Introduction

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Before the end of their first year of life, infants are able to encode sound patterns (Jusczyk & Aslin, 1995; Tincoff & Jusczyk, 1999) and associate them with their referents (Bergelson & Swingley, 2012). Later on, infants begin to represent those word-forms with finer phonological detail (e.g. Werker, Fennell, Corcoran, & Stager, 2002), and from 18 to 24 months of age, they acquire new words at an increasingly fast rate (Bergelson, 2020; Bloom, 2002; Fenson et al., 1994). The type of words acquired earlier at these ages provides information about the mechanisms and biases that constrain early vocabulary growth. Recent works show that the words that are acquired are nouns, highly concrete words, or words that appear in short sentences, an that this pattern is relatively consistent across languages (Braginsky, Yurovsky, Marchman, & Frank, 2019). Most of the literature on early word acquisition has been conducted on monolingual children. However, a substantial proportion of children around the world are exposed to two languages from birth (bilinguals, henceforth). Given that the relative amount of input a child receives in each language is a strong predictor of vocabulary size (e.g., Cattani et al., 2014; David & Wei, 2008; Floccia et al., 2018; Thordardottir, Rothenberg, Rivard, & Naves, 2006), generalising the aforementioned developmental patterns of word acquisition to bilinguals is challenging.

There is evidence that bilinguals know less words in each of their languages than monolinguals, but also that both groups know a similar amount of words when both languages are aggregated. For example, Hoff et al. (2012) found that English-Spanish bilingual toddlers in South Florida knew less words in English than monolinguals that only learnt English. In contrast, both groups knew a similar amount of total words, when words in both English and Spanish were counted together. Other studies have provided converging evidence that bilinguals and monolinguals know a similar number of words (Fabian, 2016; Gonzalez-Barrero, Schott, & Byers-Heinlein, 2020; Junker & Stockman, 2002; Oller & Eilers, 2002; J. L. Patterson, 2004; J. Patterson, Pearson, & Goldstein, 2004; Pearson & Fernández, 1994; Pearson, Fernández, & Oller, 1993; Petitto et al., 2001; Smithson, Paradis, & Nicoladis, 2014) or even a larger amount of words (Aguila, Casas, Pons, & Galceran, 2008; De Houwer, Bornstein, & Putnick, 2014), only when the languages were aggregated. While these studies have mostly relied on samples of bilingual children learning two relatively distant languages (as it is the case of English and Spanish) it is unclear whether children learning two more similar languages follow this pattern too.

A recent study by Floccia et al. (2018) highlighted language similarity as an important factor underlying the differences between monolingual and bilingual vocabulary sizes. The authors collected vocabulary data from 372 24-month-old bilingual toddlers in the UK who were learning English and an additional language. The additional language was one a pool of 13 languages that differed in their phonological and grammatical similarity with respect to English, such as Dutch, Italian, or Mandarin. To measure phonological similarity, the authors computed the average edit distance between translation equivalents in each language pair. Translation equivalents (TEs) are word-forms that belong to two different languages, but share meaning (or at least enough conceptual overlap to be considered synonyms). TEs that also overlap in form (e.g., *cat*-*gato*, in English and Spanish) are called *cognates*, whereas form-dissimilar TEs (e.g., *dog*-*perro*) are called *non-cognates*. In this study, the more cognates a pair of language shared, the higher their index of phonological similarity was. The authors reported a positive association between the index of phonological similarly and participants’ vocabulary sizes. For example, children learning English and Dutch, sharing 22.14% phonological overlap, were able to produce more words than children learning English and Mandarin, only sharing 1.97% phonological overlap. Hoff et al. results, combined with other findings that show differences in vocabulary size across monolingual and bilingual children learning relatively distant languages are difficult to generalise to other bilingual populations whose languages are closer. For instance, Aguila, Casas, Pons, & Galceran (2008) reported that bilingual toddlers learning Catalan and Spanish, two lexically very close languages, showed *larger* aggregated vocabulary sizes than monolinguals, following a different pattern than bilinguals learning English and Spanish in Hoff et al. (2012). In summary, bilinguals learning two languages that share more cognates show larger vocabulary sizes than those learning two languages that share less cognates. However, how cognateness impacts vocabulary acquisition is still unclear.

Floccia et al. pointed to parallel activation as the main mechanism underpinning their results. The *parallel activation* hypothesis suggests that bilinguals activate both languages simultaneously during speech production or comprehension. This phenomenon is the result of the activation of lexical representations in both languages, even when only one is in use (Bobb, Von Holzen, Mayor, Mani, & Carreiras, 2020; Hoshino & Kroll, 2008; Thierry & Wu, 2007). One of the clearest examples of parallel activation was provided by Costa, Caramazza, & Sebastian-Galles (2000)‘s study, in which Catalan-Spanish monolingual and bilingual adults were asked to name pictures of common objects in Catalan, their dominant language. In half of the trials, the object labels were cognates in Catalan and Spanish (*sofà*-*sofá*, translations of *sofa*)–whereas in the other half of the trials labels were non-cognates (*taula*-*mesa*, translations of *table*). Bilingual named cognate pictures faster than non-cognate pictures, even after adjusting for the lexical frequency of the items. Importantly, monolinguals did not show this effect. These results suggested that, for the bilinguals, Spanish phonology was activated during cognate trials, facilitating the production of the Catalan word-forms. Several recent studies have also provided similar evidence in children (Bosma & Nota, 2020; Jardak & Byers-Heinlein, 2019; Poulin-Dubois, Bialystok, Blaye, Polonia, & Yott, 2013; Von Holzen & Mani, 2012). These results, taken together with Floccia et al.’s, seem to point to the fact that bilinguals’ vocabulary size tends to grow faster when both languages share a high proportion of cognate TEs, leading to a increased activation of word forms in both languages during speech processing. An interesting question is whether toddlers really know enough TEs for parallel activation to be a plausible mechanism for such effect.

Despite initial claims that bilinguals do not acquire TEs during their first years of life (Volterra & Taeschner, 1978), later studies reported that not only TEs are present at early stages of lexical development, but also represent an important proportion of the early bilingual (Bilson, Yoshida, Tran, Woods, & Hills, 2015; De Houwer, Bornstein, & Putnick, 2014; Holowka, Brosseau-Lapré, & Petitto, 2002; Junker & Stockman, 2002; Pearson, Fernández, & Oller, 1993) or even trilingual (Montanari, 2010) lexicon. If parallel activation plays a role during word acquisition at these ages, it could be predicted that cognate TEs are acquired earlier than non-cognate TEs, based on the assumption that the acquisition of cognates is facilitated by the co-activation of their translation equivalent during speech processing. Indeed, cognates seem to repressent a larger proportion of bilinguals’ productive vocabulary than what expected from monolinguals’ data (Bosch & Ramon-Casas, 2014; see Fabian, 2016 for similar results in Portuguese-English bilinguals). Additionally, three-year-old children learning German and an additional language responded more accurately to cognate items than to non-cognate trials, in a task that required to select a named picture from a pool of pictures and distractors (Gampe, Kurthen, & Daum, 2018). Converging evidence was also provided by a longitudinal case study of an English-German bilingual who learnt form-similar TEs earlier than form-dissimilar TEs (Schelletter, 2002). In summary, there is evidence that during their first three years of life, children know many TEs, and seem to acquire cognate TEs earlier than non-cognate TEs.

The most common notion of parallel activation in the literature, however, does not quite satisfy the explanation needed for why TEs are acquired earlier when their forms are similar across languages. Parallel activation requires the existence of two already acquired representations, one in each language, that are activated simultaneously during language production and comprehension. This is not the case in the acquisition of TEs. First, if no members of the TE have been acquired yet, it would be impossible that form-similarity plays a role during the acquisition of TEs (as no representations are available for activation during speech processing). Second, even if one of the members of the TE has been acquired, it is not possible to activate a second member that has not yet been acquired. Third, if both members have been acquired, parallel activation is possible, but cannot account for the acquisition of the TE, which has already occurred. If parallel activation plays a role during the acquisition of TEs, it must be assumed that word-form acquisition is a gradual process that does not require mature lexical representations, in line with accumulator models accounts of vocabulary acquisition (Hidaka, 2013; Kachergis, Marchman, & Frank, 2021; e.g., McMurray, 2007; Mollica & Piantadosi, 2017). This way, once one of another member of the TE has been acquired, the exposure to the acoustic form of another member can activate the former, and their form similarity would facilitate the acquisition of the latter.

Moreover, within each TE, members that belong to the language of higher exposure are more likely to be acquired first. This would facilitate the subsequent acquisition of the member in the other language (the language of lower exposure). If parallel activation plays a role in the facilitation effect of cognateness during word acquisition, such effect should be stronger in the language to which children are less exposed. In support to this claim, the effect of cognateness reported by Floccia et al. only reached statistical significance in the additional language, not in English, participant’s dominant language. However, not this nor the other aforementioned studies tested the effect of cognateness on the acquisition of TEs, rather on participants’ aggregated vocabulary size. Thus, from this data it is not possible to draw any conclusions about the potential role of language dominance on the cognate facilitation effect.

In the present study we build onto previous studies of word acquisition to extend Floccia et al. (2018)’s findings using data from children at earlier and later ages, and modelling the acquisition trajectories of cognate and non-cognate TEs. We collected data from a sample of children of ages ranging from 10 to 36 months learning Catalan and/or Spanish, with varying degrees of exposure to each language. We hypothesised that TEs would be acquired earlier if both the Catalan and the Spanish word-forms were cognates, compared to when they are non-cognates. We also predicted that this effect would be larger in participants whose exposure to the language a given word-form belongs to is lower, compared to when exposure to that language is higher. The reason behind this prediction is that TEs should have already been acquired in one of the languages in order to generate a facilitation effect. Since word-forms are more likely to be acquired in the language of higher exposure, the potential facilitation effect of cognatness should occur more frequently, and thus be stronger, in the acquisition of the word-form in the language of lower exposure.

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