Lexical Development in Bilingual French/Portuguese Speaking Toddlers: Vocabulary Size and Language Dominance

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Abstract

In this study, we explore if French-European Portuguese (EP)-speaking bilingual toddlers produce the same number of words as their monolingual peers, in French, in EP, or in both languages. Furthermore, we explore the link between language dominance and lexicon size. We tested 53 bilingual French-EP children, among which 16 were 16–18 months old, 16 were 24–25 months old and 21 were 30–35 months old. The parents completed the French and the EP Communicative Development Inventory (adaptations of MacArthur–Bates CDI [Fenson et al., 2007]), the PaBiQ (Tuller, 2015) to evaluate language dominance and the ASQ-3 (Squires et al., 2009) to assess their developmental stages. The total vocabulary (both language combined, TV-F+EP), the total vocabulary (TV) in each language (TV-EP and TV-F) and the conceptual vocabulary (CV) were calculated. These vocabulary measures were compared with the monolingual norms in French and EP. The results showed that almost all participants had the same performance in vocabulary acquisition as their monolingual peers in French and EP, measured through the CDI in each language respectively. Their TV-F+EP and CV exceeded the vocabulary of monolinguals and language dominance was correlated with vocabulary size.
Keywords: language development; bilingualism; lexicon; French; Portuguese; toddlers

Introduction

It is frequently postulated that more than half of the world's population speaks more than one language, although for most countries of the world these numbers are not available. Growing up exposed to more than one language is the reality of a large number of people around the world. For Europe, the survey presented in Eurobarometer 386 (2012) states that 54% of the European population is able to hold a conversation in at least one additional language. The latest INSEE survey confirmed a large linguistic diversity in France (Beauchemin, Hamel & Simon, 2016). For the French population, the percentage is 51% (Eurobarometer, 2012).

Despite monolingualism not being the norm, the majority of language acquisition studies has been focused on monolingual children. However, in the past decades, the interest in bilingual first language acquisition (BFLA) – acquisition of two languages by a child having been exposed to both these languages from birth – has grown significantly. Studies on bilingual lexical acquisition are nowadays frequent but do not come always to the same conclusions: some studies conclude that lexical development in bilingual and monolingual toddlers is the same, while others conclude that lexical development in both populations is different quantitatively and/or qualitatively.

It has been established (e.g. De Houwer, 2010; De Houwer, Bornstein & Putnick, 2014; Genesee & Nicoladis, 2006; Junker & Stockman, 2002; Meisel, 1994; Niklas-Salminen, 2011; Pearson, Fernández & Oller, 1993; Petitto & Kovelman, 2003) that a simultaneous bilingual child follows the same developmental steps as a monolingual child. Many studies have found that age of first word production is the same for monolingual children and bilingual children – 12 to 15 months (Genesee, 2003; Genesee & Nicoladis, 2006; Patterson & Pearson, 2004). For simultaneous bilingual children, the lexical spurt appears around 18–20 months (De Houwer et al., 2014) – more or less at the same age as for monolingual children (for an expanded discussion about lexical spurt, see De Houwer, 2009). The distribution and the development of grammatical categories (e.g. nouns and verbs) seems to be identical in both populations as well (Nicoladis, 2001), with the use of nouns before predicates and of predicates before functional words (Genesee & Nicoladis, 2006). However, the bilingual child may exhibit some specific developments due to the presence of two languages. Nicoladis (1998) studied the vocabulary size of a young English–Portuguese-learning boy. A calculation in the study of De Houwer (2009, p. 228) showed that this boy produced five times as many words in English as
in Portuguese. Niklas-Salminen (2011) suggests that, for bilingual children, the increase of lexicon in one language can lead to a stagnation in the other. This movement can be reversed, in a constant imbalance between the two lexicons. Consequently, a lexical spurt may appear first in one language, then later in the other. Flores (2015) and De Houwer and Bornstein (2016) postulate that for early sequential child bilinguals there is a change in the degree of dominance which is often observed with schooling. Their results demonstrate more generally that, during childhood and adolescence, language development is highly flexible and can accommodate huge exposure shifts, leading to changes in language proficiency and language dominance.

