

The Impact of Older Siblings on Vocabulary Acquisition in Bilingual Children

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### Abstract

This study analyzes the effects of language input from older siblings on language skills in preschool-age Cantonese-English bilingual children. Twenty-seven bilingual preschool-age children learning Cantonese as their first language (L1) and English as a second language (L2) were tested on their vocabulary receptive and expressive skills as well as fast mapping comprehension and production skills. Participants were broken into two groups based on the language use of their older siblings: the ‘Mostly Cantonese’ group contains those participants with older siblings who use mostly Cantonese (L1) at home, while the ‘50/50’ group contains those participants with older siblings using an equal amount of Cantonese (L1) and English (L2) at home. Hypotheses that children in the ‘50/50’ group would outperform children in the ‘Mostly Cantonese’ group in vocabulary and fast mapping tests given in English (L2) were unsupported by the results of this study. Results of the vocabulary task saw no significant differences between groups. Results of the fast mapping task did, however, suggest the possibility that older siblings who speak mostly L1 are more beneficial to their younger siblings’ L1 fast mapping skills, whereas older siblings who speak both languages equally are not beneficial to their younger siblings’ L1 or L2 skills.

*Keywords:* sequential bilingualism, sibling impact, language input, fast mapping

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The purpose of this study is to determine the effects of language input from older siblings on the vocabulary learning in preschool children who learn Cantonese (L1) as a home language from birth and start to learn English (L2) as a second language in preschool settings. These children are called sequential bilingual children or young second language learners. Sequential bilingual children are unique in that they learn two languages starting at different time points and in different settings. In this study, I looked at vocabulary learning in both languages in two areas: (1) vocabulary, and (2) fast mapping in L1 and in L2. Vocabulary is considered as the accumulated knowledge of individual learned words; and the vocabulary measures collected with the Peabody Vocabulary Picture Test are used to determine lexical-semantic knowledge (Dunn & Dunn 2007). Fast mapping measures were taken to determine each participant's ability to learn novel words, or words that he or she has never been exposed to before. Fast mapping is the initial stage of the word learning process in which a person is able to map a new word to a referent (Dollaghan, 1985). Previous studies have demonstrated a correlation between language that the subject is able to identify or produce and language the subject is taking in from other people or other language sources (Bernardini, 2017; Dijkstra, Kuiken, Jorna, & Klinkenberg, 2016; Duursma et al., 2007; Place & Hoff, 2016). Despite the conventional acknowledgement of the role of siblings in child language development, only a handful of studies have been done that focus on the intricacies of sibling relationships and their impact on childhood growth and development (McHale, Updegraff, & Whiteman, 2012). Even less research has been done pertaining to the correlation between sibling relationships and their impact on the acquisition of more than one language. My study examined preschool age children who are sequential bilingual

language learners. I would like to determine if the amount of L1 and L2 used by older siblings might affect Cantonese-English bilingual children's vocabulary learning in their first language and their second language. In the past, researchers have stressed that "when studying bilingual children, the children's language experience and their educational environment need to be considered" (Hammer, Lawrence, & Miccio, 2007). For this purpose, I have included a review of current literature addressing some of the ins and outs of bilingualism and how language experience plays a role in the acquisition of two languages.

### **Literature Review**

#### **Bilingualism**

The conquest of proficiency in more than one language is something long studied by linguists. Though considered a feat by many monolingual speakers in the United States, bilingualism is not uncommon in the world. In fact, an estimated two thirds of the children in the world are exposed to bilingualism (Bialystok, 2010). Therefore, the study of bilingualism is ever-important in creating a map of how the human brain works and how we interact with the world around us. For a long time, being bilingual was looked at as something that negatively impacted a person's language ability and even cognition. This was much due to ethnocentric ideas of culture and, in the United States, large generalizations made from English-based standardized tests (Bialystok, 2010). Today, research suggests that bilingualism, rather than a quality that is 'good' or 'bad' for a person, is a dynamic process in itself, which is influenced by many factors and can be helpful or harmful to language and cognition. One way in which bilingualism can be seen as an "advantage", documented by Bialystok (2010), is that having to switch from one language to the next allows people who are bilingual to have greater "mental reorganization" or "mental flexibility" in a range of cognitive tasks (Bialystok, 2010). However, the 'bilingual advantage' has been a bit overstated, as studies demonstrate that bilinguals are by no means

‘better at language’ because of their ability to use more than one of them, rather they are simply having to spread knowledge (such as vocabulary knowledge) between two languages instead of one (Bialystok, 2010). Furthermore, the acquisition of two languages does not happen effortlessly with the static exposure to different languages throughout a child’s day (Duursma et al., 2007). Instead, it is a dynamic process with multiple factors influencing the gradual learning of two languages. Some of these factors include: being able to distinguish between the two languages, the amount of language input the child receives, and language practices which vary from home to home (Branum-Martin, Mehta, Carlson, Francis, & Goldenberg, 2014; De Houwer, 2017; Duursma et al., 2007). In the following sections, I will examine some theories that have surfaced addressing the influences of bilingualism on a person’s language and cognition, as well as the implications of the onset of second language acquisition.

**Theories of negative implications of bilingualism.** It is crucial to recognize the negative aspects of bilingualism in order to understand some of the challenges that bilinguals face. It has been widely accepted that bilingual language learners tend to lack depth in their individual languages as compared to the depth that monolingual language learners achieve in their single language. This is the idea propagated by the ‘weaker links hypothesis’, which says that those who are bilingual will use each language less, made necessary by various environments where one language may be expected over the other (Gollan, Montoya, Cera, & Sandoval, 2008). Monolingual language learners, on the other hand, are able to apply all of their focus to one language and are less likely to be exposed to bilingual language input. Furthermore, a study by Hammer et al. (2007) analyzing Spanish-English bilingual children supported the theory that even in their first language (Spanish), bilingual children are not experiencing enough language input in school or homes to achieve language skills equivalent to monolingual children (Hammer

et al., 2007). Additionally, bilinguals may face deficits as compared with monolinguals in their abilities to produce speech. In a study comparing performances of multi-word utterances in monolinguals and bilinguals, Sadat et al. (2012) found that “bilinguals, even when using their L1, exhibit a cost compared to monolinguals in the articulation of noun phrases” (Sadat, Martin, Alario, & Costa, 2012; Sadat, Martin, Magnuson, Alario, & Costa, 2016). These studies clearly indicate the challenges that bilingual children often face as they attempt to keep up with monolingual peers. Pearson (2007) summarizes some of these challenges, which often involve the child as well as his or her family, emphasizing that children in bilingual environments don’t necessarily become bilingual. It is suggested that this might be due to a number of environmental factors such as language input, language use, and attitudes toward different languages (Pearson, 2007). Such issues often arise in immigrant populations, where there is a minority language spoken at home and a majority language spoken in the broader community (Pearson, 2007). Such is the case in my study of Cantonese-English bilingual participants. Whereas monolinguals have outperformed bilinguals in single language contexts, the benefits of bilingualism have been found in functioning that is higher up in the brain.

**Theories of positive implications of bilingualism.** One of the most studied theories of bilingualism is that of enhanced metalinguistic abilities in bilinguals, including the control of attention (Barac, Bialystok, Castro, & Sanchez, 2014). While monolingual children are documented to have a larger vocabulary and greater grammatical skills in their one language, bilinguals have been reported to have less rich language skills in each of their two languages, but heightened abilities in other aspects of language and cognition due to the necessity of switching between languages that bilingual people are constantly faced with (Bialystok & Poarch, 2014). An important aspect of bilingualism to note is that “both languages of a bilingual are jointly

activated during all linguistic processing, even in strongly monolingual contexts in which the non-target language would be inappropriate” (Bialystok, 2010). It is possible that this dual activation could give a bilingual language learner benefits in ways of a somewhat constant engagement of both languages, as well as ways to bridge weaknesses in one language with ability in the other language. Another advantage that bilinguals may possess is an enhanced ability in attention to speech as compared with monolinguals (Kuipers & Thierry, 2015). Most documented advantages assigned to bilinguals, however, are within the realm of metalinguistic abilities and cognitive effects, as examined in the next section.

**Bilingualism and cognition.** While language abilities of bilingual individuals are enriched in some ways and deprived in others, cognitive effects of bilingualism are seen in a primarily positive light. Researchers have found that bilingualism enhances executive functioning for metalinguistic skills as well as non-verbal processing skills (Bialystok, 2010). Furthermore, this enhanced performance of executive function has been found to influence a person throughout his or her life, in areas of the control of attention, dealing with conflict, and in situations in which “set shifting” is necessary (Bialystok & Poarch, 2014). This effect on cognition is explicitly linked with brain activity, as explained by Bialystok, as “evidence that frontal lobe regions are involved in selection [of the correct word in a given task] for bilinguals to a greater extent than monolinguals has been produced in a number of studies” (Bialystok, 2010). This difference is thought to be in part the result of “access to two languages and the constant possibility that either will be required” (Bialystok, 2010). These heightened metalinguistic abilities in bilingualism emphasize that there is a difference between brain functioning in bilinguals and monolinguals, which is why so much research has been done to understand the effects that learning multiple languages has on the brain.

**Sequential bilingualism.** In this study, I looked specifically at sequential bilingual learners, meaning that the child has learned the first language since birth and begins to learn the second language at a later stage of language acquisition, in this case, during preschool. It is important to understand the difference between simultaneous bilingual learners and sequential bilingual learners. Simultaneous bilingual learners begin learning two languages at the same time, typically from birth, and continue on similar learning trajectories with both languages. However, in a study conducted with Catalan-Spanish sequential and simultaneous bilinguals, it was found that simultaneous bilingual learners still have a dominant language, and “do not attain the same level of proficiency as early bilinguals in their first language” (Sebastian-Galles, Echeverria, & Bosch, 2005). In this study by Sebastián-Gallés et al. (2005), ‘early bilinguals’ are synonymous with ‘simultaneous bilinguals’. On the other hand, sequential bilingual learners begin learning their first language at birth, and begin to learn a second language later in life, in most cases, once they enter a school where the majority language (L2) is taught. The ‘language outcome’ that a child presents at any given time might be explained by their categorization as a simultaneous or sequential bilingual learner, which is why understanding the implications of each is essential in both research and clinical settings (Hammer et al., 2007). This difference is even found in the brain structure of simultaneous and sequential bilingual learners. Klein et al (2014) found that “learning a second language after gaining proficiency in the first language modifies brain structure in an age-dependent manner whereas simultaneous acquisition of two languages has no additional effect on brain development” (Klein, Mok, Chen, & Watkins, 2014). For the purpose of my study, I will be concentrating on sequential bilingual learners, who make up the vast majority of the participants.



Another aspect of sequential bilingualism, is that as the second language (L2) is being introduced, it is not uncommon to observe deficits in the first language, especially in preschool children, for whom Language 1 (L1) has not been fully developed (Schiff-Myers, 1992).

Although studies as to whether these phenomena occur in those learning a second language as an adult are not quite as prevalent, I feel that I can personally relate to this shift between languages. When I was studying abroad in Valparaíso, Chile during my Junior year of college, I remember experiencing slight deficits in my English skills. It was amazing to me how, after spending twenty-two weeks in a country where the majority language (Spanish) was not my first language (English), I became slightly less proficient in the language that I had been spending my entire life mastering. One specific example that I can recall is that, toward the end of my stay in Chile, when speaking English with friends in my program or calling my family on the phone, I continuously failed to find the English equivalent for the Spanish word “desarrollar”. Translated directly, this word simply means ‘to develop’. For some reason, I either couldn’t find the word ‘develop’ in my brain, or perhaps I felt that ‘desarrollar’ meant something ever so slightly different in the language that it belongs in. We, as human beings, are perfectionists when it comes to language, and for good reason. It is the way that we communicate with others, the way that we allow feelings, intentions, and dreams - which are contrived and cultivated so intricately within our own minds – to become exposed to another mind that *just might* be able to understand it enough for it to be shared. When a person learns a new language, for a time that ability to express cognition is inhibited by a lack of linguistic ability. My experience with this, only for five and a half months as a college student, is why I see bilingualism as both frustrating, and fascinating. What a shame that, as mentioned previously, bilingual individuals have been through a history of disrespect from others, simply because the

second language has not been developed fully enough to support his or her true knowledge. This is why I personally believe in the study of bilingualism for its immediate relevance for such a large portion of the world's population, and the urgency that it assigns to educators and clinicians, whose responsibility it is to become aware of the situations that bilingual language learners are often faced with.

It is evident that being bilingual is not an ability that can be characterized point-blank, but requires a holistic understanding of the effects that it can have on a person's language abilities, as well as a detailed understanding of the contextual factors of an individual's experience that might also shape his or her proficiency in multiple languages. I will now evaluate existing research pertaining to the socio-cognitive and linguistic influence of siblings.

### **Effects of Siblings on Development**

The idea that siblings share a special interpersonal connection is not often refuted by those of us who have siblings, nor by those who don't have siblings who have probably witnessed in awe the debacle between siblings when a sister inevitably steals the favorite shirt, or a brother eats the last hot pocket. Though we laugh at such classic tales of sibling rivalry as adults, there is a serious connection between siblings that deeply affects a person's cognitive and social maturation. One very strong case for this phenomenon is the acquisition of language. Research suggests that "interactions with older siblings promote young children's language and cognitive development, their understanding of other people's emotions and perspectives, and conversely, their development of antisocial behavior" (Brody, 2004). Therefore, there seems to be a connection between siblings that can give children certain advantages and disadvantages in life, based on their experiences with their sibling. This dynamic between older sibling and younger sibling creates "naturally occurring teaching and caregiving experiences [which] benefit

cognitive, language, and psychosocial development in both older and younger siblings,” (Brody, 2004). Dai & Heckman (2013) also suggest that influences from older siblings may be as important or more important than influences from parents on a child (Dai & Heckman, 2013). Even though, as McHale states, “siblings are a fixture in the family lives of children and adolescents, and a body of work documents their role in one another’s everyday experiences as companions, confidantes, combatants, and as the focus of social comparisons”, the relationship between siblings is often excluded from family research (Kibler, Palacios, Simpson-Baird, Bergey, & Yoder, 2016; McHale et al., 2012).

I can personally relate to the theory of a ‘special bond’ between siblings, due to my experiences with my sister who is three years older than me. Recently, at a convenience store, we started smelling different shampoos to decide which one to buy, which led us down a twenty-minute nostalgic escapade of smelling each shampoo and conditioner bottle, declaring with joy what moment of our childhood the different scents brought us to. Even though we didn’t always know the memory the other person was thinking of, we agreed on enough of them to remind me how incredibly strong our bond is as siblings. That being a strange interaction based on olfactory connections to memories, there are many other aspects of my life that have been influenced by my sister, Megan. Academic expectations from my parents, desires to achieve, and ways of interacting with others while growing up were all shaped in a way by the example I took from her and the relationship we shared.

**Social and cognitive implications of older siblings.** Research suggests that my sister and I are not alone in the deep cognitive, social, and linguistic dynamic that arises as children grow up in the same household. “Parents, clinicians, and now researchers in developmental psychology recognize the significance of the sibling relationship as a contributor to family

harmony or discord and to individual children's development" (Brody, 2004). An older sibling can influence his or her younger sibling in direct and indirect ways, creating a positive trend for the latter born child if their relationship is good, or a negative trend if their relationship is poor (Cutting & Dunn, 2006). The interpersonal relationship between siblings more overtly demonstrates the connection between the two. "Sibling influences emerge not only in the context of siblings' frequent and often emotionally intense interactions but also by virtue of siblings' role in larger family system dynamics" (McHale et al., 2012). Interactions such as caregiving opportunities, play activities, as well as arguments between siblings are examples of these. In a study conducted by Howe et. Al (1998), siblings were observed in their pretend play with each other (Howe, Petrakos, & Rinaldi, 1998). They found that "use of internal state language was associated with high-level negotiation by sibling pairs who engaged in more frequent pretend play" (Howe et al., 1998). This means that this continued interaction between siblings in a play setting compelled children to express their 'inner state' with each other. Such type of language environment where children are in their own pretend world with each other proves "knowledge of the internal emotional, physiological, and cognitive states of others" (Howe et al., 1998).

Older siblings can also indirectly affect their younger siblings through how parental beliefs and practices are formed by the older sibling (Brody, 2004). In a study conducted by Hoff-Ginsberg (1998) looking into the effects of socioeconomic status and birth order on language, it was found that "the birth order-related differences in maternal speech were that mothers talking to later borns used shorter utterances and asked more questions than mothers talking to first borns" (Hoff-Ginsberg, 1998). Differential treatment from parents can also indirectly affect a child's sense of self in relation to his or her sibling depending on whether the child perceives the differential treatment to be fair or unfair (Brody, 2004).

Some other factors that can determine what kind of influence siblings have on each other include age difference, gender, and culture. Older siblings may provide younger siblings with differentiated cognitive strengths depending on their gender. Dai and Heckman (2013) found that male older siblings contributed more to the younger sibling's development of mathmatic skills, and that female older siblings contributed more to the younger sibling's development of English skills (Dai & Heckman, 2013). Furthermore, Whiteman et al (2002) indicates that the strength of the relationship between siblings is very important to consider and that for both mothers and children, the quality of experience with an older child/sibling was a better predictor of target-based expectations for the young adolescent than was the simple presence or absence of an older sibling" (Whiteman & Buchanan, 2002). If siblings share a disharmonious relationship, it is quite possible that pretend play and pleasant or prolonged interactions are less frequent than those between siblings who get along most of the time. This would mean that the child is relying more on parents or friends for language than the older sibling.

Another factor to consider is the age difference between the children. Cutting and Dunn (2006) cite the strength and value of pretend play among children (Cutting & Dunn, 2006). "Studies conducted in children's homes and in laboratories show that older siblings in middle childhood can teach new cognitive concepts and language skills to their younger siblings in early childhood" (Brody, 2004) .However, if there is a gap too large between younger sibling and older sibling (say, 12 years, for example), it is probable that the older sibling would produce language input similar to that of an adult to the child, which would could influence language effects seen in the child.

Culture can also influence the type of relationship that siblings have with one another. In a study about the caregiving roles of older siblings with their two-year-old siblings, Rabain-

Jamin (2003) looks into the Wolof (from Senegal) and Zinacantec Maya (from Mexico), and how sibling roles are varied between cultures (Rabain-Jamin, Maynard, & Greenfield, 2003). It was determined that “The Wolof tend to scaffold the younger child to use verbal means of expression, whereas the Zinacantecs tend to respond to nonverbal cues emitted by the younger child without requesting the younger one to verbally specify demands” (Rabain-Jamin et al., 2003). This study indicates the variety of inter-sibling dynamics among different cultures, as well as serving as an indication of how older siblings can directly impact younger sibling’s language acquisition. Another finding from this study was that older siblings tended to address two to three year olds with ‘action directives’ to engage them in current activities (Rabain-Jamin et al., 2003). This might indirectly encourage those children with older siblings to engage in more social activities involving language, thus increasing use of language in the child.

**Sibling influence on language.** Older siblings have also been thought to somewhat negatively affect a child’s language skills. Brody (2004) suggests that social skills of a younger child may be negatively affected by the presence of an older sibling (Brody, 2004). Furthermore, in a study conducted by Bridges & Hoff (2014), it was found that when older siblings are in the room with a younger sibling, parents are more likely to speak to the older sibling than the younger sibling (Bridges & Hoff, 2014). This might negatively influence the younger child by means of less exposure to the language. Although older siblings (as young as 4 year olds) have been seen to alter their language to make it simpler when speaking to younger siblings, it is suggested that the younger sibling could be disadvantaged by the lower quality, in terms of grammatical structure, accuracy, and richness of the older sibling’s input. Interactions with older siblings might include less encouragement or ‘scaffolding’ than with parents (Tomasello & Mannle, 1985). In Hoff-Ginsberg’s study of birth order, it was found that older siblings had more

developed semantic and grammatical skills, whereas younger siblings were able to reproduce ‘social responses’ with less significant meanings (Hoff-Ginsberg, 1998). This may imply some sort of meta-awareness of the pragmatics of language that younger siblings have as compared with more micro, fine-tuning details that older siblings may be stronger with. The theory that younger siblings have greater socio-linguistic gains than their older siblings might be explained by research that suggests younger siblings must produce “contingent utterances to join ongoing conversations between their mothers and older siblings” (Hoff-Ginsberg, 1998). Therefore, a desire to ‘keep up’ with older siblings might influence the formation of language in younger siblings’ brains.

**Bilingual siblings.** Furthermore, some research has been done to explore the implications of this ‘sibling connection’ with children who are bilingual. It has been found that “older siblings are powerful resources, mediators, and catalysts in Spanish-speaking immigrant homes in that they engage in language and literacy practices through modeling and enacting their expertise with younger siblings who themselves bring important knowledge to school-valued practices in which siblings engage” (Kibler et al., 2016). In two studies conducted by Bridges & Hoff (2014), language input from an older sibling was reported from within Spanish-English bilingual homes. “Both studies found that older siblings used English more in talking to the toddlers than did other household members and that toddlers with older siblings were more advanced in English language development” (Bridges & Hoff, 2014). It was also found that “in sibling interactions, exchanges also consisted of back-and-forth negotiations of meaning in which family members engaged in translations across languages” (Kibler et al., 2016). These studies provide evidence that older siblings encourage more L2 use within the home. This would result in greater volumes of the family’s second language being spoken at home, indicating an increase in L2 input for

younger siblings. The impact of language input on language acquisitions will now be described at length.

### **Language Input**

The role of language input in language acquisition has been largely debated by scholars. Research suggests that language input has significant impact on the development of language based on a number of factors, including quantity and quality of the input (Place & Hoff 2016). It has been much debated among researchers what the term “language input” entails. While some researchers such as Carroll indicate a difference between exposure and input in that exposure is language directed to the child and exposure is language specifically used as a “solution to a particular learning problem,” others, such as Duursma (2007), demonstrate a more generalized view of language input. For the purpose of my study, I take on the more generalized approach to this concept, meaning that language input is any type of language that a child might be exposed to. Behaviorists such as Skinner have suggested that language environment and input have a very strong correlation to language learning almost to the point of static interaction yielding sufficient language acquisition (Abutalebi & Clahsen, 2017). What Abutalebi et al. (2017) conclude is that language input and language acquisition share a more dynamic relationship between each other, and that large assumptions should not be made. Subsequently, “progress can be made by asking more subtle questions, such as how exposure affects different kinds of linguistic knowledge, different kinds of bilinguals, and what the mechanisms are by which the language learner employs information available from the linguistic environment” (Abutalebi & Clahsen, 2017). Moreover, the relationship between language input and language learning does not function by means of a formula, rather, there are many nuances of language input that can affect a learner of such language in various ways. For obvious reasons of the



involvement of two languages rather than just one, correlation between language input and bilingualism is very complex. While Carroll et al (2017) suggests that the influence of language input on language acquisition is similar in monolingual and bilingual language learners, Kibler (2016) implies that the repertoires of children who are bilingual, receiving linguistic and cultural information from two groups rather than one in the case of monolinguals, require a more dynamic assessment (Carroll, 2017; Kibler et al., 2016). This is why it is important to consider the different factors that accompany language input when dealing with bilingual populations, as many require conscious choices made by family members, school environments, and the child him/herself.

Although research shows that bilingual children have been outperformed by monolingual children in their respective languages, Gathercole and Thomas (2009) point out “that in bilingual communities in which one language is very dominant, acquisition of the dominant language may be quite unproblematic across sub-groups, while acquisition of the minority language can be hampered under conditions of reduced input” (Gathercole & Thomas, 2009). This is crucial in understanding how the minority language (L1) might be preserved as a child is also being exposed to the majority language (L2). Children and their families run into more difficulties if the language preferred at home is not the majority language for the surrounding community. Hammer et al. (2007) supports this idea with their study of bilingual kindergarten children who speak Spanish as L1 and English as L2. The results of this study “[imply] that children’s exposure to Spanish literacy at home and school was not sufficient to fully support children’s Spanish early reading abilities at the level of monolinguals” (Hammer et al., 2007). This proves that sheer volume of language input cannot be considered the most important factor when proficiency in two languages is the goal. In fact, more beneficial analysis would include “seeing

families as multi-directional communities of practice offers an analytic lens for adequately capturing the dynamic processes through which siblings teach and learn language and literacy practices from each other” (Kibler et al., 2016).

Research has also been done concerning the age of first exposure to the second language. Bernardini (2017) explores the idea that there is not a certain cutoff point of age of first exposure to a language that would account for ease of language acquisition across the board (Bernardini, 2017). This implies that, while exposure to a second language at an early age is optimal for becoming bilingual, there are not such strict guidelines for the age of first exposure and success of proficiency in both languages. These results are particularly useful in the analysis of language in sequential bilingual learners, as some parents worry about when a good time to start teaching their child a new language would be. A similar effect was found about the use of language within schools in Dijkstra’s study of preschool children learning Dutch and Frisian. They found that “the use of an explicit language policy at the preschool was not a significant factor...in other words, participants attending Frisian-medium or bilingual schools did not perform significantly better than participants attending preschools without an explicit language policy” (Dijkstra et al., 2016). Both studies indicate that strict vs. relaxed language policies do not necessarily alter a child’s language learning.

While overall language preference in the home can shape a significant amount of language input that a child receives at the home, individual language preference of the child, or individual preferences of surrounding people, with varying degrees of influence on the child, may also play significant roles. This is supported by Branum-Martin et al (2014), where it is suggested that there is a relation between language acquisition and language use pertaining to individual family members (Branum-Martin et al., 2014). This is crucial to my current study,

which seeks to add to language input research, highlighting older siblings as such ‘individual family members’ that may impact language performance for the preschool children.

The effects of the quality of language input that a child receives has also been studied. A study by Place and Hoff (2016) involving thirty-month olds exposed to Spanish and English “replicated previous findings that the percent of input provided by native speakers is a positive quality indicator and found suggestive evidence that the number of speakers is also a positive quality indicator. There was little evidence that the frequency of language mixing is a negative indicator” (Place & Hoff, 2016). This implies that it is not crucial for different languages to be strictly split up within the home, allowing bilingual families to access full repertoires of both languages without being worried that this might negatively affect language learning of young children. It has also been found that input from native speakers has a “positive quality effect” on language input as compared with non-native speakers for a given language (Au, Chan, Cheng, Siegel, & Tso, 2015; Place & Hoff, 2016). The concept of language input is essential to my study because my hypothesis is contingent on the effect that different types of input, such as an older sibling, might have on a child learning two languages sequentially.

### **Vocabulary Learning**

Vocabulary refers to the quantity of words that are solidified as knowledge in a person’s brain. Vocabulary measures are commonly used among researchers to assess vocabulary skills. In a study by Kohnert and Kan (2005) concerning the lexical-semantic development in 3-5 year olds learning Hmong and English, it was found that “one language does not simply form a subset of information encoded in the other language or that semantic information from one language is automatically transferred to the other. The distribution of lexicalized concepts across the two language systems may reflect differences in the social contexts of using L1 and L2” (Kohnert &

Kan, 2005). Therefore, the formation of a set vocabulary in bilingual learners includes many factors, such as the ability/inability of words to transfer from one language to the other, that make it more difficult to quantify a child's vocabulary repertoire as compared with monolingual language learners. One reason that vocabulary measures are so commonly used is that language use and word use are sometimes seen as relatively synonymous among very young children, such as 1 and 2 year olds who use single words to communicate (Pearson, Fernandez, Lewedeg, & Oller, 1997). Pearson et al (1997) continues to note, however, that as children get older, vocabulary use by itself becomes a less important way of measuring language as more higher-up structures of language become required (Pearson et al., 1997). Another trend supported by the literature is that receptive vocabulary repertoires typically exceed expressive vocabulary repertoires across the board (Kohnert & Kan, 2005). Receptive vocabulary includes words that children are able to identify, whereas expressive vocabulary includes words that children are able to produce themselves. The current study uses receptive and expressive vocabulary measures as a critical way to analyze language proficiency within the subjects in accordance with current research.

### **Fast Mapping**

Fast mapping is the initial word-learning process during which novel words are quickly paired with meaning. This involves the use of linguistic and nonlinguistic cues to gather information pertaining to the meaning and potential categorization of the novel word (Yow et al., 2017). The use of fast mapping measurements to analyze language proficiency is also very common among researchers, and is observed using novel-object-word pairing tasks for which participants see a novel object and are given the name for the object and then promptly asked to name or identify the object (Kan & Kohnert, 2008; Yow et al., 2017). Fast mapping is the first

stage of word learning during which a ‘mapping’ of novel words is developed so that novel words can eventually become a part of the vocabulary repertoire (Kan & Kohnert, 2008). As with vocabulary, or lexical/semantic skill, fast mapping has been used previously to demonstrate subjects’ abilities in a given language. This coding process of fast mapping is essential to learning a second language, and has larger implications for executive functioning in the brain. Due to differences in language environment, monolingual and bilingual children have been reported to perform differently on fast mapping tasks. Perhaps because of the necessity to switch between languages, or the increased exposure to objects that have different names in each language, bilinguals are often better than monolinguals at picking up on referential cues given by a speaker (Yow et al., 2017). Referential cues are conversational elements such as hand gestures, facial expressions, and context within a sentence. On the other hand, monolingual children have been seen to attend more to the properties of the object and are more strict with mutual exclusivity (one object should have one name) than bilingual children (Yow et al., 2017). It has also been suggested that bilingual individuals experience crosslinguistic influences, where each language is effected by the other, during the acquisition of language which might yield differences in word learning skills between bilingual and monolingual children (Alt, Meyers, & Figueroa, 2013). These differences in approach to fast mapping demonstrated by bilingual and monolingual children might also influence their performance on fast mapping tasks. In a study conducted by Kan et. al (2014), it was found that bilingual participants performed better in their comprehensive fast mapping tests than did monolingual participants, and that speech practice in a child’s first and second language indicated “different patterns of fast-mapping performance” (Kan, Sadagopan, Janich, & Andrade, 2014). Therefore, it is indisputable that fast mapping skills are important tools for assessing bilingual language abilities.

### **The Current Study**

The purpose of my study is to determine if language input from older siblings would specifically enhance the language skills of preschool age bilingual Cantonese-English speakers in the areas of vocabulary and fast mapping. The current literature has outlined bilingual disadvantages in individual languages but heightened metalinguistic and executive functioning skills in bilinguals. Although sibling research seems to be lacking, it has been shown that older siblings can influence younger children in a variety of ways, and that sometimes their role in the family can shift language practices as a whole, but input from older siblings is typically not as rich as that from parents.

This study includes Chinese-American participants, many of whom immigrated to the U.S. in the past ten years, living in the San Francisco area. According to Luo and Wiseman's (2000) study focusing on children of Chinese immigrants to the United States, these children tend to rely on family members to encourage their use of the native language. However, their results indicate that peers were the most influential in the child's decision to continue learning or speaking their family's native language, along with age of immigration and strength of family ties (Luo & Wiseman, 2000). Siblings, however, were not analyzed in the study by Luo & Wiseman (2000) to assess native language motivation. While many articles such as this one notably omit siblings as separate influences on bilingual children, I hope that my study will serve to impel other researchers to fill in the gap that exists in the literature concerning the interaction between sibling input and bilingual language learning.

As a synthesis of what I have learned from current studies regarding bilingualism, siblings, and language input, I have developed 3 research questions that I would like to address in my project:

1. *Does language input from older siblings in L1 and L2 significantly affect the vocabulary skills of sequential bilingual preschoolers?*
2. *Does language input from older siblings in L1 and L2 significantly affect the language learning, or fast mapping skills of sequential bilingual preschoolers?*
3. *Does the use of L1 vs. L2 in older sibling language significantly affect L1 and L2 skills of sequential bilingual preschoolers?*

Based on the information that previous researchers have provided on bilingualism and sibling interactions, I hypothesize that participants with older siblings providing them with more L2 input will perform better on L2 language tasks than participants with older siblings providing less L2 input.

## **Methods**

### **Participants**

Participants of the study were recruited from 6 Cantonese-English bilingual preschools in the Headstart program in the San Francisco area. Children that were excluded from my study included those with no older sibling, those who spoke English as their first language, as well as those with noted language concerns such as a language disorder or language impairment. The participants are 27 preschool age children, both male (9) and female (18). The mean age of the participants is 3 years and 9.4 months at the start of the study. The Headstart program admits children ages 0 to 5 from low income families. To qualify for this study, participants have to be exposed to Cantonese from birth as reported by parents. After the consent process, the parents of the participants were asked to fill out a parent questionnaire form about various influences on the child's learning.

From these questionnaires, information was gathered such as birthplace of the child, highest level of education of the parent, and the language the child is most comfortable speaking. Results indicate that 6 of the participants were born outside of the U.S. and 21 were born in the U.S. Of the 27 participants, 29.63% had at least one parent who graduated from college, 55.56% had at least one parent who graduated from high school, and 14.81% had at least one parent who graduated from middle school or junior high.

Information was also gathered pertaining to the siblings of the participants in order to determine if language exposure from an older sibling had a particular impact on the participant's language acquisition. As Table 1.1 below suggests, 8 participants were reported to have older siblings who speak Cantonese/Toisan 100% of the time at home; 9 participants were reported to have an older sibling(s) who speak 80% Cantonese/Toisan at home and speak English 20% of the time at home; and 16 participants who have sibling(s) that speak Cantonese/Toisan 50% of the time at home and English for the other 50% of the time.

Data was originally collected for Dr. Kan's lab in order to conduct longitudinal studies on a larger group of this preschool population. My study focuses on only 'Time 1' test scores from a set of multiple trials that the preschool children completed over a span of several years.

Participants were broken into two groups. Group one, renamed as the 'Mostly Cantonese' group, consists of participants who have an older sibling who speaks mostly L1 (Cantonese). The 'Mostly Cantonese' group includes participants with older siblings speaking 100% Cantonese (L1) while at home and 0% English (L2) as well as those with older siblings speaking 80% Cantonese (L1) and 20% English (L2) at home. Group two, renamed as the '50/50' group, consists of participants who have an older sibling speaking 50% Cantonese (L1) and 50% English (L2) at the home.



Table 1.1

*Groups, number of participants in each group, and age mean of participants.*

<i>Groups</i>	<i>n</i>	<i>Mean age in months (SD)</i>
1. Mostly Cantonese (7) 100% Cantonese/Toisan; 0% English (6) 80% Cantonese/Toisan; 20% English	14	46.43 (6.22)
2. 50/50 (4) 50% Cantonese/Toisan; 50% English	13	48.15 (7.65)

## Vocabulary

**Measures.** In order to assess vocabulary proficiency, participants were asked to complete four tests: one picture naming test and one picture identification test in each of the two languages (Cantonese and English). Picture naming assessments in both languages are used to measure expressive skills in L1 and L2, while picture identification assessments in both languages are used to measure receptive skills in L1 and L2.

**Procedures.** Participants in the Kai Ming language project were given identification numbers to maintain confidentiality within the study. These identification numbers were then used for recording test results, which were sent back to Dr. Kan's lab after completion at the HeadStart programs in San Francisco. For these assessments, Cantonese English bilingual research assistants were provided with test forms from Dr. Kan's lab in Boulder, Colorado.

For picture naming tests, participants were asked to identify a set of 90 pictures. When presented with a picture representative of a vocabulary word, the participant was asked to say out loud what the picture was of. Each participant was administered one picture naming test in Cantonese and one picture naming test in English. These tests were repeated up to four more times within the next couple of years, with at least a month or two in between each trial. This

study looks only at ‘Time 1’, the first test taken by the participant in both Language 1 (Cantonese) and Language 2 (English).

Picture Identification tasks were also given in Language 1 (Cantonese) and Language 2 (English). There were a total of 103 items. Participants were asked to point to the picture of a word that the language assistant asked them for.

**Scoring.** In both picture naming and picture identification tests, dichotomous scoring was used, meaning that a score of 0 was given for an item if the child waited more than 15 seconds to answer or if the child answered incorrectly. Scores were reported out of a possible 90 points for picture naming and a possible 103 for picture identification tasks. Each participant received 1 score for each of the 4 vocabulary tests administered.

### **Fast Mapping**

**Measures.** Fast mapping skills were measured in order to evaluate each participant’s ability to learn novel words. Four fast mapping tests were administered to the participants: comprehension and production tests in both L1 and L2. Participants were tested on 8 novel words, administered in 4 different blocks. Each block contained 2 novel words and 1 familiar word that the child already knew. An example of the test form used for fast mapping tests can be found in Appendix A.

**Procedures.** The tests were administered once in L1 (Cantonese) and once in L2 (English) for each participant. CVC words, or words with consonant-vowel-consonant patterns were used in order to ensure consistency among test items and remain age-appropriate. During the exposure phase, participants were presented the novel words and the familiar word randomly in a play context. Immediately after the presentation phase, the child was asked to select the correct items from a total of 5 items. The number of items he or she could select correctly

provided a comprehension score. The participant was also asked to name each of the 5 items.

The number of items he or she could name correctly provided a production score.

**Scoring.** In both comprehension and production fast mapping tests, dichotomous scoring was used, meaning that a score of 0 was given for an item if the child waited more than 15 seconds to answer or if the child answered incorrectly. Scores were reported out of 6.0 possible points.

## Results

### Vocabulary Descriptive Results

Descriptive data was gathered from the two vocabulary tests in both L1 and L2. Table 2.1 below shows the mean vocabulary receptive and expressive scores along with standard deviation scores for groups 1 and 2. Vocabulary results indicate very minimal differences between the ‘Mostly Cantonese’ and ‘50/50’ groups. The ‘50/50’ group seems to outperform the Mostly Cantonese group, but this difference was not significant. Overall, test scores between the Mostly Cantonese group and the 50/50 group did not exhibit significant differences. A trend to be noted is that expressive vocabulary scores were recorded as being slightly lower than receptive scores, especially in L2, which is to be expected (Kohnert & Kan, 2005). Figure 2.1 below represents these results by comparing the percentage of test items answered correctly for receptive and expressive tests in L1 and L2.

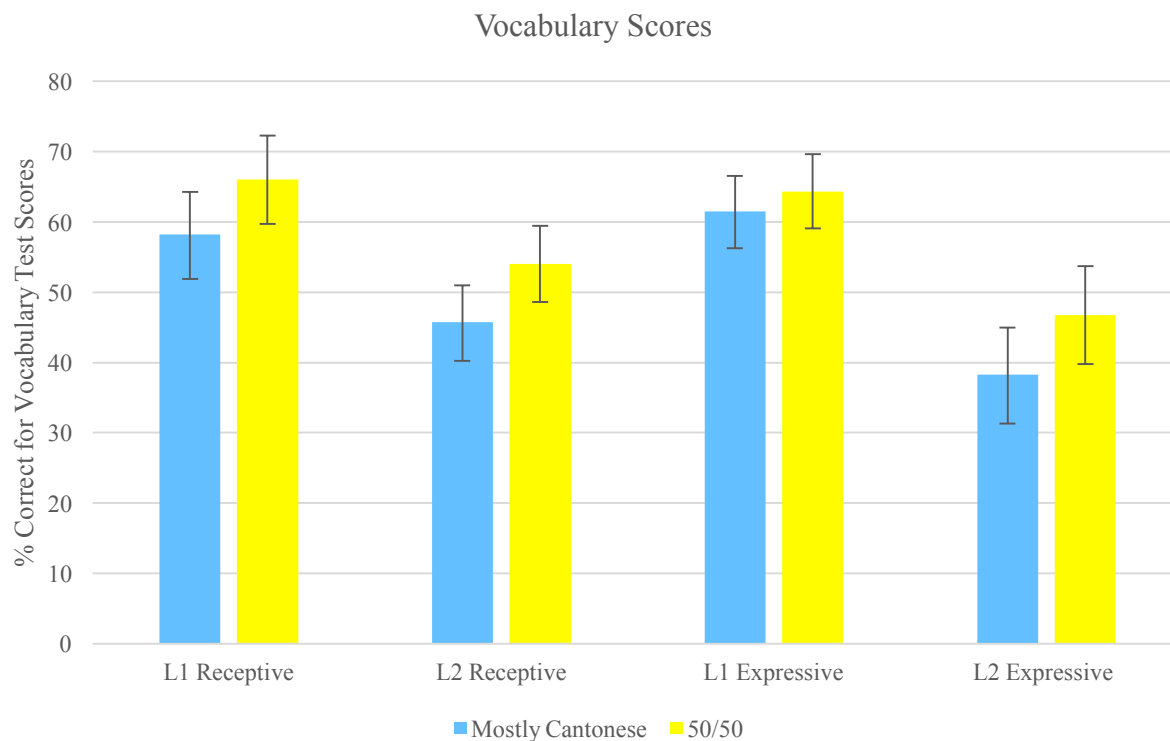
Table 2.1

*Vocabulary Receptive and Expressive mean scores for ‘Mostly Cantonese’ and ‘50/50’ groups.*

	<i>Mostly Cantonese</i>	<i>50/50</i>
L1 Receptive vocabulary	59.93 (26.95)	68.0 (12.69)
L2 Receptive vocabulary	47.08 (23.44)	55.67 (22.27)
L1 Expressive vocabulary	55.36 (18.27)	57.92 (16.82)
L2 Expressive vocabulary	34.43 (24.02)	42.08 (22.36)

Figure 2.1

*Sibling group comparison: Percentage of test items answered correctly for receptive and expressive tests in L1 and L2.*



### Vocabulary Inferential Results

A repeated measures Inferential data was gathered by running an ANOVA which was used to examine the participants' receptive and expressive vocabulary reported scores. The dependent variables are the percent correct of participant's vocabulary scores. The independent variables were language (Cantonese vs. English), modality (receptive vs. expressive), and sibling group ('Mostly Cantonese' vs. '50-50' use of L1 and L2).

This indicated significant differences in scores between the languages and between the two modalities ('Mostly Cantonese' and '50/50' groups). As illustrated in Table 2.2, results show that there were main effects of language, and modality. An overall difference in scores between tests given in L1 (Cantonese) and tests given in L2 (English) was reported. Cantonese vocabulary scores were significantly higher than English vocabulary scores. An overall

difference in scores between receptive tests and expressive tests was also observed, with receptive vocabulary scores being significantly higher than expressive vocabulary scores. However, there was no significant effect of sibling group, group x language interaction, or group x modality interaction. The findings suggest that there is no differences between siblings who used more Cantonese at home and those who used half Cantonese and half English at home for vocabulary scores.

Table 2.2

*ANOVA output for vocabulary receptive and expressive scores.*

	<i>F</i>	<i>p</i>	$\eta^2$	<i>Post hoc comparisons</i>
Language	10.23**	<.01	0.18	Cantonese > English
Modality	16.42***	<.001	0.08	Receptive > Expressive
Sibling group	1.6	>.05	0.04	No effect
Group x language	0.053	>.05	<0.001	No effect
Group x modality	0.53	>.05	<0.01	No effect
Language x modality	1.19	>.05	<0.01	No effect
Language x modality x group	0.23	>.05	<0.01	No effect

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

### Fast Mapping Descriptive Results

Descriptive data was gathered from the two fast mapping tests in L1 and L2. Table 2.3 below shows the mean fast mapping comprehension and production scores, along with standard deviation scores for the ‘Mostly Cantonese’ and ‘50/50’ groups. Fast mapping results suggest that overall comprehension scores exceed production scores. This again supports current data suggesting that production of language is a more difficult task than comprehending it (Kohnert &

Kan, 2005). The ‘Mostly Cantonese’ group appears to outperform the ‘50/50’ group in their Cantonese comprehension scores, though this was not a large enough difference to be considered significant. Figure 2.3 below demonstrates performance on fast mapping raw score results between the ‘Mostly Cantonese’ and ‘50/50’ groups in L1 and L2.

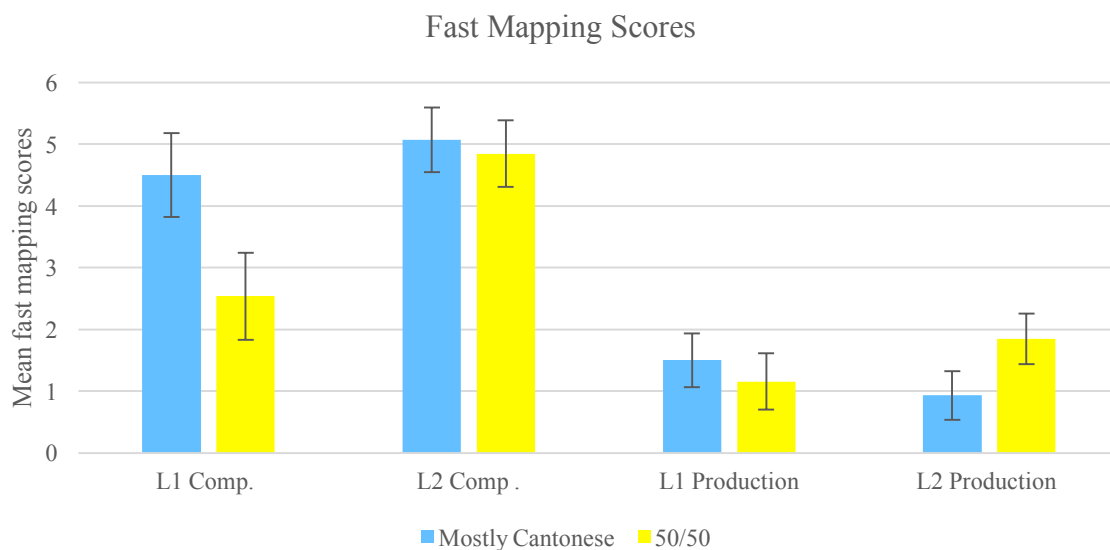
Table 2.3

*Fast Mapping Comprehension and Production mean scores for ‘Mostly Cantonese’ and ‘50/50’ groups.*

	<i>Mostly Cantonese</i>	<i>50/50</i>
L1 Comprehension	4.5 (2.13)	2.54 (2.9)
L2 Comprehension	5.07 (1.73)	4.85 (2.15)
L1 Production	1.5 (1.01)	1.15 (2.11)
L2 Production	0.93 (0.99)	1.85 (1.86)

Figure 2.3

*Mean fast mapping comprehension and production scores in L1 and L2.*



### **Fast Mapping Inferential Results**

A repeated measures ANOVA was used to examine the participants' comprehension and production fast mapping scores. The dependent variables are participant's mean scores on the fast mapping measures. The independent variables were language (Cantonese vs. English), modality (comprehension vs. production), and sibling group ('Mostly Cantonese' vs. '50-50' use of L1 and L2). Inferential statistics run for fast mapping indicate significant results in the areas of language and modality, as well as significant effects of multivariate comparisons of group x language, group x modality, and language x modality.

As shown in Table 2.4, results indicate that there were main effects of language and modality. However, there was no significant effect of sibling group, group x language interaction or group x modality interaction. The findings suggest that there was, in fact, a difference in Cantonese fast mapping performance between participants in the 'mostly Cantonese' group and the '50/50' group. However, there is no evident difference between the 'mostly Cantonese' group and the '50/50' group in the area of English fast mapping skills. This finding is particularly interesting because it demonstrates that perhaps older siblings who speak mostly L1 (Cantonese) are more beneficial to their younger siblings' L1 skills, whereas older siblings who speak both languages equally are not beneficial to their younger siblings' L1 or L2 skills.

The results of my study indicate significant differences in scores between the 'Mostly Cantonese' group and the '50/50' group in the area of fast mapping production. What is so interesting about these results is that they suggest that a more 'evenly distributed' bilingual language input from older siblings (the '50/50' group) does not help children with fast mapping skills in either language. Furthermore, the data suggests that participants in the '50/50' group, with older siblings speaking an equal amount of L1 and L2, might experience a decline in L1

skills as compared with participants in the ‘Mostly Cantonese’ group, who are experiencing more L1 input from older siblings.

Table 2.4

*ANOVA output for fast mapping comprehension and production scores.*

	<i>F</i>	<i>p</i>	$\eta^2$	<i>Post hoc comparisons</i>
Language	4.51*	<.05	0.03	English > Cantonese
Modality	80.9***	<.0001	0.45	Comprehension > production
Sibling group	0.7	>.05	<.01	No effect
Group x language	4.51*	<.05	0.03	Cantonese: Mostly Cantonese > 50/50 group English: no difference
Group x modality	4.63*	<.05	0.03	Comprehension: Mostly Cantonese > 50/50 group Production: no difference
Language x modality	4.84*	<.05	0.03	Comprehension: English > Cantonese Production: no difference
Language x modality x group	0.14	>.05	<.001	No effect

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

### Fast Mapping pairwise comparisons

Pairwise comparisons between independent variables help demonstrate the effects that these independent variables demonstrated on each other. Figures 2.5, 2.6, and 2.7 below illustrate the pairwise comparisons of Group x Language, Modality x Group, and Language x Modality, respectively. The most significant information that these charts give us is the difference between groups in the Group x Language comparison. The ‘Mostly Cantonese’ group significantly



outperformed the ‘50/50’ group in fast mapping Cantonese tests. However, fast mapping scores for both groups demonstrate no significant difference on English tests. In the Modality x Group pairwise comparison, no significant differences were shown between Group 1 and Group 2 for Comprehension and Production fast mapping scores, but both groups performed better in comprehension tasks than in production tasks, which was expected. The Language x Modality comparison shows this same effect, with performance between L1 and L2 being similar, and performance on comprehension tasks exceeding performance on production tasks in both L1 and L2.

Figure 2.5: *Fast mapping performance in each language by group.*

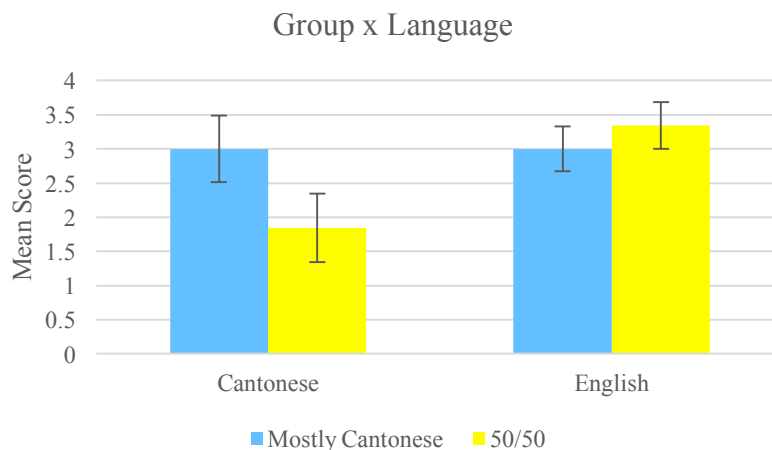


Figure 2.6: *Fast mapping comprehension and production scores by group.*

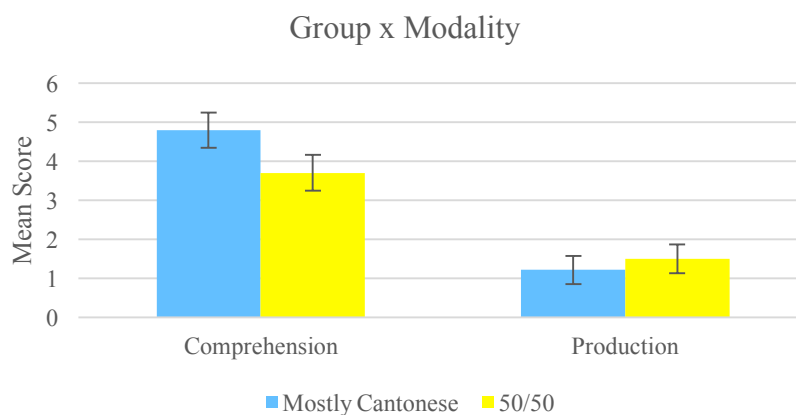
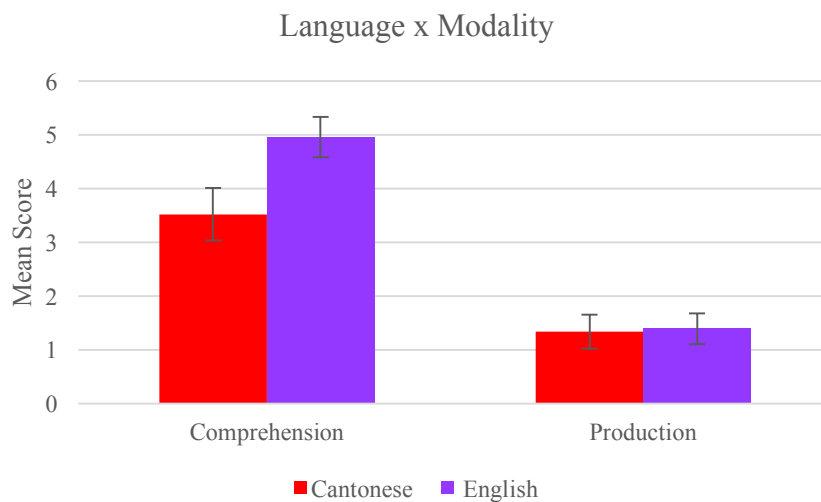


Figure 2.7: *Fast mapping comprehension and production by language.*



### Results summary

My hypothesis that participants in the ‘50/50’ group would outperform participants in the ‘Mostly Cantonese’ group in the areas of English vocabulary and fast mapping skills was unsupported. Although there seems to be an impact of language input from older siblings, it is not in the way that I had anticipated. