of progress for the subset of children who completed all three years of the study. These analyses highlighted the greater improvement of the bilingual children than monolinguals in establishing French vocabulary by the third year. In this case, there was a general improvement in performance over the years but no evidence that the progress was different for monolingual and bilingual children.

A different picture emerged from the third approach, continuous analyses, where both French vocabulary and semantic fluency were shown to be positively related to degree of bilingualism. In all three years, higher degree of bilingual experience was positively associated with higher French vocabulary and better performance on semantic fluency. As children's French vocabulary improved over the years, bilingual experience accounted for a greater proportion of that score. Therefore, even though categorical comparisons failed to detect significant differences between language groups at the beginning of the study, considering the entire sample showed

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

that in each year the progress in French vocabulary was calibrated to degree of bilingual experience.

The results from the phonological fluency task were different in that there was no contribution to performance from degree of bilingual experience in any of the analyses, confirming that phonological fluency is based on different skills or processes than semantic fluency. It is interesting to note that the continuous analysis of phonological fluency scores in Year 1 was the only one in which SES emerged as a significant factor. The phonological fluency test is difficult because it requires searching lexical representations on the basis of initial word sound despite the fact that those representations are organized by meaning (Luo et al., 2010). To perform this task, therefore, children require practice in that unusual way of thinking about words. Speculatively, it is parents with more education who have access to resources and engage their children in the type of word games that provides that practice. Moreover, if phonological fluency reflects academic success more directly than vocabulary knowledge as is the case for semantic fluency, as suggested earlier, then there may be implications for broader academic outcomes from these phonological fluency results. One possibility is that they suggest that the French curriculum is not differentially impacting academic success for the groups either in terms of SES or language, but further research with different measures is required to explore that idea.

There are three main conclusions from these results that address the central question of the study, namely whether children's experiences with other languages impact their progress in learning French, the language of instruction in French Immersion programs. First, children with multilingual experience were more successful in learning the new language than monolingual children, although the difference was difficult to detect in the first two years. Thus, early stages of learning a new language are somewhat similar for children with these different experiences but once a base is established, the multilingual children progress more rapidly. This point is especially important when the language is being used for the purpose of school instruction and academic success depends on its mastery. Parents are notoriously anxious about whether learning a third language is an unnecessary burden for children; the present results suggest it is not.

Second, children in a bilingual education program for whom the language of the home and the language of the community were different, and both were different from the language of schooling, performed as well or better than monolingual children on proficiency tests in the language of instruction. These results are a strong endorsement for the appropriateness of bilingual education for all children. There is no evidence from this study that linguistic diversity of students in French Immersion programs leads to counter-indications of this program for some students. The results clearly do not rule out bilingual children from these programs; moreover, where language group differences did occur, it was generally the bilingual children who performed better. However, it must be noted that despite linguistic diversity, the sample was relatively homogeneous for socioeconomic status, a factor of immense importance in all academic and learning outcomes (Davis-Kean, 2005). All the children in the present study were middle-class; no children lived in poverty or suffered the associated risks. For that reason, French Immersion is a special case of bilingual education in that it appeals to children of greater privilege than are often enrolled (Allen, 2004). It is unclear, therefore, whether these results will extend to

https://doi.org/10.1017/S0142716421000618 Published online by Cambridge University Press

populations that are more compromised. However, a study by Thomas-Sunesson et al. (2018) comparing performance on executive function tasks for low SES children in a bilingual education program in California found that despite overall performance being very poor, children's degree of bilingualism was positively associated with test scores. Children who were more bilingual achieved better cognitive outcomes than did children whose bilingual proficiency was less balanced.