Vocabulary size is a good measure of language ability both in monolingual and bilingual language development (Gathercole, Mon Thomas & Hughes, 2008). It has been extensively studied in both populations (e.g. Bleses et al., 2008; O’Toole et al., 2016) with the use of parental reports such as the MacArthur–Bates Communicative Development Inventories (CDIs) (Fenson et al., 1993). The vocabulary of monolingual children includes the number of words produced and/or understood in their single language whereas, in a bilingual population, several measures might be used (De Houwer, 2019; Fenson et al., 2007). The first one, named Total Vocabulary (TV-La+Lb), is simply the sum of the words in both languages a. and b., i.e. La+Lb words (e.g. in French [F] chaise ‘chair’ + in European Portuguese [EP] cadeira ‘chair’ = two words). In addition, some studies on bilinguals used a second measure, named Conceptual Vocabulary (CV). CV corresponds to the number of ‘concepts’ lexicalised by the child, i.e. the total number of translation equivalent pairs in the two CDIs added to the words in each language that are not translation equivalents (Pearson et al., 1993) (e.g. table ‘table’ + mesa ‘table’ = one concept; in [F] chat ‘cat’ + in [EP] carro ‘car’ = two concepts). It implies identifying translation equivalents, assuming, as an approximation, that they are isomorphic for both languages. Even if there is not always a complete correspondence between translation equivalents, combining these two measures allows a more complete vocabulary characterisation of bilingual toddlers. Nevertheless, CV does not take into consideration phonological development, which is a significant part of vocabulary learning (McGregor, Friedman, Reilly & Newman, 2002).

Junker and Stockman (2002) examined whether simultaneous bilinguals were weaker language learners than their monolingual peers. They found a larger vocabulary using TV-La+Lb for bilingual children than for monolingual children. De Houwer and colleagues (2014) also found a greater number of words for bilinguals using TV-La+Lb. But Thordardottir and colleagues (2006) and Core, Hoff, Rumiche and Señor (2013) found no differences between the two populations. Junker and Stockman (2002) found that the CV
and verb diversity of bilingual children were comparable to that of monolingual peers. However, Thordardottir and colleagues (2006), and Core and colleagues (2013) showed a smaller CV for bilingual children than for monolingual children. In general, when the number of words in both languages was considered, simultaneous bilingual children and monolingual children had the same performance on parental rating instruments measuring vocabulary size (De Houwer et al., 2014; Junker & Stockman, 2002; Pearson et al., 1993; Petitto & Kovelman, 2003).

Some contradictory results could be explained by methodological differences such as using TV-La+Lb or CV, using a mix of BFLA (Bilingual First Language Acquisition) and ESLA (Early Second Language Acquisition) children, or having just a single parent as a rater (De Houwer et al., 2014). Contradictory results could also be explained by other factors such as language exposure. For monolingual (Goodman, Dale & Li, 2008; Hart & Risley, 1995; among others) as well as for bilingual (Bridges & Hoff, 2014; Buac, Gross & Kaushansky, 2014; De Houwer, 2018; Hoff et al., 2012) children, the quantity and the quality of input have a great impact on lexical development. It suggests that child bilingual development depends very much on the linguistic practices of a child’s family and of his/her wider environment. In this bilingual situation, one language is more often used with the child and one particular language can be preferably used in a particular context (Genesee, Nicoladis & Paradis, 1995). Because children in bilingual environments vary in how much of each language they hear, they often have stronger skills in one language than in the other; they are considered as dominant in one language (Baetens Beardsmore, 1982). Bilingual children with similar skill levels in both languages are rare (Baker, 2006). How to define and measure language dominance is a long-standing debate (for a discussion about this, see Silva-Corvalán & Treffers-Daller, 2016; and more specifically De Houwer & Bornstein, 2016). Globally speaking, language dominance is usually defined as relative exposure and/or proficiency in two languages and is evaluated through direct and indirect measures. In our work, we will follow Almeida et al.’s (2017) methodology for identifying language dominance. More details about this methodology are given in the next section.

