Holistic Linguistics: An in-depth analysis of six bilingual English-French children living in Quebec City

by

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Abstract

The Problem: When it comes to assessing and intervening with bilingual populations, language interventionists face a difficult problem. Not only is there a lack of standardized tests for these populations, but even the use of the few that exist have limits about their conclusions. These limits are dependent on questions about language exposure. Assessing a balanced, simultaneous bilingual is likely to wield different language results than a child with the same profile whose bilingualism began after the age of three years. To address this issue, in-depth analyses of how these factors all interact in bilingual children are needed. While these analyses have traditionally focused on monolingual children, the use of bilingual children requires certain other factors to be considered, such as age of exposure, and types and amount of ongoing exposure.

Objective: Based on best practices in the field of speech-language pathology, this study will use formal testing and parent questionnaires to evaluate internal and external factors of bilingual language development.

Methods: Case study analyses were conducted of six children living in Quebec City who were four-years-old. Formal testing was used to evaluate expressive and receptive vocabulary, narration, phonological awareness, and phonological production abilities. Parent questionnaires provided information on weekly hours spent with parents in each language and weekly hours spent in an academic setting.

Conclusions: Narrative scores were the most consistent variable across participants, as expected. Expressive vocabulary was the least consistent and often the lowest-scoring domain. The children scored the highest on receptive vocabulary in one or both languages. Phonological abilities (measured via percent consonant correct) were all higher in English, even for children who were exposed to more French than English. Interestingly, all participants had speech that

was intelligible for their age, based on whole word match, in one or both of their languages of at least 60%. In terms of phonological awareness, the three bilingual children who spent a balanced amount of time in each language with their parents had the lowest phonological awareness scores, while the children who spent an unequal amount of time (20% or less in one of the languages) had superior phonological awareness scores in one or both of their languages. Amount of time spent in a French academic setting was positively associated with French narrative skills in terms of First Mentions on the ENNI. While different language profiles were observed in these 6 cases, parent reports of time spent in each language were related to 5 of the 6 language profiles.

Implications: These results indicate that, even with parent reports of language exposure amount, good practice includes assessing in all of a child's languages to get a full profile of their strengths and weaknesses.

Preface

This thesis is an original work by Jana Barkowsky.

The research conducted for this thesis was collected as part of a multi-university project led by Dr. Andrea MacLeod at University of Alberta, Dr. Daniel Bérubé at the University of Ottawa, Dr. Pascal Lefebvre at University Laurentienne, and Dr. Natacha Trudeau at the Université de Montréal. This project received research ethics approval from Research Ethics Board 1 at the University of Alberta. The study ID is Pro00114134.

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Introduction

The Context

Canada has a strong, growing bilingual population. As of 2021, the bilingual English-French population in Canada was 17.7% (Statistics Canada, 2022). In total, 21.4% of Canadians speak French as their first language; whereas 75.5% speak English as their first language (The Daily, 2022). When the language the individual speaks is not the one shared by the majority of the province, the term Official Language Minority Communities (OLMC) is used. OLMCs and bilingual populations have been found to have differences in speech and language development from monolingual language-dominant populations (Hambly et al., 2012). However, bilingual populations and OLMCs have undergone little research in terms of their speech and language development (MacLeod et al., 2011; Hambly et al., 2012). This gap in research has led to a lack of community understanding and support for OLMCs, which has implications for identity, health, and education (Lafrance & Gottardo, 2005). Considering 10.2% of Quebec speaks predominantly English at home, this indicates that a large population of the province is underserved, and may have undiagnosed and untreated language and speech difficulties (The Daily, 2022). The lack of standardization when it comes to expected language development in these children further exacerbates these difficulties. Speech-language pathologists often only assess a child's language skills in the language in which they feel the most comfortable, which neglects difficulties or strengths in the child's language capacities and knowledge that are observable when considering all of their languages (ASHA, 2023; Thordardottir et al., 2006). Therefore, children in OLMCs are assessed in a way that doesn't show the whole picture, without knowledge of what is truly expected of the population. Discussions about what constitutes bilingualism further complicate the matter (Hambly et al.,

2012). For the purposes of this study, a bilingual is an individual who can speak and/or understand more than one language.

As a result of these difficulties, both under-identification and over-identification of language and speech disorders are common for bilingual children (Hambly et al., 2012). Symptoms of a communication disorder may be incorrectly attributed to differences due to bilingualism (Hambly et al., 2012; Paul et al., 2018). Likewise, differences due to language interaction and amount of exposure may be considered "disordered" in nature, despite being a typical part of bilingual language acquisition (Hambly et al., 2012; Rvachew et al., 2013). This under- and over-diagnosis results in some children with typical development receiving unneeded intervention, and other children missing out on crucial help with their communication difficulties.

Considering the impact that untreated language and speech disorders may have on a child's social, emotional, and academic success, under-diagnosis has considerable ramifications for bilingual children with developmental communication difficulties (Paul et al., 2018). Correspondingly, the over-identification of bilingual children with typical language development results in further strain on speech and language services, resulting in less help available for the children who need it (Paul et al., 2018). Therefore, the development of appropriate screening and assessment tools for this population, as normed on the population itself, is an essential first step towards successful intervention with varied populations.

Bilingual Language Acquisition

Despite learning two languages at the same time from birth, simultaneous bilinguals do not develop their language system at a slower rate (Hambly et al., 2012). The same can be said of sequential bilinguals, who are defined as learning another language after the age of 3 (Paul et al.,

2018). However, there are some key differences in the language of bilingual individuals, which are typically attributed to age of exposure, quantity of exposure, and cultural factors. These factors lead to qualitative differences and increased variation in speech production of bilingual children (Hambly et al., 2012). Without considering these key differences, bilingual individuals' language scores will inaccurately reflect their abilities (Thordardottir et al., 2006). Therefore, bilingual assessment must not only consider the typical factors of phonological production, phonological awareness, vocabulary size, and narrative skills; it must also include an analysis of the individual's linguistic environment, as well as the linguistic environment of the community at large (Hambly et al., 2012).

Age of Exposure

The age at which a child first receives exposure to a language is an important consideration in bilingual and multilingual language development. However, many children have staggered exposure to multiple languages. Exposure before the age of 3 is considered simultaneous bilingualism, and exposure to a language after 3 years is considered sequential bilingualism (Kehoe & Havy, 2019; & Paul et al., 2018). This is hypothesized to be due to a phonological sensitive period, wherein by the time a child is 12 months old their ability to discriminate between non-native phonetic contrasts is greatly reduced (Giroud et al., 2020). This cut-off does not mean that age of exposure has a drastic change in impact after a child is 3 years old, but rather that children are more likely to have "native-like" production of a language the sooner they're exposed, indicating more of a sloping effect than a cut-off (Giroud et al., 2020). For this reason, all participants in this study were asked at what age they were first exposed to English and first exposed to French.

Quantity of Exposure

A common fear of parents of bilingual children is that their child will not receive enough exposure to either language to become proficient. Therefore, the amount of exposure that a child receives on a daily, or weekly, basis is a factor for consideration in bilingual studies. In fact, relative exposure has been found to be linked to outcomes in both phonology and vocabulary (Kehoe & Havy, 2019; MacLeod et al., 2011; Thordardottir et al., 2006). In particular, Kehoe and Havy (2019) showed that quantity of exposure to French for bilingual French-English children influenced phonological production, as measured by percent consonants correct and coda accuracy. However, this factor seems to be limited and inconsistent in its influence, in terms of areas of language and timing of development. In the same study that found that amount of exposure had a significant influence on lexical development in children, Thordardottir et al. (2006) also found that syntax, by comparison, was less influenced by exposure. This supports the findings of past studies regarding the importance of exposure to vocabulary, and further supports the theory that the influence of quantity is possibly restricted to certain domains. Furthermore, Kehoe and Havy (2019) showed that even with low rates of exposure to a language, high phonological scores could still be achieved by children, indicating a possible baseline amount of exposure needed to acquire a phonological inventory. In a study of bilingual Spanish-English children, Parra et al. (2011) found that relative exposure to English accounted for 25% of the variance in phonological memory with English-like non-word stimuli. Regarding Spanish, they found that 20% of variance was due to exposure to Spanish. This indicates a possible baseline requirement of 20-25% regular exposure to another language to acquire and its phonological inventory.

In support of these findings, Beauchamp and MacLeod (2022) found that 6-9 year-olds simultaneous English-French bilinguals living in francophone communities between Ottawa and Montreal required only 21% of exposure to French in their lifetime to score within the average range for vocabulary as well as overall expressive and receptive abilities in that language. Likewise, Thordardottir (2011) showed that language lifetime exposure must be between 20% and 70% for 5-year-old English-French bilinguals living in Montreal, in order for the children to receive an average score on a language test, according to monolingual standards. MacLeod and Beauchamp (2022) and Hambly et al. (2011) hypothesize that this difference in findings is due to age, thereby indicating that with an increased age, quantity of exposure plays less of a role. Taken together, these findings indicate that not only is a different amount of language exposure required for average performance in each language domain, but that the impact of exposure quantity also varies by person.