Third, different results were obtained from the categorical and continuous approaches to data analyses. The categorical method, which is the main approach used in the literature, led to few significant effects. Combining children into somewhat arbitrary language groups concealed important individual variation. In contrast, analyses of the continuous data revealed small but reliable incremental changes in performance on the language tasks that could be attributed to the children's degree of bilingual experience. These analyses offered a more detailed view of the patterns and systematically accounted for the role of other factors, such as intelligence and vocabulary, in a way that categorical comparisons cannot do. Different analyses provide different information, and it is possible that some controversies in the literature could be resolved in terms of this factor.

Developing strong language skills is a key to children's success (Pace et al., 2019), and bilingualism provides a general boost to cognitive functioning in young childhood (Barac et al., 2014). The possibility that it also enhances the learning of a new language, especially in an educational setting, is a significant addition to this profile. More importantly, children who spoke an additional language at home learned the language of instruction in this immersion program at least as well as children who were learning it as their second language. On this basis, diverse home language experience should not disqualify children from immersion education.

Acknowledgements. This research was funded by Grant 435-2017-0778 from the Social Sciences and Humanities Research Council, Canada, to EB. We are grateful to (in alphabetic order) Leora Goldstein, David Jesin, Gaelle Nsamba Luabeya, Claire Quenneville, Malaika Taylor, Viviana Vumbaca, for their contributions to this study. We are also grateful to the principals, teachers, and families for their participation, especially to the children.

Competing Interests. The authors declare no competing interests.

References

Allen, M. (2004). Reading achievement of students in French immersion programs. *Educational Quarterly Review*, **9**(4), 25–30. Catalogue 81-003-XIE. Retrieved from https://www150.statcan.gc.ca/n1/pub/81-003-x/81-003-x2002004-eng.pdf

Anderson, J. A. E., Hawrylewicz, K., & Bialystok, E. (2020). Who is bilingual? Snapshots across the lifespan. *Bilingualism: Language & Cognition*, **23**(5), 929–937. https://doi.org/10.1017/S1366728918000950

Au-Yeung, K., Hipfner-Boucher, K., Chen, X., Pasquarella, A., D'Angelo, N., & Deacon, S. H. (2015). Development of English and French Language and Literacy Skills in EL1 and EL French Immersion Students in the Early Grades. *Reading Research Quarterly*, **50**(2), 233–254. http://doi.org/10.1002/rrq.95

Barac, R., Bialystok, E., Castro, D. C., & Sanchez, M. (2014). The cognitive development of young dual language learners: A critical review. *Early Childhood Research Quarterly*, **29**, 699–714. http://doi.org/10.1016/j.ecresq.2014.02.003

Barik, H. C., & Swain, M. (1975). Three Year Evaluation of Large-Scale Early Grade French Immersion Program: The Ottawa Study. *Language Learning*, **25**(1), 1–30. http://doi.org/10.1111/j.1467-1770.1975.tb00106.x

Barik, H. C., & Swain, M. (1976). Update on French Immersion: The Toronto Study through Grade 3. *Canadian Journal of Education*, **1**(4), 33–42. https://www.jstor.org/stable/1494622

Barik, H. C., & Swain, M. (1978). Evaluation of a French Immersion Program: The Ottawa Study through grade five. *Canadian Journal of Behavioural Science*, **10**(3), 192–201. http://doi.org/10.1037/h0081548

Bérubé, D., & Marinova-Todd, S. H. (2012). The development of language and reading skills in the second and third languages of multilingual children in French Immersion. *International Journal of Multilingualism*, **9**(3), 272–293. https://doi.org/10.1080/14790718.2011.631708

Bialystok, E. (2018). Bilingual education for young children: Review of the effects and consequences. *International Journal of Bilingual Education and Bilingualism*, **21**, 666–679. http://doi.org/10.1080/13670050.2016.1203859

Bialystok, E., & Luk, G. (2012). Receptive vocabulary differences in monolingual and bilingual adults. *Bilingualism: Language and Cognition*, **15**(2), 397–401. https://doi.org/10.1017/S136672891100040X