If a bilingual child has a dominant exposure to one language, his/her vocabulary performance in that language appears to be the same as his/her monolingual peers (e.g. Junker & Stockman, 2002). Cattani and colleagues (2014), among others, explored the influence of the proportion of exposure to English in the performance on vocabulary tests with 2:6-year-old bilingual children. They compared their performance with that of monolingual English-speaking peers. They administered the British version of the CDI, the Preschool Language Scale, the British Picture Vocabulary Scale, and an object-naming
measure. Exposure was a predictor of the performance on vocabulary test for the bilingual population. Bilinguals who heard English 60% of the time or more had the same performance as monolingual peers.

The first aim of the present work was to compare French-EP bilingual toddlers’ lexical development with that of their monolingual peers. Do bilinguals produce the same number of words as their monolingual peers, in French, in EP or in both languages combined? The second aim was to explore the role of language exposure for bilingual acquisition by looking at the potential link between language dominance and lexical size. To the best of our knowledge, this study is the first to explore the bilingual lexical development in this pair of romance languages: French and EP. It is also, as far as we know, the first study in the domain to combine, in an experimental protocol, validated and adapted questionnaires (ASQ, CDI and PaBiQ) for both populations and languages (French and EP).

Given the literature, we expected vocabulary size in each language for bilinguals to be in the monolingual norm. We also expected TV-F+EP to be higher for bilingual than for monolingual toddlers, and CV to be comparable between bilinguals and monolinguals (De Houwer et al., 2014; Junker & Stockman, 2002). Finally, we expected to find a positive correlation between language dominance and lexical size.

**Method**

**Participants**

One hundred and six parents of 53 bilingual French-EP-speaking toddlers living in France and in Switzerland were included in this study. Mean age for the entire children’s group was 24.21 with a standard deviation of 6.25. The children were divided into three age groups according to their developmental level: 16 children were 16–18 months old (mean age = 16.32, SD = 0.60), 16 were 24–25 months old (mean age = 24.13, SD = 0.50), and 21 were 30–35 months old (mean age = 31.14, SD = 1.59) (Table 1).

Parents were recruited through local organisations, community events, online advertisements, radio stations and personal contacts on a volunteer basis. Some parents are Portuguese emigrants and others are born in France or in Switzerland. One or both children’s parents are speaking EP as their mother tongue.

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* Data collection was carried out by the second author and is part of her dissertation research on early language development in European Portuguese and French-speaking toddlers in France (work in progress at the University of Lyon 2, France).
Table 1. Participant distribution according to age (in month) and gender.

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>16–18</th>
<th>24–25</th>
<th>30–35</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>F</td>
<td></td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>11</td>
<td>9</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>16</td>
<td>16</td>
<td>21</td>
<td>53</td>
</tr>
</tbody>
</table>

Inclusion criteria were: (1) children were developing typically (according to the ASQ-3; Squires, Twombly, Bricker & Potter, 2009), (2) children had exposure to French and EP since birth, and (3) the children parents reported on did not have a twin pair. However, one child started being exposed to EP from birth, with exposure to French starting only at 3 months of age. We included this toddler in our sample because he/she has a normal development and a similar performance as the other toddlers in the other questionnaires (e.g. PaBIQ).

Parents formed a fairly highly educated sample. Only 5.7% of the 53 mothers and 9.4% of the 53 fathers did not obtain a high-school degree. 52.8% of mothers and 56.6% of fathers did obtain a high school degree, in the absence of a higher degree. Finally, 41.5% of mothers and 34% of fathers had a bachelor's degree.

Procedure

All parents filled in both the French (Kern & Gayraud, 2010) and the EP (Viana et al., 2017) Communicative Development Inventory adaptations of the MacArthur–Bates CDI (Fenson et al., 2007), the Questionnaire for Parents of Bilingual Children (PaBIQ; Tuller, 2015) and the Ages & Stages Questionnaires, 3rd edition (ASQ-3; Squires et al., 2009) (approximately 55–70 minutes altogether). The questionnaires (other than the CDIs) were administered in the language that parents were most comfortable with (Table 2). Both the mother and the father of each child filled the same questionnaire together and at the same time. Each word selected by the mother and/or the father counted as a produced word by the child.