Phonology

Cross-linguistic Phonological Interaction

Phonological production is often considered a language-specific skill, although interaction between the phonological systems of bilinguals is commonly reported (Hambly et al., 2013). As each language has its own phonetic inventory and phonetic frequency, they each therefore have their own phonological patterns that both a typically developing child and a child with Developmental Language Disorder (DLD) exhibit (Bernhardt et al., 2017; Rvachew et al., 2013). It is therefore important to consider the implications of both the absence or presence of these patterns in a bilingual's other language. For example, Spanish-Catalan bilingual children could only discriminate a phonemic contrast unique to Catalan at 12 months, unlike monolingual Catalan children who could identify this contrast at 8 months (Bosch & Sebastian-Gallés, 2003).

Therefore, to hold these bilingual children to the monolingual Catalan standard of discriminating between these two sounds at 8 months would lead to an incorrect diagnosis of a delay. Similarly, Meziane and MacLeod (2021) found a higher degree of accuracy of consonants present in both Arabic and French for Arabic-French bilingual children, in comparison to the accuracy for a consonant present in only one of the languages. A comparison of 18 studies on Spanish-English children in the United States by Montanari et al. (2018) found that bilingual children had a consistent, statistically significant better PCC for phonemes that were shared by their languages than those unique to one of their languages. These results of shared versus unshared phonemes are particularly relevant for languages with less overlap in their phonological inventory, or when considering phonemes that are less common across languages, such as the voiceless interdental fricative /θ/. For example, if a child with reduced intelligibility has not yet mastered the unshared phonemes of their languages, this may suggest a speech sound disorder more than the reverse.

Phonological Production in Bilinguals

When measuring a bilingual in the language that they use the most to communicate, not only do they typically have superior phonological abilities than in their less frequently used language, but they often demonstrate equal abilities to their monolingual peers (Ball et al., 2001; Kehoe & Havy, 2019; Law & So, 2006). This trend is consistent for English-French populations as well. MacLeod et al. (2011) examined the expected PCC of bilingual English-French children, and found that with 50-85% of use, the bilingual children, when measured in the language dominant in that region, did not have PCCs that were statistically different from monolingual peers (MacLeod et al., 2011). These results indicate that bilingual children typically have high PCC scores in at least one of their languages, if not both.

However, as discussed earlier, bilingual children are often not assessed in both languages, indicating that they may be evaluated in their less used language. Indeed, bilingual children have been found to have a lower PCC in their less used language (Meziane & MacLeod, 2021). Contrastingly, Fabiano-Smith and Barlow (2010) found that Spanish-English bilingual children had more complex phonetic inventories than bilingual children in both of their languages, regardless of which was their most used language.

This wide variety in PCC findings has led to the inclusion of another method of measuring phonological production, whole word match (WWM). Based in nonlinear phonology, WWM evaluates whether or not a child produces the entirety of a word correctly (Bérubé and MacLeod, 2021). WWM is also valuable in that, unlike PCC scores, it does not require transcription. It is therefore more accessible to clinicians trying to assess a child in languages in which the SLP is not proficient. Due to the young age of these participants, a WWM score of approximately 60% is expected (Berube and MacLeod, 2021). It is also expected that a higher PCC and WWM score is found in the more used language of the children who use one more than the other, and that if this measure is equal, that English will have a higher PCC and WWM due to its word size discussed in the vocabulary section below. It is predicted that the learning context will have no impact on PCC or WWM.

Phonological Awareness

Phonological awareness, the ability to identify and manipulate speech sounds, is both related between and across languages (LaFrance & Gottardo, 2005). High correlations between L1 and L2 phonological awareness skills have been found in multiple studies, regardless of the similarity in phonology or other linguistic structures of the two languages (Cote, 2017; Hambly et al., 2012). A study by Bialystok et al. (2005) showed that English-Chinese bilingual children

exhibited transfer of phonological awareness skills, despite English and Chinese being extremely different in regards to phonological structure. Furthermore, phonological awareness is related to multiple other linguistic domains within one language and across languages. For example, phonological awareness skills in one language are related to reading skills in that same language, and as it is related across languages, it is also then associated with reading skills in a bilingual's other language (Bialystok et al., 2005; Cote, 2017; LaFrance & Gottardo, 2005). Therefore, phonological awareness has language-specific effects and cross-linguistic transfer. An analysis of the relationships of phonological awareness in bilingual children is thus expected to both be consistent with the language-general pattern commonly found, as well as to confirm the language-specific relationships between phonological awareness and other linguistic domains. Regarding an academic setting, it is predicted that those who spend more time in an academic setting will have higher phonological awareness scores.

Vocabulary

When it comes to measuring vocabulary, it has been found that measuring a bilingual's vocabulary in only one language under-represents their total vocabulary size (Thordardottir et al., 2006). Rather, it is commonly recommended that vocabulary is measured in all languages someone speaks, and then combined (Thordardottir et al., 2006). However, simply adding together the measures of both languages is not always a viable solution, since the complexity of the inflectional system of each language impacts the possible, and realistic, vocabulary size. In addition, standardized tasks typically only sample a person's vocabulary rather than capturing all words known, so adding the scores together is not conceptually sound. These problems apply to French and English. For example, French has longer words on average, and less monosyllabic words compared to English (Brosseau-Lapre, 2018; Rvachew et al., 2013). Additionally, even

when measuring by conceptual vocabulary, which attempts to measure the number of concepts a child understands regardless of language, bilingual children may still score significantly lower than monolingual children (Thordardottir et al., 2006). It is suggested that this is due, at least in part, to differences in amount and frequency of exposure to each language (Thordardottir et al., 2006). Therefore, some argue that norms must be established for bilingual populations for both receptive and expressive vocabulary, according to their exposure amount and frequency (Thordardottir, 2011).

Regarding the relevance of vocabulary measurements to phonological production, phonological accuracy has been found to be positively related to combined expressive vocabulary (Kehoe & Havy, 2019). However, Kehoe et al. (2020) also found that phonological production only influenced lexicon size up to 48 months of age. Considering these differing findings, it is important to measure both phonological production and vocabulary in the effort to further the understanding of the relationship between these two factors. Further, measuring both receptive and expressive vocabulary allows for more specific comparisons regarding their relationship to other inter-linguistic and intra-linguistic domains. It is predicted that this study will find higher receptive vocabulary than expressive vocabulary scores in both languages of the case studies, as this is a typical pattern of language knowledge (Paul et al., 2018). It is also predicted that both receptive and expressive vocabulary will be impacted by language exposure, in that the language in which the child is more exposed to will have higher scores than the other language. Due to the tendency for an academic setting to include explicit vocabulary instruction, it is expected that both receptive and expressive vocabulary scores will be higher in those who spend many hours in an academic setting.

Narration

When evaluating bilingual children, narration is commonly an examined element as it uses many language domains, and is associated with reading development (Paradis et al., 2021). Cleave et al. (2010) propose that the Edmonton Narrative Norms Instrument (ENNI) is a valid measure for evaluating narration skills and assessing language abilities. The ENNI, and many other narration assessment tasks, evaluate two different domains of narration. Macrostructure measures coherence of a story, including that it has a beginning and an end, and that the characters and setting are well-established (Paradis et al., 2021). Microstructure, contrastingly, measures the grammatical accuracy and lexical richness of a story (Paradis et al., 2021). Children with a developmental language disorder (DLD) often have difficulties with both macrostructure and microstructure; whereas, children without a DLD who are using a language other than their first language have been found to demonstrate strong macrostructure skills, even in that language (Paradis et al., 2021). It is theorized that this is due to saliency. Specifically, since story structure tends to be similar across many cultures, regardless of the multiple languages that a child has been exposed to, they have been exposed as much to this structure as monolingual children (Bedmore & Pena, 2008). The narrative element that will be examined for this study, first mentions, has conflicting views on whether it should be considered macrostructure or microstructure (Paradis et al., 2021; Schneider et al., 2005). However, as the children in this study were all bilingual from birth, difficulties with microstructure are not predicted to occur, and thus this differentiation is less relevant to this study.

Considering the reliability of narration for differentiating between bilingual children who have a DLD and typical-developing bilingual children, it is important to examine its relationship to other language factors. For this reason, this study also examines the relationship between

macrostructure and other language domains, and amount of exposure. It is anticipated that narration will be the most consistent between languages. It is predicted that narration will not be impacted by language exposure or learning context.

Case Studies

Considering the number of factors that can influence language development and be influenced by it, a high level of variability in performance by multilingual children is expected. This variability is found in language context factors, such as the varying impact of language amount to abilities (Hambly et al., 2011), and in terms of language domains, as seen in the differences in phonological production found by Kehoe and Havy (2019). The relationships between these factors are complex, so a series of case studies allows for a full examination of how these skills are interacting and also ensures a holistic view of language abilities, which is especially important for bilingual children (ASHA, 2023). Few past studies have done in-depth analyses of multiple language measures in bilingual children (Hambly et al., 2013). Therefore, even if someone were to do an in-depth analysis of a child with suspected speech and/or language difficulties, there is no blueprint from which they can interpret results. This study will add valuable information to the field, as it provides a research-based method of interpreting the complex language profiles of bilingual children.