Bialystok, E., Luk, G., Peets, K. F., & Yang, S. (2010). Receptive vocabulary differences in monolingual and bilingual children. *Bilingualism: Language and Cognition*, **13**(4), 525–531. http://doi.org/10.1017/S1366728909990423

Bice, K., & Kroll, J. F. (2015). Native language change during early stages of second language learning. *Neuroreport*, **26**(16), 966–971. https://doi.org/10.1097/WNR.0000000000000453

Bice, K., & Kroll, J. F. (2019). English only? Monolinguals in linguistically diverse contexts have an edge in language learning. *Brain and Language*, **196**, 104644. https://doi.org/10.1016/j.bandl.2019.104644

Bild, E-R, & Swain, M. (1989). Minority Language Students in a French Immersion Programme: Their French Proficiency. *Journal of Multilingual and Multicultural Development*, **10**(3), 255–274. https://doi.org/10.1080/01434632.1989.9994377

Brito, N., & Barr, R. (2012). Influence of bilingualism on memory generalization during infancy. *Developmental Science*, **15**(6), 812–816. https://doi.org/10.1111/j.1467-7687.2012.1184.x

Cenoz, J. (2013). The influence of bilingualism on third language acquisition: Focus on multilingualism. *Language Teaching*, **46**(1), 71–86. https://doi.org/10.1017/S0261444811000218

Dagenais, D., & Berron, C. (2001). Promoting multilingualism through French immersion and language maintenance in three immigrant families. *Language, Culture and Curriculum*, **14**(2), 142–155. https://doi.org/10.1080/07908310108666618

Dagenais, D., & Day, E. (1998). Classroom language experiences of trilingual children in French immersion. *Canadian Modern Language Review*, **54**(3), 376–393. https://doi.org/10.3138/cmlr.54.3.376

Dagenais, D., & Day, E. (1999). Home language practices of trilingual children in French Immersion. *Canadian Modern Language Review*, **56**(1), 99–123. https://doi.org/10.3138/cmlr.56.1.99

Dagenais, D., Day, E., & Toohey, K. (2006). A Multilingual Child's Literacy Practices and Contrasting Identities in the Figured Worlds of French Immersion Classrooms. *International Journal of Bilingual Education and Bilingualism*, **9**(2), 205–218. https://doi.org/10.1080/13670050608668641

Davis-Kean, P. E. (2005). The influence of parent education and family income on child achievement. *Journal of Family Psychology*, **19**(2), 294–304. https://doi.org/10.1037/0893-3200.19.2.294

DeLuca, V., Rothman, J., Bialystok, E., & Pliatsikas, C. (2019). Redefining bilingualism as a spectrum of experiences that differentially affects brain structure and function. *Proceedings of the National Academy of Sciences*, **116**(15), 7565–7574. https://doi.org/10.1073/pnas.1811513116

Dunn, L. M., & Dunn, D. M. (2007). *Peabody Picture Vocabulary Test-Fourth Edition*. Bloomington, MN: NCS Pearson Inc.

Dunn, L. M., Theriault-Whalen, C. M., & Dunn, L. M. (1993). *Échelle de Vocabulaire en Images Peabody (EVIP)*. Richmond Hill, Canada: Psycan.

Friesen, D. C., Luo, L., Luk, G., & Bialystok, E. (2015). Proficiency and control in verbal fluency performance across the lifespan for monolinguals and bilinguals. *Language, Cognition and Neuroscience*, **30**(3), 238–250. https://doi.org/10.1080/23273798.2014.918630

Grogan, A., Green, D. W., Ali, N., Crinion, J. T., & Price, C. J. (2009). Structural correlates of semantic and phonemic fluency ability in first and second languages. *Cerebral Cortex*, **19**(11), 2690–2698. http://doi.org/10.1093/cercor/bhp023

Guerrero, S. L., Smith, S., & Luk, G. (2016). Home language usage and executive function in bilingual preschoolers. In J. Schwieter (Ed.), *Cognitive Control and Consequences of Multilingualism* (pp. 351–374). Amsterdam, Netherlands: John Benjamins.