Table 2. Questionnaire duration

<table>
<thead>
<tr>
<th>Domain</th>
<th>Questionnaires</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communicative development</td>
<td>French and EP versions of the CDI</td>
<td>30–40 minutes</td>
</tr>
<tr>
<td>Quantity and quality of input in both languages</td>
<td>PaBIQ (French and EP versions)</td>
<td>15 minutes</td>
</tr>
<tr>
<td>General cognitive skills</td>
<td>ASQ-3 (French and EP versions)</td>
<td>10–15 minutes</td>
</tr>
</tbody>
</table>

Note: EP – European Portuguese.
Material

Vocabulary evaluation

French (Kern & Gayraud, 2010) and EP (Viana et al., 2017) ‘Words and Sentences’ adaptations of the MacArthur–Bates CDI (Fenson et al., 2007) were used to assess the toddlers’ linguistic level. These parental questionnaires allow the evaluation of the size of production vocabulary and the exploration of grammatical and semantic composition of words produced by toddlers between 16 and 30 months old. We used these versions of the questionnaire even with the few children who were over 30 months as we wanted to use the same tool for all the children. Moreover, even at 30 months old, the children of the norming study were not able to produce all words that were on the questionnaire, which means that it is possible to use the words and sentences questionnaire with older children because there is no ceiling effect at 30 months. The only limitation of such a choice concerns the conclusion about vocabulary size of children over 30 months. As we were comparing their results with younger children, we were not able to say if they were delayed or not. However, we carried out the same statistical analysis with children aged 30 months or less only. No bias due to the inclusion of older children (31–35 months) was found. The inclusion of older children did not impact our analysis.

The questionnaire ‘Words and Sentences’ of the French CDI (Kern & Gayraud, 2010) was adapted and validated based on data collected for 663 monolingual children aged 16 to 30 months. The questionnaire ‘Words and Sentences’ of the EP CDI (Viana et al., 2017) was adapted and validated based on data collected for 636 monolingual children aged 16 to 30 months. The general architecture of the MCDI was preserved. However, the authors of the two versions (French and EP) took into account some cultural and linguistic specificities for each language. The French version of the questionnaire ‘Words and Sentences’ includes a list of 690 words; the EP version includes a list of 639 words. Both versions are divided into 22 semantic categories: sound effects and animal sounds, games and routines, vehicles, animal names, toys, clothing, outside things, places to go, small household items, body parts, food and drink, furniture and rooms, people, descriptive words, action words, words about time, helping verbs, question words, prepositions and location, quantifiers, pronouns, and connecting words.

In order to compare the monolingual lexical development to the bilingual one, we calculated the number of words produced in French and EP (TV-F; TV-EP). We also calculated the TV (the sum of the number of words in French and EP; TV-F+EP) and the CV (total of translation equivalent [TE] pairs on the two CDIs). Regarding the CV, there are 358 TEs between the French and EP CDIs. For the French CDI, there are 332 words that have no TEs. For the
EP CDI, there are 281 words that have no TEs. CV was calculated by adding the number of TEs between languages to the words that have no TEs in French nor EP. There are a few polysemous words in the list (e.g. 10 words in EP), but as words in the CDI are classified by categories (e.g. ‘animal names’, ‘food and drinks’), it was possible to exclude possible semantic ambiguities.

**Language background questionnaire (PaBiQ)**

The Questionnaire for Parents of Bilingual Children (PaBiQ; Tuller, 2015) was administered in French or in EP (the same questionnaires were used in Almeida et al., 2017 and Tuller et al., 2018). This questionnaire contains general questions about the child and his/her family and questions about language use in different contexts. Some of these questions allowed for the estimation of the quantity and quality of exposure in both languages.

All mothers claimed to know some French as well as EP. Sixty per cent of mothers rated themselves as having an excellent level of French proficiency; 26% rated themselves as having a good level; and 13% said they had basic abilities (‘gets along’ corresponding to ‘moyen’ in French and ‘médio’ in EP). For EP, 89% of mothers claimed to have an excellent level, 4% claimed to have a good level, and 8% of mothers claimed to have basic abilities. The profile for fathers was different. All fathers claimed to know some French but 8% of fathers knew very little or no EP. Those who did know EP claimed to know it very well (92%). Thirty-six per cent of fathers rated their French as being excellent level, 23% rated it as good, and 42% of fathers claimed to have basic abilities.

By using the PaBiQ, we calculated for each child his/her language dominance and his/her No Risk index following the method used by Almeida et al. (2017) and Tuller et al. (2018). The No Risk index was calculated based on parental concerns, the age of the first word and first sentence, as well as language difficulties in the family (Almeida et al., 2017; Tuller, 2015). The results showed that no child in our population was at risk of being language-impaired. For language dominance, we used the language exposure score for each language by adding up the six following scores (/50): age of onset (/4), frequency of early exposition (/4), diversity of early contexts of exposure (/8), length of exposure (/4), present use at home (/16), present use during different activities and with friends (/14). Then, we subtracted the language exposure/use score of French from the language exposure/use score of EP. We applied the cutoffs used by Almeida et al. (2017) and Tuller et al. (2018):

1. **Balanced bilinguals**, when toddlers had a language dominance index between −6 and +6
2. **French dominant**, when they had a language dominance index below −6
3. EP dominant, when they had a language dominance index above +6

The results showed that 18 (33.96%) had French as a dominant language, 16 (30.19%) of the participants had EP as a dominant language, and for the remaining participants (N=19, 35.85%), there was no language dominance. Regarding the analyses by age group (see Figure 1), for 16–18-month-old toddlers, the results showed that four (25%) of the participants had French as a dominant language, seven (43.75%) had EP as a dominant language, and, for the remaining participants (N = 5, 31.25%), there was no language dominance. For 24–25-month-old toddlers, the results showed that five (31.25%) had French as a dominant language, four (25%) had EP as a dominant language, and, for the remaining participants (N = 7, 43.75%), there was no language dominance. For 30–35-month-old toddlers, nine (42.86%) of the participants had French as a dominant language, five (23.81%) had EP as a dominant language, and, for the remaining participants (N = 7, 33.33%) there was no language dominance.

Figure 1. Distribution of language dominance computed from the PaBIQ by age (in months)

\[\text{Note: EP – European Portuguese.}\]

**Ages & Stages Questionnaires**

Parents filled in the Ages & Stages Questionnaires (ASQ-3, Squires et al., 2009). These questionnaires assessed the toddlers’ general development. The corresponding age version of the questionnaire was used. We chose the French (Squires & Bricker, 2016) or the EP (Lopes et al., 2015) version of the questionnaire according to parent language preference.

The ASQ-3 contains 30 items that evaluate the areas of communication, gross motor, fine motor, problem-solving, and personal-social skills. The final score in each domain tells us if ‘the child’s development appears to be on schedule’, or if we need to ‘provide the child with learning activities and
establish a monitoring process’, or if ‘the child needs a professional evaluation’ (Squires et al., 2009, p. 7).

The results were compared with French and EP norms. For the gross motor scale and the problem-solving scale, one child in each of this scale needed a professional evaluation. For the communication in French scale and the communication in EP scale, two children in each of these scales needed learning activities and to establish a monitoring process. Despite of these poor results, we included these toddlers as they exhibited normal language development when measured through French and EP CDIs and PaBIQ.

**Results**

**Vocabulary size**

Because of the heterogeneity of our sample in terms of parents’ education level and its possible influence on quantity and quality of input, we first calculated TV-F+EP and CV according to the parents’ education levels. When considering all the children, regardless of age, no differences were found in TV-F+EP according to maternal ($\chi^2(2) = 1.25, p = .54$) or paternal ($\chi^2(2) = 2.73, p = .26$) educational levels. Likewise, for CV, no differences were found according to maternal ($\chi^2(2) = .93, p = .63$) or paternal ($\chi^2(2) = 2.46, p = .29$) education levels.

Second, we examined if the toddlers’ score distribution corresponds to monolingual norms (as shown in Figure 2). The first age group was compared to the 16-month-old norms, the second to the 24-month-old norms, and the third to the 30-month-old norms. We will have to keep in mind that children from the third group are a little bit older than the respective norming group. We looked at the proportion of children below and above the 10th percentile. French and EP CDI results showed that most of our children were performing above the 10th percentile for both the French and EP monolingual norms. Regarding TV-F, 39 of the 53 children were above the 10th percentile and 14 were at risk according to French monolingual norms. A chi-square analysis for goodness of fit (expected distribution: 90% of the children above the 10th and 10% below) showed that children’s TV-F does not follow the expected distribution ($\chi^2(1) = 15.87, p < .001$). When the TV-EP is considered, 46 of the 53 children were above the 10th percentile, and seven were at risk according to the EP norms. A chi-square analysis for goodness of fit (expected distribution: 90% of the children above the 10th and 10% below) showed that children’s TV-EP follows the expected distribution ($\chi^2(1) = 3.84, p = .44$). Only two of these children were below 10th percentile both for French and EP. For TV-F+EP and CV all the children were above the 10th percentile compared to EP norms.
monolingual norms ($\chi^2(1) = 5.89, p = .015$). Compared to the French norms, 52 of the 53 children were above the 10th percentile ($\chi^2(1) = 3.88, p = .049$). Except for one child, then, who did not meet the 10th percentile cutoff point for the French norms (but did reach it for the EP norms), the bilingual children in this study can be considered to be typically developing, at least for vocabulary.

Subsequently, we looked at the distribution of children with a TV below or above the median (50th percentile) compared to French and EP monolingual norms. Chi-square analysis for goodness of fit showed that bilingual children’s TV-F does not follow the expected distribution (half of the children above the 50th and half below) according to the French norms ($\chi^2(1) = 8.32, p = .004$): only 16 of the 53 children were above the 50th percentile. In contrast, children’s TV-EP follow the expected distribution compared to the EP norms ($\chi^2(1) = .02, p = .89$): 26 of the 53 children were above the 50th percentile. For TV-F+EP, 43 of 53 children were above the 50th percentile for both the French and the EP norms. These distributions are statistically different ($\chi^2(1) = 20.55, p < .001$ in either case) from the expected one (half of the children above the 50th and half below).

The children’s average TV-F score is situated at the 35th percentile compared to the French norms. The children’s average TV-EP score is situated at the 47th percentile compared to the EP norms. The children’s average TV-F+EP score is situated at the 68th percentile compared to the French norms and at the 74th percentile compared to the EP norms.

**Figure 2.** Mean of vocabulary size by language and age (months) compared to the 50th percentile of monolingual norms

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<tr>
<td></td>
<td>16–18</td>
<td>20 words</td>
<td>18 words</td>
<td>19 words</td>
<td>19 words</td>
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<td></td>
<td>24–25</td>
<td>189 words</td>
<td>200 words</td>
<td>194.5 words</td>
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<tr>
<td></td>
<td>30–35</td>
<td>455 words</td>
<td>418 words</td>
<td>436.5 words</td>
<td>436.5 words</td>
</tr>
</tbody>
</table>

Note: TV-F+EP: total vocabulary (both language combined, TV-F+EP), TV-EP and TV-F: the total vocabulary (TV) in each language, CV: Conceptual vocabulary. The lines in the graphic correspond to the mean of words in the two languages (Fr + EP).
The children’s average CV score is situated at the 63rd percentile compared to the French norms and at the 68th percentile compared to the EP norms. Thus, the French-EP bilinguals performed better on vocabulary size across both languages than their monolingual peers when CV was considered, both compared to French norms ($\chi^2(1) = 11.79, p < .001$), where 39 of the 53 children were above the 50th percentile, and compared to EP norms ($\chi^2(1) = 11.79, p < .001$), where 39 of the 53 children were above the 50th percentile as well (see Figure 2).

**Vocabulary size and language exposure**

In this study, a positive Dominance score means a dominance in French, and a negative Dominance score means dominance in EP. A statistical analysis was performed to check whether a correlation is observed, as expected, between vocabulary measurements and language dominance. The dominance score (based on the Parental questionnaire PaBIQ) was correlated with TV-F ($r_s = .30, p = .028$). Children who are dominant in French have a larger number of French words. The Dominance score is also correlated with the percentile of EP monolingual norms ($r_s = -.28, p = .046$). Children who are dominant in EP have a larger number of EP words.

As expected, dominance does not seem to have an effect on TV-F+EP ($\chi^2(2) = .84, p = .66$) or on CV ($\chi^2(2) = 1.09, p = .58$).

**Figure 3.** Participant distribution according to CDI percentiles (French and EP) and language dominance

Note: EP – European Portuguese.
**Vocabulary evaluation and general development**

In this section, we consider only the parental score for the ASQ-3’s communication skills scale. This scale consists of six questions. Each question was given a point score (‘yes’ yielded 10 points, ‘sometimes’ yielded 5 points, and ‘not yet’ yielded 0 points). By summing the points for each item, we obtained the domain score, which varies between 0 and 60 points. The child was considered in developmental risk in a specific domain if the domain score was below the cutoff (i.e. a z score below −2 standard deviation). The final score obtained refers to one of these three answers: ‘child’s development appears to be on schedule’, ‘provide the child learning activities and establish a monitoring process’ or ‘the child needs a professional evaluation’. We used the EP version of the ASQ-3 to assess children’s EP, and the French version of the ASQ-3 to assess children’s French. A statistical analysis was performed to check whether a correlation was observed between vocabulary measurements and communication skills as assessed by the ASQ-3 for French and for EP. TV-EP was correlated with the ASQ’s Scale of Communication in EP ($r_s = .65, p < .001$). The EP ASQ-3 Scale of Communication was also positively correlated with TV-F+EP ($r_s = .54, p < .001$) and with CV ($r_s = .51, p < .001$). Identical results were found for TV-F. TV-F was correlated with French ASQ-3 Scale of Communication ($r_s = .58, p < .001$). The French ASQ-3 Scale of Communication was also correlated with TV-F+EP ($r_s = .54, p < .001$) and CV ($r_s = .54, p < .001$).

**Discussion**

The aims of our study were to explore (a) if French-EP bilingual toddlers produce the same number of words as their monolingual peers, in French, in EP or in both languages, and (b) the link between lexical size and language dominance. To do so, we calculated the number of words in each language, TV-F+EP, and CV, measures suggested in the literature as being the best to evaluate bilingual children’s vocabulary (Pearson et al., 1993). We expected that vocabulary size in each language of the bilinguals would be similar to that of monolinguals. We also expected that TV-F+EP for bilinguals would be higher than the single-language vocabulary of monolingual peers but we expected CV to be comparable (De Houwer et al., 2014; Junker & Stockman, 2002). Additionally, we expected to show through a correlation between lexicon size and language dominance that language exposure would be positively correlated with bilinguals’ vocabulary development (Thordardottir et al., 2006).

As expected, the results showed that, as a group, the French-EP bilinguals performed the same as monolingual peers between 16 and 35 months in EP
vocabulary acquisition (reflecting findings by De Houwer, 2010; Junker & Stockman, 2002; Pearson et al., 1993). Even if we took into consideration children aged 30 months or below, this result remains the same. Nonetheless, for French, even with the data of the children older than 30 months, the bilinguals’ French vocabulary size was below the French monolingual norm (only 16 of 53 children were above the 50th percentile).

In line with the results of De Houwer (2010) and Thordardottir et al. (2006) on other pairs of languages, TV-F+EP scores exceeded monolingual vocabulary scores in both French and EP. Moreover, when CV was considered, and compared to both EP and French monolingual norms, the French-EP bilinguals had a sizeable expressive vocabulary size across both languages. This result differs from previous studies which showed that CV was comparable or smaller when monolingual and bilingual toddlers were compared (e.g. De Houwer et al., 2014; Junker & Stockman, 2002).

The 14 toddlers that are below the 10th percentile for French, as well as the 7 toddlers that are below the 10th percentile for EP, might be considered at risk of language impairment in each language respectively. However, this result should be approached with caution. First, the PaBiQ questionnaire showed that no child was at risk of being language-impaired (based on the results of the calculation of No Risk index; Almeida et al., 2017; Tuller, 2015). We also found that none of the TV-F+EP or CV scores were below the 10th percentile compared to EP monolingual norms, and, for French, only one child was below the 10th percentile. It is, then, crucial, when assessing vocabulary in bilingual children to assess both languages. De Houwer (2019) investigated the use of the CDI with bilingual populations. She pointed out some methodological issues and advised an evaluation of both of the child’s languages for it to be equitable and complete. Moreover, our results seem to indicate as well that TV-La+Lb or CV scores should be used in order to determine language delay risk, which is completely in line with Core et al’s (2013) recommendation. As our children are ranked the same way based on TV-La+Lb and CV scores, either one or the other score could be used. De Houwer (2010) came to the same conclusion by showing that the CV score comparison did not add any information that was already known from a simple vocabulary size comparison.

The fact that one child was below the 10th percentile for French but not for EP, with its TV-F+EP score, could be linked to possible French underestimation by the child’s parents. The reason could be that the parents are not in the presence of their child when he/she talks in French (for example, when the child is in a caregiver’s house). It is also important to highlight that both parents are dominant in EP and it may cause a problem during the evaluation. This assumption is confirmed by the PaBiQ, where parents indicated that EP
was frequently used at home, and French was frequently used in other contexts outside of the home. In fact, the child was dominant in French and it started attending nursery at 16 months. Finally, additional evidence for possible French underestimation for the parents is the fact that even if parents are able to understand both languages, the percentage of parents with an excellent level of EP was higher than the percentage of parents with an excellent level of French. This additional evidence is in line with the TV-F and TV-EP distribution of our sample where TV-F did not follow the expected distribution, whereas TV-EP did follow it (half the children were above the 50th percentile and half below). As parents in our study were, on average, more proficient in EP, their child vocabulary report can possibly contain a small bias towards EP. To avoid such bias, vocabulary assessment should be carried out by checking the language proficiency of the respondent, and, when possible, having a second respondent with a higher proficiency in the other language to complete the questionnaire.

Nevertheless, even with this possibly small bias in this study, the dominant language is related to a larger vocabulary in that language. Dominance in French was correlated with a greater number of French words produced by toddlers and the same correlation was found for EP dominance. The data from the ASQ-3 Scale of Communication was in line with these results. As language dominance was defined in this work by exposure patterns and proficiency, our results confirm the link between language exposure and bilingual child vocabulary size (Thordardottir et al., 2006). They confirm also that if a bilingual child has much more exposure to one language, he/she will have the same vocabulary performance in that language as his/her monolingual peers (Junker & Stockman, 2002).

**Conclusion**

In this study, we compared the lexical development of French-European Portuguese bilingual toddlers in France with monolingual toddlers in France and Portugal. To our knowledge, this study is the first to explore the bilingual lexical development in French and EP. Additionally, it is the first to combine, in an experimental protocol, validated and adapted questionnaires for both populations and languages. We calculated for each toddler the number of words in each language, total vocabulary and conceptual vocabulary (Pearson et al., 1993). Our results showed that the majority of participants had the same performance in vocabulary acquisition as their monolingual peers in both languages (French and EP). Moreover, their total and conceptual vocabularies exceeded the vocabulary of monolinguals. Finally, language dominance was
correlated with vocabulary size. For this specific population, our results suggest that bilingualism does not hinder lexical development. However, it is not possible to generalize these results to other bilingual populations considering the important impact on children's linguistic behaviours of elements such as environment and environment changes, the type of languages under study, and data collection methods, among others. It is also not possible to generalize these results to the entire linguistic competence of our participants, as we did not study the development of other language components, which may interact with lexical development such as phonology in particular. This suggests that future research on early bilingualism should follow children longitudinally by combining quantitative and qualitative measures on the global linguistic behaviours of the children and their environment.

References