Research Question

This study seeks to answer the questions: how do language domain profiles and external language factors vary in individual cases of bilingual children? What patterns emerge from these case studies? The hypotheses regarding interactions between the domains of the children's language profiles and the external factors are in Table 1 below. The impact of language exposure column is regarding the individual child language profiles, as well as overall patterns in these

profiles. The impact of learning context column predicts results between children's profiles as well as between their languages, for those who spend a significant amount of time each week in an academic setting.

Table 1

Hypotheses regarding language measures and external factors

Measure	Impact of language exposure	Impact of learning context
PA	No impact	More > less
Phonological production: PCC	More > less If balanced: English > French	No impact
Phonological production: WWM	More > less If balanced: English > French	No impact
Expressive vocabulary	More > less	More > less
Receptive vocabulary	More > less	More > less
Narration	No impact	No impact

Methods

Participants

Data from a total of 6 participants was analyzed in this study (5 girls; 1 boy). Ages at time of testing ranged from 49 months (4;1) to 58 months (4;10), with an average age of 55.5 months (4;7.5) All participants resided in Quebec City, Quebec, Canada. All participants were parent-reported as typically developing, and were attending a preschool program in French. Other participant requirements were that they had exposure to both the minority language (English) and the majority language (French) for at least 12 months before taking part in the study, and that the participants were able to communicate in both languages. The age of exposure of all 6 participants was 0 months for both languages, meaning they are all simultaneous French-English bilinguals.

Stimuli

The parents of participants filled out a questionnaire ahead of testing, which included questions about the amount and age of exposure to both languages, such as "At what age was your child first exposed to English?". The parts of this questionnaire relevant to this study are included in Appendix A. The Goldman-Fristoe Test of Articulation-Second Edition (GFTA: Goldman & Fristoe, 2000) and l'Évaluation sommaire de la phonologie chez les enfants d'âge préscolaire (ESPP: MacLeod, 2014) were used to evaluate phonological production in English and French, respectively. For English and French receptive vocabulary, the Peabody Picture Vocabulary Test, Fourth Edition (PPVT: L. Dunn & D. Dunn, 2007) and l'Échelle de vocabulaire en images Peabody (ÉVIP: L. Dunn et al., 1993) were administered, respectively. For expressive vocabulary in English and French, the Expressive One Word Picture Vocabulary Test Fourth Edition (EOWPVT: Martin & Brownell, 2011) and its French version, EOWPVT-F (OOAQ,

1995), were administered. The Edmonton Narrative Norms Instrument (ENNI: Schneider et al., 2005) was administered in both languages as well, and coded as ENNI-E and ENNI-F to distinguish between which version was administered. Regarding phonological awareness, the Pre-Reading Inventory of Phonological Awareness (PIPA: Dodd et al., 2000) was administered for English, and the Épreuve préscolaire de conscience phonologique (ÉPCP: Lefèbvre et al., 2008) was administered for French. Both of these tests were completed in their entirety. For the PIPA, this included subtests on rhyme awareness, syllable segmentation, alliteration awareness, sound isolation, sound segmentation, and letter-sound knowledge. For the ÉPCP, this included subtests on rhyme judgment, initial consonant identification, syllable segmentation, and syllable deletion. Due to the difference in stress systems and onset-rime rules between English and French, conclusions about phonological awareness cross-linguistically must be made cautiously. This caution must be further emphasized in this study, as certain phonological awareness skills were only evaluated in one language.

Procedure

The order of language evaluations was randomly assigned. Those assigned an odd number were first evaluated in French, whereas those with an even number were first evaluated in English. Sessions aimed to be 90 minutes or shorter. Each session evaluated, in order: receptive vocabulary, phonology, language, narrative, expressive vocabulary, and phonological awareness. The sessions followed this order for both languages of testing. Parent questionnaires were also filled out during the session, depending on the parents' preferred language for the questionnaire. The administrator of the tasks did not need to score the task in the moment, although the other researcher who was present did often score the tasks. All sessions were

recorded and then saved with an anonymous participant code, and test forms were scanned and uploaded with the same participant code.

Data Coding

To compare results within languages and between languages, scores have been reported in varying forms according to what is most comparable. The GFTA results, in terms of percent consonants correct (PCC) and whole word match (WWM), were converted into a percentage based on the number of correct instances, divided by the number of possibilities for a correct response. The same was done for the ESPP. Since neither the ESPP nor the GFTA have been normed on a bilingual population, standardized scores and percentile ranks were not an appropriate way to report the PCC and WWM results. Therefore, percentages were used. For PCC, this percentage was based on how many consonants, of the ones selected by the assessment, were produced correctly. For WWM, this percentage was based on how many of the target words were produced correctly. For the PPVT and the ÉVIP, the results were recorded in percentile rank. This is because not only are their raw scores not comparable across languages, but norms also do exist for bilingual populations. Results for the EOWPVT, in English and in French, were also recorded in terms of percentile ranks, to keep the scoring methods across vocabulary measures similar. Of note with percentile rank is that a 0% does not mean that the child got no test questions correct. Rather, it means that 0% of typically developing children, on whom the norms were established, received a lower score. Therefore, scoring in the 50th percentile would be an average score, as it would mean that 50% of children received a lower score, and 50% received a higher score. The ENNI First Mentions (FM) scores in English and French were both reported in percentage out of the highest score present in the test participants, which was 18. This made sure the scores are not unusually low for this measure of language. For

the PIPA and the ÉPCP, individual scores were divided by the highest score of the group, which was 38.

"Hours w/parents" was used to indicate the number of hours spent with the child's parent(s) in that language in an average week. "Academic hours" refers to the number of hours in a French academic setting in an average week, as none of the participants attend schooling in English. These settings included both childcare and preschool. Each case was given a pseudonym name.

Because all participants were reported as being exposed to both languages from birth, this variable was not included as a control or a dependent variable.

When looking at the individual scores, one may note that the English phonological awareness (PA) scores tend to be quite low. However, this test (PIPA) was created for children ranging from 4;0 to 6;11, meaning that these children were at the younger end of the range for this task. Therefore, a wide variety in scores is not in and of itself a reason for concern, since this test and its counterpart, the EPCP, were created to assess a child's readiness for learning in terms of phonological awareness. The scores may be used for diagnosis in clinical settings, but since that is not the purpose of this study, the scores were converted to a percentage based on the highest score so as to not distract from the overall patterns observed. Conclusions that can be drawn reading the interaction between PA across languages and subtle differences are thus limited.

Results

Case 1: Danielle

As can be seen in Figure 1, Danielle demonstrates relatively high English assessment results. Her PCC and WWM from the GFTA were 97% and 83%, respectively. She was in the 61st percentile for her English receptive score, while she fell in the 75th percentile for her expressive vocabulary. Her phonological awareness score was 68% in English. Her ENNI-E FM score is also high, at 88%. She spends about 48 hours per week in English with her parents. These results can be seen in the red left-sided columns in Figure 1 below.

Figure 1

Case 1 (Danielle)'s assessment results

Figure A. PCC and WWM

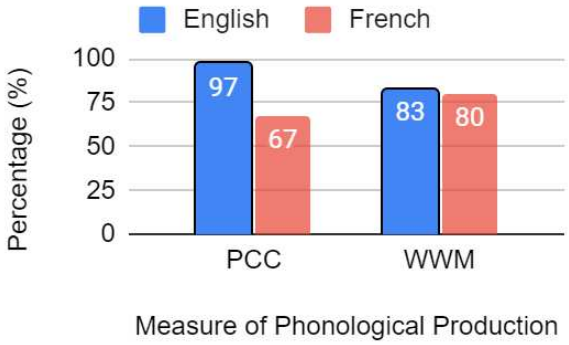


Figure B. Receptive and expressive vocabulary

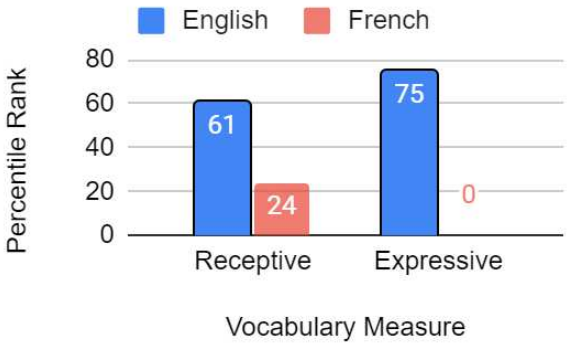


Figure C. PA

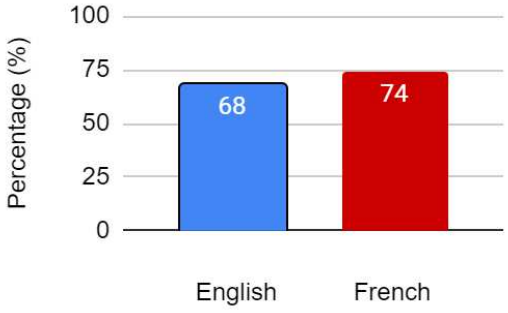


Figure D. Narration

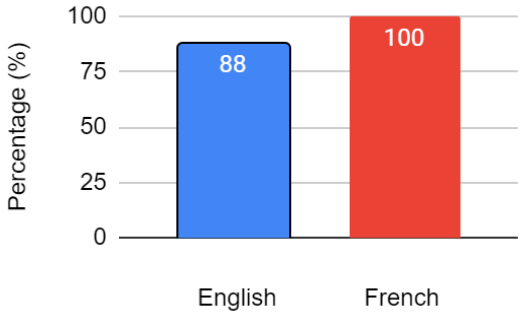
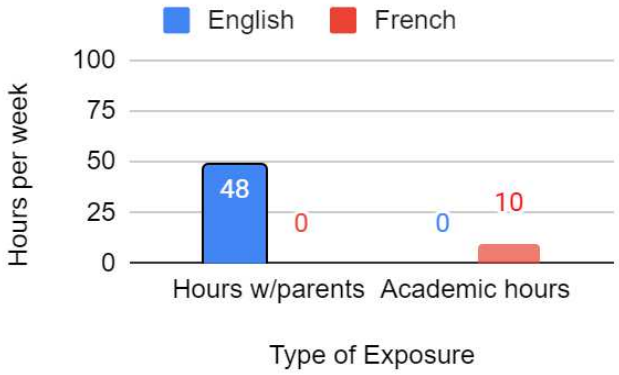


Figure E. Context and Amount of Exposure



In terms of her French assessment results, Danielle's PCC and WWM were 67% and 80%, respectively. Her receptive vocabulary percentile rank was 24th, whereas her expressive vocabulary results did not place her in a percentile rank due to her low score. Her French narration score was 100%, while her PA score was 74%. She spends zero hours per week with her parents in French, although she spends 10 hours per week in a French academic setting, on average. These results are shown in Figure 1 above, wherein the leftmost, blue column for each language variable is the English assessment result, and the right-most, red column is the French assessment result.

When comparing her results across languages, Danielle's phonological production and vocabulary scores are higher in English than in French (Figures 1a and 1b). Her PA and narration scores are both higher in French (Figure 1c and 1d). Her parents reported that they speak only English with her (Figure 1e).

Case 2: Louie

Louie's English assessment results are quite strong, with exception to his WWM score of 64% on the GFTA. His PCC was 94% on the GFTA, while his narration score was 94%. His English PA score was 100%. His receptive and expressive vocabulary percentile ranks were the

87th and 96th, respectively. He spends 70 hours per week with his parents in English. These results are demonstrated in the left-sided, blue columns in Figure 2 below.

Figure 2

Case 2 (Louie)'s assessment results

Figure A. PCC and WWM

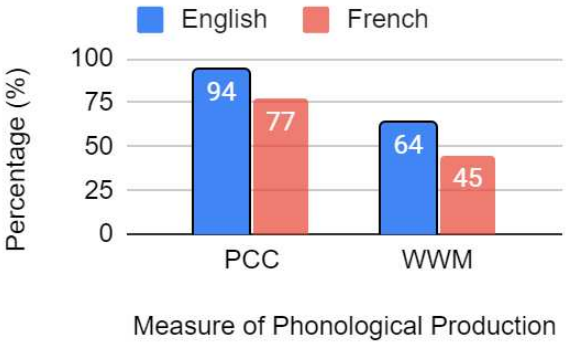


Figure B. Receptive and expressive vocabulary

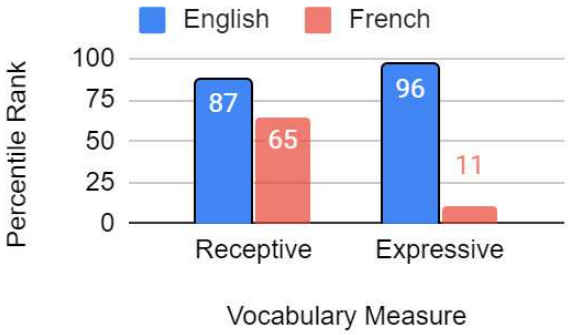


Figure C. PA

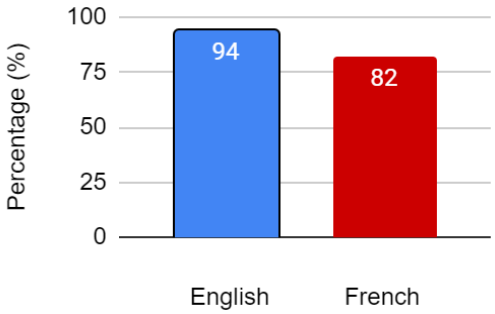


Figure D. Narration

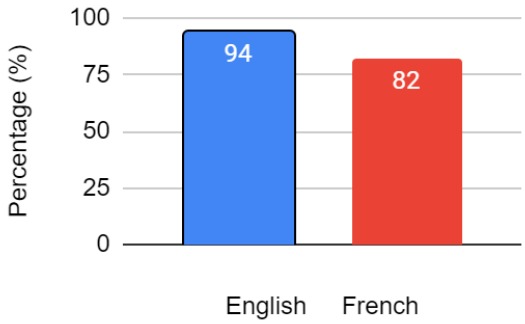
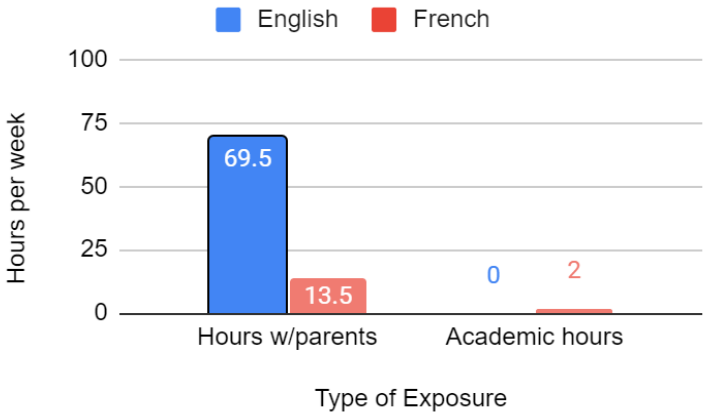


Figure E. Context and Amount of Exposure



In terms of his French assessment results, Louie scored 45% for WWM and 77% for PCC on the ESPP. In terms of vocabulary, his percentile rank for receptive vocabulary was 65th, whereas he was in the 11th percentile for expressive vocabulary. His narration score was 82%, and his PA was 71%. He spends an average of 14 hours per week with his parents in French, and 2 hours a week in a French academic setting. These results are demonstrated in the red, right-hand columns in Figure 2 above.

When looking at Louie's results between languages, of particular note is the discrepancy between his expressive vocabulary percentile rank, from the 96th percentile in English to the 11th percentile in French (Figure 2b). His receptive vocabulary percentile ranks pattern similarly, as his English score is again higher than his French score (87th vs. 65th) (Figure 2b). His PA also has a large discrepancy between languages, from 100% in English to 71% in French (Figure 2c). His phonological production scores are also higher in English than in French, in terms of both PCC (94% vs. 77%) and WWM (64% vs. 45%) (Figure 2a). His narration score was also higher in English, at 94% compared to 82% (Figure 2d). He spends an average of 14 hours per week in French with his parents, while he spends an average of 70 hours per week with them in English (Figure 2E).

Case 3: Adeline

The third case, Adeline, demonstrates relatively consistent scoring in English. Her PCC (84%), narration score (82%), receptive vocabulary (81st percentile) and expressive vocabulary (81st percentile) are all in the 80s. These results can be seen in the left-sided columns in Figure 3 above. Her WWM is slightly lower than her PCC, at 68% (Figure 3A). Her English PA,

however, is relatively low at 34% (Figure 3c). She spends an average of 58.5 hours per week with her parents in English (Figure 3e).

Figure 3

Case 3 (Adeline)'s assessment results

Figure A. PCC and WWM

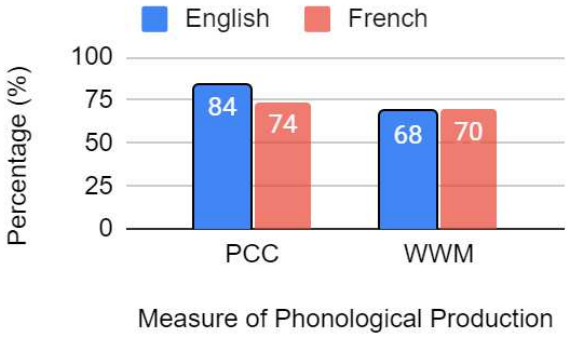


Figure B. Receptive and expressive vocabulary

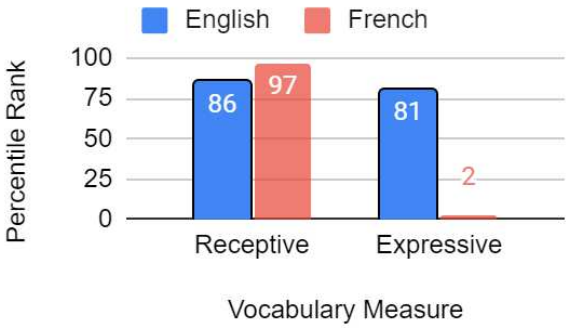


Figure C. PA

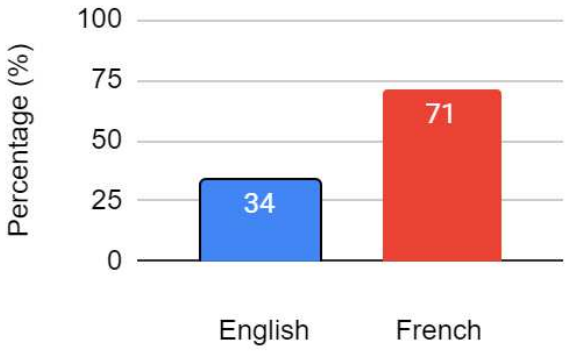


Figure D. Narration

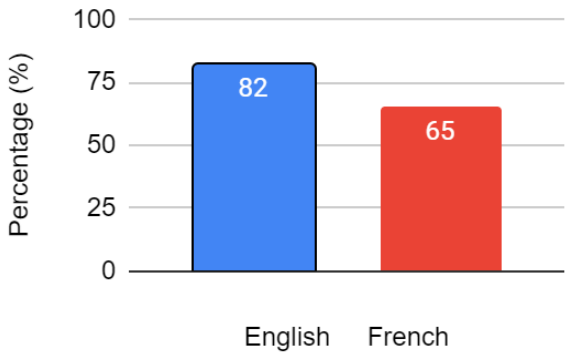
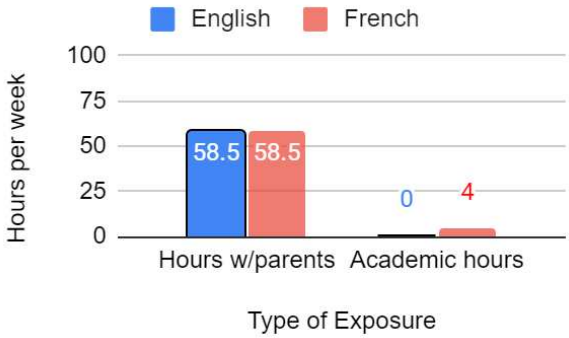


Figure E. Context and Amount of Exposure



In terms of her results for the French assessment, Adeline received a PCC score of 74%, a WWM score of 70%, and a PA score of 71%. Her receptive percentile rank is quite high, at the 97th percentile for French. However, her expressive vocabulary score puts her at the 2nd percentile. She spends an average of 59 hours in French with her parents per week, and 4 hours in a French academic setting per week. Her narration score in French was 65%, as seen in Figure 3d. These French assessment results may be seen in Figure 3's right-handed columns above.

Adeline's results across languages don't show many major discrepancies. Her French scores are often higher than her English scores, as is the case for her WWM score, her receptive vocabulary score, her PA score, and her narration score. She has higher scores for English regarding narration, PCC, and expressive vocabulary. She spends an equal amount of time in both languages with her parents, at 58.5 hours per week. She spends an average of 4 hours per week in a French academic setting.

Case 4: Emilie

Case 4, Emilie, has a high English PCC score on the GFTA of 92%. However, her WWM score was 57%, her PA score was 34%, and her narration was 47%. She was in the 1st percentile rank for her expressive vocabulary in English, and the 18th percentile rank for receptive. She spends 51 hours a week in English with her parents. These results may be seen in the left-sided, blue columns in Figure 4 below.

Figure 4

Case 4 (Emilie)'s assessment results

Figure A. PCC and WWM

Figure B. Receptive and expressive vocabulary

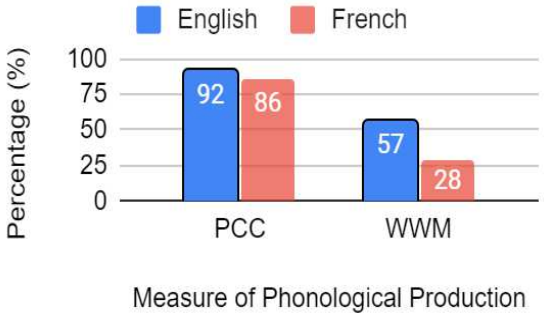


Figure C. PA

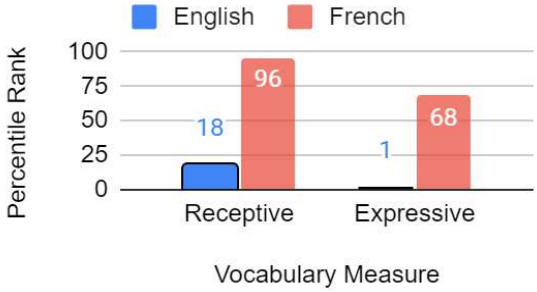
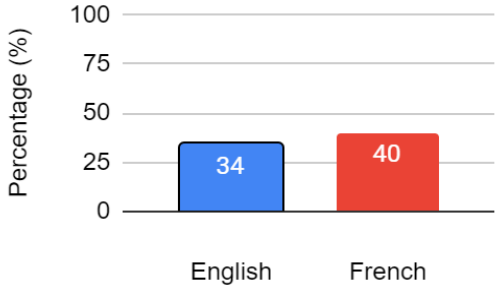


Figure D. Narration



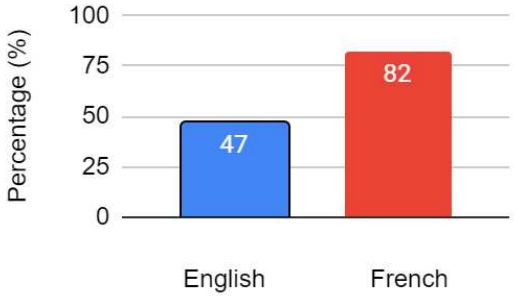
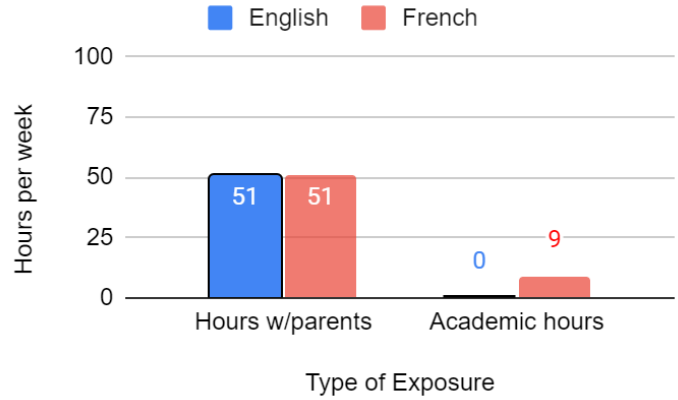


Figure E. Context and Amount of Exposure



In the French assessments, Emilie scored 28% for WWM on the ESPP. She also scored 53% for narration, 40% for PA, and 86% for PCC, as seen in the right-handed columns in Figure 4 below. For French vocabulary, she scored in the 96th and 68th percentile for receptive and expressive, respectively. She spends 9 hours in a week in a French academic setting, and

spends about 51 hours a week with her parents in French. These results may be seen in the right-hand column of the figures in Figure 4 above.

When comparing Emilie's language assessment results across languages, one can see a clear difference between her percentile rank for expressive vocabulary in French and in English (1st percentile and 68th percentile, respectively). The same discrepancy is present for her receptive vocabulary, as she scored in the 18th percentile for English, and the 96th percentile for French (Figure 4b). She also has a higher French narration score and PA score. However, her English phonological production scores are higher than French, particularly regarding WWM. Her parents reported an equal amount of exposure to both English and French with them, at 51 hours per week in each language. She spends an average of 9 hours per week at a French academic setting.

Case 5: Natalie

Case 5, Natalie, has overall high English assessment results. Her PCC score and WWM score on the GFTA are 96% and 89%, respectively. Her narration score was 94%, whereas her PA score was 90%. In terms of vocabulary, her receptive vocabulary score was in the 53rd percentile, whereas she was in the 63rd percentile rank for expressive vocabulary. She spends no hours a week with her parents in English, according to the parent report. These results can all be seen in the left-hand columns of the graphs in Figure 5 below.