Hirosh, Z., & Degani, T. (2018). Direct and indirect effects of multilingualism on novel language learning: An integrative review. *Psychonomic Bulletin & Review*, **25**(3), 892–916. https://doi.org/10.3758/s13423-017-1315-7

Hopp, H., Vogelbacher, M., Kieseier, T., & Thoma, D. (2019). Bilingual advantages in early foreign language learning: Effects of the minority and the majority language. *Learning and Instruction*, **61**, 99–110. https://doi.org/10.1016/j.learninstruc.2019.02.001

Kastner, J., May, W., & Hildman, L. (2001). Relationship between Language Skills and Academic Achievement in First Grade. *Perceptual and Motor Skills*, **92**(2), 381–390. https://doi.org/10.2466/PMS.92.2.381-390

Lambert, W., Genesee, F., Holobow, N., & Chartrand, L. (1993). Bilingual Education for Majority English-Speaking Children. *European Journal of Psychology of Education*, **8**(1), 3–22. https://doi.org/10.1007/BF03172860

Lorenz, E., Bonnie, R. J., Feindt, K., Rahbari, S., & Siemund, P. (2019). Cross-linguistic influence in unbalanced bilingual heritage speakers on subsequent language acquisition: Evidence from pronominal object placement in ditransitive clauses. *International Journal of Bilingualism*, **23**(6), 1410–1430. https://doi.org/10.1177/1367006918791296

Lorenz, E., Rahbari, S., Schackow, U., & Siemund, P. (2020). Does bilingualism correlate with or predict higher proficiency in L3 English? A contrastive study of monolingual and bilingual learners. *Journal of Multilingual Theories and Practices*, **1**(2), 185–217. https://doi.org/10.1558/jmtp.15517

Luk, G., & Bialystok, E. (2013). Bilingualism is not a categorical variable: Interaction between language proficiency and usage. *Journal of Cognitive Psychology*, **25**(5), 605–621. https://doi.org/10.1080/20445911.2013.795574

Luo, L., Luk, G., & Bialystok, E. (2010). Effect of language proficiency and executive control on verbal fluency performance in bilinguals. *Cognition*, **114**, 29–41.

Meir, N., & Armon-Lotem, S. (2017). Independent and Combined Effects of Socioeconomic Status (SES) and Bilingualism on Children's Vocabulary and Verbal Short-Term Memory. *Frontiers in Psychology*, **8**, 1442–1442. https://doi.org/10.3389/fpsyg.2017.01442

Murphy, K. A., Language and Reading Research Consortium (LARRC)**, & Farquharson, K.** (2016). Investigating profiles of lexical quality in preschool and their contribution to first grade reading. *Reading and Writing*, **29**(9), 1745–1770. https://doi.org/10.1007/s11145-016-9651-y

Oller, D. K., Pearson, B. Z., & Cobo-Lewis, A. B. (2007). Profile effects in early bilingual language and literacy. *Applied Psycholinguistics*, **28**(2), 191–230. https://doi.org/10.1017/S0142716407070117

Ouellette, G. (2006). What's Meaning Got to Do With It: The Role of Vocabulary in Word Reading and Reading Comprehension. *Journal of Educational Psychology*, **98**(3), 554–566. https://doi.org/10.1037/0022-0663.98.3.554

Pace, A., Alper, R., Burchinal, M. R., Golinkoff, R. M., & Hirsh-Pasek, K. (2019). Measuring success: Within and cross-domain predictors of academic and social trajectories in elementary school. *Early Childhood Research Quarterly*, **46**, 112–125. http://doi.org/10.1016/j.ecresq.2018.04.001

Pollak, S. D., & Wolfe, B. L. (2020). Maximizing research on the adverse effects of child poverty through consensus measures. *Developmental Science*, **23**(6), e12946. http://doi.org/10.1111/desc.12946