Figure 5

Case 5 (Natalie)'s assessment results

Figure A. PCC and WWM

Figure B. Receptive and expressive vocabulary

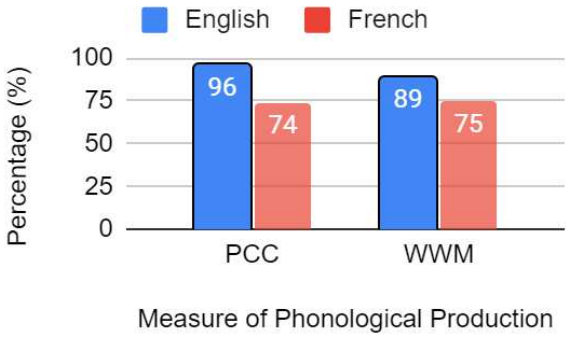


Figure C. PA

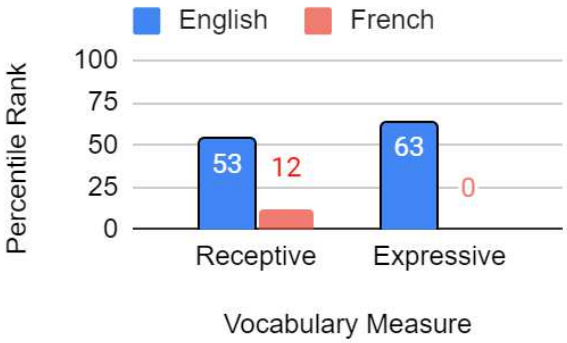
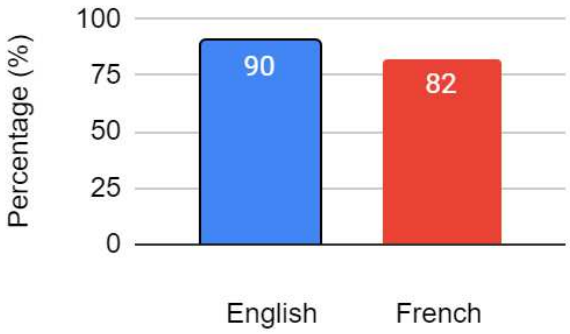


Figure D. Narration



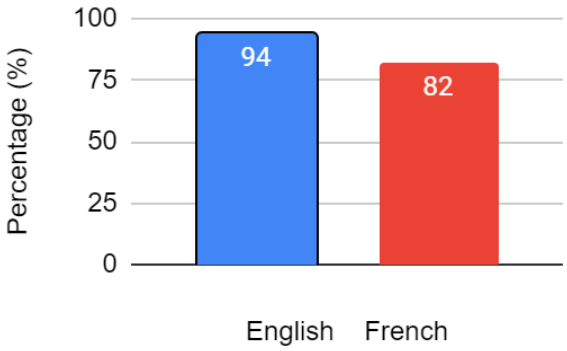
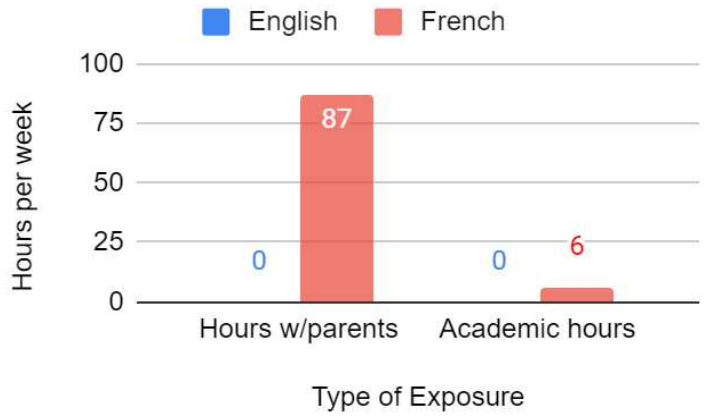


Figure E. Context and Amount of Exposure



Natalie's French results are also relatively strong. Her French PA score is 82%/ Her PCC (74%) and WWM (75%) scores on the ESPP are both in the 70s (Figure 5A). Her expressive vocabulary score (0 percentile), is her lowest scoring result for French. Her narration score (82%), PA (82%), and receptive vocabulary score in French (82) are all high,

being in the 80s. These may be seen in the right-hand columns of the graphs in Figure 5. She spends an average of 87 hours a week with her parents in French (Figure 5e). She also spends 6 hours a week in a French academic setting (Figure 5e).

When looking at her results in both languages, Natalie's results are consistently higher in English. This discrepancy ranges from 63 points (expressive vocabulary percentile rank) to 8 points (PA %). Her vocabulary scores show the highest discrepancies, as seen in Figure 5B above. Her parents reported that they spend all their time with her in French, and she attends a French academic setting for 6 hours per week.

Case 6: Josephine

Josephine (Case 6) scored high on PCC (99%) and WWM (98%) in English, while her English PA (47%) is much lower. Regarding vocabulary, she scored in the 55th percentile for her receptive English vocabulary, and in the 21st percentile rank for her expressive vocabulary. Her English narration score is 94%. Finally, she spends about 41 hours a week with her parents in English. These results are seen in the leftmost columns of the graphs in Figure 6 below.

Figure 6

Case 6 (Josephine)'s assessment results

Figure A. PCC and WWM

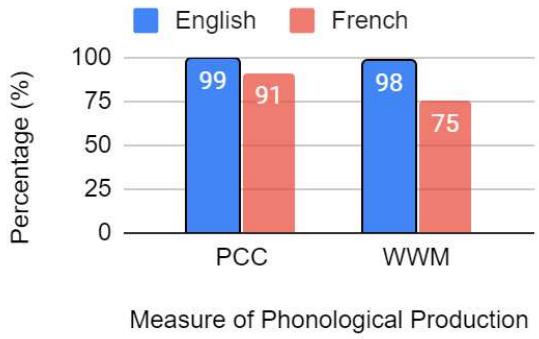


Figure B. Receptive and expressive vocabulary

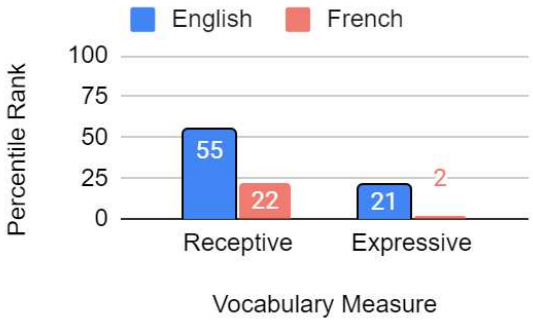


Figure C. PA

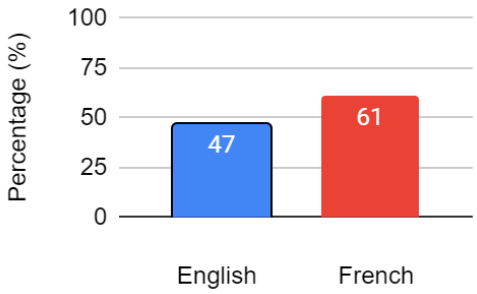


Figure D. Narration

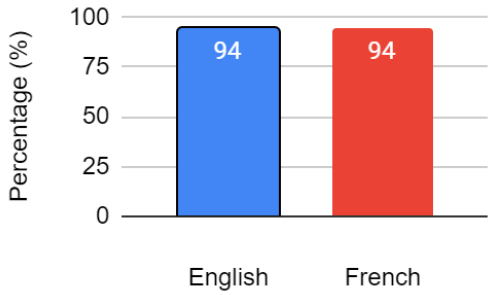
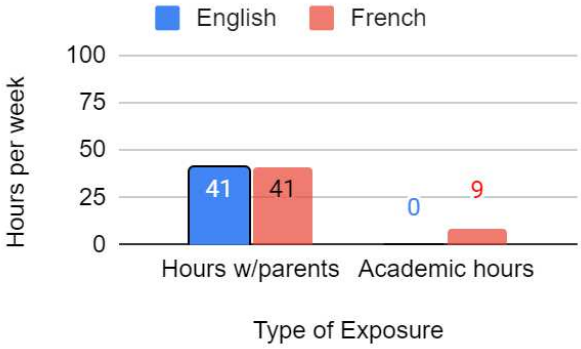


Figure E. Context and Amount of Exposure



Josephine's French assessment results are relatively high across most results. Her PCC and WWM, at 91% and 75% respectively, contrast with a PA percentage of 61. Her expressive vocabulary percentile rank of 2nd contrasts with her receptive vocabulary percentile rank of 22nd. Finally, she received a percentage of 94% for narration. She spends a total of 41 hours per week with her parents in French, and spends 9 hours a week in a French academic setting. These results can be seen in right-hand columns of the figures in Figure 6 below.

Josephine's English results are higher regarding phonological production and vocabulary (Figure 6a, Figure 6b). She scored equally on narration in English and French (Figure 6d). Her French PA score is higher than in English (Figure 6c). Her parents reported that they spend an equal amount of time with her in both languages, at 41 hours in each language a week (Figure 6e).

When looking at her results side-by-side, Josephine's higher result varies by task. In terms of PCC, WWM, and vocabulary, her English test results are higher than her French test results. However, in terms of narration and PA, her French results are higher than their English counterparts. She spends an equal amount of time with her parents in each language. These results can be seen in Figure 18 below.

Discussion

The research questions of this study consist of two major sections. First, how do language domain profiles and external language factors vary in individual cases of bilingual children? Second, what patterns emerge from these case studies? Consequently, the discussion section will first discuss each case in-depth. Then, each variable will be discussed independently, regarding trends across the cases. Finally, future directions and conclusions are discussed.

Individual Case Analyses

Case 1: Danielle

Danielle is growing up in a mostly English-speaking household. However, she is attending a French preschool, and living in Quebec City, a city where English is the minority language. The impact of that home exposure to English can be seen in her percent consonants correct (PCC) and vocabulary scores, which are all higher in English than in French. Contrastingly, Danielle does spend 10 hours a week in a French academic setting. Since phonological awareness (PA) includes skills such as rhyming and segmentation, which are often taught in early education, a higher PA in the language of instruction is not surprising. This indicates that, for Danielle, her time spent with her parents in English vs. in the classroom in French strengthened different skills. Hypothetically, her French teacher might be somewhat concerned by her phonological production and expressive vocabulary at this age, but we can see by looking at her English expressive vocabulary that her results are as expected for her age in at least one of her languages, as 75% of children who were part of the normative sampling for the EOWPVT received a lower score than her. Her high narrative scores further suggest that she does not have a language development disorder, and is instead one of many possible bilingual profiles.

Case 2: Louie

Louis is also growing up in a household that mostly speaks English, although he does still speak some French with his parents (20% of the time). He is only attending a French preschool and/or daycare for 2 hours a week. Consequently, his English assessment results are quite high, and his French results are more varied. His whole word match (WWM) score is relatively low in both languages, but considering his phonological awareness abilities are high, this is likely due to speech difficulties more than language. However, we can see that his PCC score is high in English, indicating he already has a good grasp of English consonants. Considering that the PCC score is based on selected phonemes in the GFTA, it's likely that while Louie has a good production for his age, he doesn't have some of the later-developing phonemes, such as "s" (Paul et al., 2018).

Similarly to Danielle, Louie's French language abilities are not as strong as in English. Once again, expressive vocabulary in French is most impacted by the lower exposure to French at home. Interestingly, whereas Danielle had zero hours with her parents in French and was not in a percentile rank, despite her 10 academic French hours, Louie spends 14 hours with his parents in French and 2 at school, and had an expressive vocabulary score in the 11th percentile rank. This aligns with what Kehoe and Girardier (2020) found about expressive vocabulary and language exposure, in that a bilingual child will have a higher expressive vocabulary score in their more language with the most exposure. However, Louie did demonstrate a larger WWM discrepancy than Danielle. A possible explanation for this discrepancy would be the hours that Danielle spends in French academics a week. For Danielle, the hours spent at school didn't result in improved expressive vocabulary abilities, they did result in an improved WWM score. Therefore, while she might not say many words in French, the ones she does say are said well.

Case 3: Adeline

Adeline's parents reported that they spend an equal amount of time with her in French as in English, which would indicate that she's a balanced bilingual. Indeed, when looking at her language abilities, paradoxes can be found throughout. For example, while her receptive vocabulary skills in both languages are very strong, she has a higher score in the French receptive vocabulary than in English. However, the reverse is true for expressive vocabulary, in that her French expressive vocabulary score is much lower than her English expressive vocabulary score. She also has a slightly higher PCC in English, suggesting that she's better able to articulate her sounds in English, and is thus likely better understood in English. However, she still can understand well in French, as seen by her high receptive vocabulary score and her high PA score. Fore her, in a hypothetical context, if her French teacher received education on bilingual language development, they would know that this is a normal part of bilingualism and that Adeline's good grasp of English means she isn't suffering from any language difficulties. This can be further confirmed by looking at her adequate narration results (82% in English), as well her relatively high WWM in both languages, which indicates good speech intelligibility.

Case 4: Emilie

Emilie's parents report that they spend an equal amount of time with her in each language, which would imply she's a balanced bilingual. Indeed, her phonological skills are slightly higher in English (92% vs 86% PCC). Her contrasting slightly higher PA scores in French further support this notion (40% vs 36%), as does the slightly higher French narration scores (53% vs 47%). However, the large discrepancies in vocabulary scores suggest that she, at least at this age, has more vocabulary knowledge in French than in English (96 vs. 18 percentile rank for receptive, for receptive, 68 vs. 1 percentile rank for expressive). This may be explained

due to the greater amount of time she spends per week in a French academic setting, where she may be exposed to a greater range of vocabulary. If she is learning the word for a certain concept in both English and French at home, but only learning the word for a concept in French at school, then it's possible that her French vocabulary is larger at the moment. Judging by the similar PCC between languages, and the relatively high expressive vocabulary score in French, it would seem that Emilie, unlike Adeline, is likely comfortable answering the teacher in French, and perhaps talking to peers in French as well. Regarding Adeline's low PA scores and narration scores, this is a situation in which a conversation with her parents might be helpful, to consider how much literature she's being exposed to and in what manner, as this may explain these two outliers.

Case 5: Natalie

Natalie's parents reported that they only speak French with her. With this in mind, we would expect her to have higher French results than English. However, when looking at her results, one can see that her English abilities are consistently better than their French counterparts. The persistence of this discrepancy in her vocabulary scores indicate that she is more proficient in English, at least at this time. She is better able to express herself, and understand words, in English. Considering she is currently reported as receiving no exposure to English, these results are very unexpected and suggest that the questionnaire is missing a key context of exposure in her case. This is further discussed in the future research and limitations sections.

Case 6: Josephine

Josephine, like Adeline and Emilie, reportedly spends an equal amount of time with her parents in each language, in addition to the 9 hours a week spent in a French academic setting. All three of these cases also have superior phonological awareness in French, which is likely that

slight edge that French receives from academic, explicit teaching of PA. However, unlike Adeline and Emilie, Josephine's receptive and expressive vocabularies are stronger in English. Considering that, under the factors examined, she is exposed to French in more environments than English, these results are particularly interesting.This could possibly be due to a home factor not considered in this study, such as sibling language preference, or the presence of anglophone friends.

Patterns and Implications

Table 2 below discusses whether the case findings agree with the prediction. If the child was equally exposed to French and English with their parents, the hypothesis for phonological production (PCC and WWM) was that the child would obtain a higher score in English than French. For other domains, there is no hypothesis regarding balanced bilingualism and scores, which is indicated by "n/a" in Table 2. The boxes lightly shaded in are those that do match the prediction made. This table will be discussed in the sections below.

Table 2

Results regarding hypotheses

		Cases						
Measure	Predictions	1	2	3	4	5	6	Average
PCC	Exposure: yes	Y	Y	Y	Y	N	Y	Correlated
	Setting: no correlation	Y	Y	Y	Y	Y	Y	No correlation
WWM	Exposure: yes	Y	Y	N	Y	N	Y	Correlated
	Setting: no correlation	Y	Y	N	Y	Y	Y	No correlation
Receptive vocabulary	Exposure: yes	Y	Y	n/a	n/a	N	n/a	Correlated
	Setting: yes	N	N	Y	Y	N	N	No correlation
Expressive	Exposure: yes	Y	Y	n/a	n/a	N	n/a	Correlated

vocabulary	Setting: yes	N	N	N	Y	N	N	No correlation
PA	Exposure: no correlation	Y	N	n/a	n/a	Y	n/a	No correlation
	Setting: yes	Y	N	Y	Y	N	N	Unclear
Narration	Exposure: no correlation	Y	N	n/a	n/a	Y	n/a	No correlation
	Setting: no correlation	N	Y	Y	N	Y	Y	No correlation

Narration

Narration scores varied between languages by 6%, such as in the case of Emilie, up to 29% for Josephine. Overall, it was the domain that was the most consistent across languages and within profiles. This supports the hypothesis that narrative skills are relatively constant across a child's languages, regardless of amount or type of exposure. Interestingly, one might have expected Danielle and Josephine's English narrative skills to be stronger than their French counterparts, since English is the language to which they are the most exposed. The opposite is found to be true. An additional factor to consider when looking at these unexpected narration scores is that both of these children spend many hours a week (9-10) in a French academic setting. It is likely that in this setting, they are exposed to stories frequently, in which the teacher emphasizes new characters and engages the students in active listening. Considering intervention for narrative abilities of children with language difficulties often includes explicit instruction of macrostructure and microstructure, this type of activity in a preschool classroom would likely have already strengthened these children's French narrative skills.

Indeed, the other child who spends a similar amount of time at school also had a higher French than English narrative score. This indicates that, when it comes to assessing narration of children at this age, one must consider where they have received the most salient story model. Regarding the expectation set forth in the introduction section that narration would be the most

consistent between languages, this expectation was met. This is important, as this means that these results are congruent with what other research, such as Paradis et al. (2021), tells us.