Pot, A., Keijzer, M., & de Bot, K. (2018). Intensity of multilingual language use predicts cognitive performance in some multilingual older adults. *Brain Sciences*, **8**(5), 92. https://doi.org/10.3390/brainsci8050092

Puig-Mayenco, E., González Alonso, J., & Rothman, J. (2020). A systematic review of transfer studies in third language acquisition. *Second Language Research*, **36**(1), 31–64. https://doi.org/10.1177/0267658318809147

Raven, J., Raven, J. C., & Court, J. H. (2003). *Manual for Raven's Progressive Matrices and Vocabulary Scales*. San Antonio, TX: Harcourt Assessment.

Revelle, W. (2020). *psych: Procedures for Personality and Psychological Research*, Northwestern University, Evanston, Illinois, USA.

Rohde, T., & Thompson, L. (2007). Predicting academic achievement with cognitive ability. *Intelligence (Norwood)*, **35**(1), 83–92. https://doi.org/10.1016/j.intell.2006.05.004

RStudio Team. (2020). *RStudio: Integrated Development for R*. RStudio, PBC, Boston, MA, USA.

Siemund, P., & Lechner, S. (2015). Transfer effects in the acquisition of English as an additional language by bilingual children in Germany. In H. Peukert (ed.) *Transfer Effects in Multilingual Language*

Development (pp. 147–160). Amsterdam, Netherlands: John Benjamins. https://doi.org/10.1075/hsld.4.07sie

Smith, T., Smith, B., & Dobbs, K. (1991). Relationship between the peabody picture vocabulary test-revised, wide range achievement test-tevised, and weschler intelligence scale for children-revised. *Journal of School Psychology*, **29**(1), 53–56. https://doi.org/10.1016/0022-4405(91)90015-J

Statistics Canada. (2016). *2016 Census of mother tongue for the residents of Canadian metropolitan areas*. Retrieved from https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/lang/Table.cfm?Lang=E&T=12&Geo=00&SP=6

Statistics Canada. (2020). *Number of students in official languages programs, public elementary and secondary schools, by program type, grade and sex*. Retrieved from https://doi.org/10.25318/3710000901-eng

Surrain, S., & Luk, G. (2019). Describing bilinguals: A systematic review of labels and descriptions used in the literature between 2005–2015. *Bilingualism: Language and Cognition*, **22**, 401–415. http://doi.org/10.1017/S1366728917000682

Swain, M., & Lapkin, S. (2005). The evolving sociopolitical context of immersion education in Canada: Some implications for program development. *International Journal of Applied Linguistics*, **15**(2), 169–186. http://doi.org/10.1111/j.1473-4192.2005.00086.x

Swain, M., Lapkin, S., Rowen N., & Hart, D. (1990). The role of mother tongue literacy in third language learning. *Languages, Culture and Curriculum*, **3**(1), 65–81. http://doi.org/10.1080/07908319009525073

Thomas-Sunesson, D., Hakuta, K., & Bialystok, E. (2018). Degree of bilingualism modifies executive control in Hispanic children in the USA. *International Journal of Bilingual Education and Bilingualism*, **21**, 197–206. http://doi.org/10.1080/13670050.2016.1148114

White, L. (2020). Choosing between theories: Can L3 acquisition really decide? *Second Language Research*. https://doi.org/10.1177/0267658320941047

Xie, Z. (2018). The influence of second language (L2) proficiency on cognitive control among young adult unbalanced Chinese-English bilinguals. *Frontiers in Psychology*, **9**, 412. https://doi.org/10.3389/fpsyg.2018.00412

Cite this article: Shorbagi, SH., Dias Martins, C., and Bialystok, E. (2022). Acquiring the language of instruction: Effect of home language experience. *Applied Psycholinguistics* **43**, 463–484. https://doi.org/10.1017/S0142716421000618