Vocabulary

Interestingly, receptive vocabulary was not consistently higher than expressive vocabulary across language profiles. In reality, it was higher in 3 of the cases, while expressive vocabulary was higher in the other 3. These results contrast with what Paul et al. (2018) have found, and what is expected of a monolingual profile, in that language competence is expected to outpace language performance. Regarding the prediction that the language with the most exposure would have the higher score, this was found to be overall true for both receptive and expressive vocabulary. Therefore, for the children with unbalanced exposure to the two languages, they had higher receptive and expressive vocabulary scores in the language to which they received the most exposure. However, regarding the prediction that the French academic setting would impact vocabulary, there was no relationship between the academic language and vocabulary scores for these cases. This indicates that for these cases, amount of home exposure was more important than the context for vocabulary acquisition.

Furthermore, vocabulary was not found to be associated with phonological accuracy. This agrees with Kehoe et al.'s (2020) findings that phonological production is associated with lexicon size only up to 4 years old. Considering all participants were between 4 and 5 years old, these findings agree with Kehoe et al.'s conclusion.

Regarding expressive vocabulary in particular, there were large discrepancies in results between languages, ranging from 19 to 85 points of difference between English and French percentile ranks. Receptive vocabulary scores also varied between languages, from 11 points (Louie) to 78 points (Emilie). Overall, because these children are still so young, it is not unusual

for one of their languages to be much stronger than the other in terms of vocabulary (Paul et al., 2018).

For most children, the language with the most exposure had higher receptive and expressive vocabulary scores. Interestingly, for those children with an equal amount of exposure to both languages, there were inconsistent results. Adeline had higher English expressive scores, but higher French receptive scores. Emilie's French vocabulary scores were both higher than her English scores. Josephine had the reverse of Emilie, in that both of her English vocabulary scores were higher than their French counterparts.

Phonology

Regarding PCC, all cases had higher PCC in English than French, ranging from a 6% to 30% difference. WWM patterned similarly, with the exception of Adeline, who had a higher WWM in French by 2%. These results indicate that all of these children, regardless of amount of exposure to English, had higher phonological production scores in English. These results are contrary to the hypothesis that more language exposure would be associated with higher language-specific PCC and WWM scores. This contrasts with the findings by MacLeod et al. (2011), who found that language exposure did have an influence on phonology. However, these findings and similar ones are based on children around 2-3 years old. Considering all participants for this study were 4 years old, it's possible that age has mitigated the degree to which language exposure influences PCC. Regarding the prediction regarding WWM averages, all of the participants had a WWM of at least 60% in one or both of their languages, meaning they are able to functionally communicate with those around them. Overall, the data agrees with the hypotheses regarding phonological production and both amount and type of exposure. Both PCC

and WWM were, on average (4/6 cases), higher in the language with the most exposure. They were also both not impacted by the type of exposure.

Regarding phonological awareness, it would appear that the children who were reported to be interacting with their parents in predominantly one language had higher results across the profiles, even compared to the balanced bilinguals with many academic hours a week. Due to the differences in stress systems and average syllable structures across the languages, comparison of the PA results across languages is only conducive with large discrepancies, such as in Louie's much higher phonological awareness scores in English, or Adeline's much higher French PA. These discrepancies do indicate a break from the typical pattern of transfer of phonological awareness skills found by Cote (2017) and Bialystok et al. (2005). However, since these studies also looked at reading, their participants were older. It is thus possible that this pattern changes with time, as the child is exposed to skills of phonological awareness in more domains. Regarding the hypotheses made, it was found that, as predicted, phonological awareness was not higher in the language of the most exposure. In terms of type of exposure, the results were unclear, as half the participants did have a higher PA in their language of education, while the other half did not.

Hours in a French Academic Setting

Regarding the influence of hours spent in a French academic setting, some interesting patterns do emerge. Those who spent the most hours in this setting, ranging from 9-10 hours a week, include Danielle, Emilie, and Josephine. These are also the three participants who scored better on narration in French than in English. This was discussed above, as likely being due to the explicit instruction of narrative structure in classrooms. Another interesting pattern is that these three participants did not have the highest phonological awareness score in either language.

Overall, while it's likely that being part of a French academic setting for many hours a week has helped their narrative skills, it hasn't produced superior phonological awareness skills. However, these impacts may vary by the emphasis of the program, and the child's pre-existing strengths. This may be seen in the fact that while both reported as balanced bilinguals at home, Emilie, who attends French school 9 hours a week, has an expressive vocabulary percentile rank of 68th in French, and Josephine, who also attends her French academics for 9 hours a week, has an expressive vocabulary percentile rank of 2nd. Overall, amount of time spent in a French academic setting does seem capable of improving skills when targeted, as seen with the French narration results, yet there are many other mediating variables that impact language.

Language Exposure at Home

The final variable, hours spent with parents in each language, showed two distinctive patterns:. Children who spend an equal amount of time in each language with their parents include Adeline, Emilie, and Josephine, and those who use mostly one language at home, including Natalie (French), Danielle (English), and Louie (English).

Considering all of Natalie, Danielle, and Louie speak predominantly one language at home (80% or more of the time), we would expect their results to be higher in their home language. While this can be said for Louie, it cannot be said for the other two participants. Danielle's higher French scores in narration and PA may have been mediated by the high amount of time she spends in a week at a French school. However, one could still reasonably say that her English abilities outpace her French abilities, especially when considering the large discrepancy in expressive vocabulary scores and PCC between languages. In terms of Natalie, despite the parent report of predominantly speaking French, she scored higher on all her English assessments than her French assessments. This case raises to question whether Natalie is

answering her parents in French, and if not, whether she is expected to. A preference to answer in English may be present, despite an understanding of French and an ability to speak it. As previously discussed, a variety of factors may be contributing to this pattern. However, her scores in English indicate that she does not have any language difficulties, and that she will acquire French in a typical manner. While the case of Natalie, when considering her current exposure, does disagree with past studies, it would be impossible to know for sure without having access to her lifetime exposure information.

Regarding the parent-reported balanced exposure bilinguals, all of Adeline, Emilie, and Josephine demonstrate interesting results. No one language is particularly superior to the other in any of their profiles. For example, while Adeline's PA might be stronger in French, her expressive vocabulary is stronger in English. At this age in their lives, their language domains are more language-specific, indicating they're likely using specific languages in specific situations, as decided by the adults in their lives. With the exception of Natalie's case, this confirms the expectation that amount of exposure impacts language abilities at 4 years old. Natalie's results confirm another observation made in the introduction, which is that the impact of exposure quantity and quality vary person by person.

Future Directions

Regarding the influence of hours spent in a French academic setting before entering schooling, this would be an interesting area for future research. Those who spend the most hours in this setting, ranging from 9-10 hours a week, include Danielle, Emilie, and Josephine. These are also the three participants who scored better on narration in French than in English. A longitudinal study of whether these children stay advanced in their French narrative skills with time, compared to other bilinguals, would be a possible area of future research.

Other areas of interest for future research may include longitudinal studies of phonological awareness and vocabulary in simultaneous bilingual children, and in-depth case analyses with consideration to lifetime exposure. In particular, early assessment of phonological awareness and later assessment of reading skills in bilingual populations would be a valuable addition to the field. Considering Natalie's case, wherein her language exposure amounts do not predict her language results, lifetime exposure may explain her contrasting results. While not available in this study, this would also be an excellent area for further research.

Furthermore, amount of exposure is a complex factor, in that one may consider the amount of time an individual speaks and/or hears that language, who the conversation partner(s) is/are, and/or the percent of conversation that is in that language. An analysis of all these factors in association with language domains would also be a valuable topic for future research.

Conclusions

This study further supports findings regarding the consistency of narration for assessment of bilingual children. All children were found to be strong in PCC in one or both languages, while WWM was expectantly much lower. Narration was also positively associated with French preschool and/or daycare. The balanced bilinguals were found to have the lowest phonological awareness scores. Regarding vocabulary, the variability across balanced and unbalanced bilingual profiles indicates that this is likely not a reliable measure of language proficiency in these children. Overall, these results indicate that assessing a bilingual child in both their languages is crucial to ensure accurate diagnoses and interventions.

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Appendix

Questionnaire 1

Questionnaire 1

All information provided will remain strictly confidential.
Toutes les informations fournies demeureront strictement confidentielles.

Date:	
Last name:	
First name:	
Date of birth:	
Age:	
Father's name:	
Mother's name:	
Address:	
Telephone:	
Email:	
How did you hear about our research project?	

Questionnaire 2

Date:	Child's Birth Date:
Experimenter's Name:	Child's Age:

What language(s) are spoken at home?

_____

If your child attends a day-care, what languages are spoken there?

_____

At what age was your child first exposed to English? French? Others?
English:_____ French:_____
Other: _____

The following chart will give us information about the languages that your child hears and is spoken to day-to-day by different people in his or her life:

Person	First Language of person:	Language used with child:	Amount of time spent with child on a weekday in hours:	Amount of time spent with child on a weekend in hours:
mother				
father				
siblings				
caregiver				
teacher				
Other people:				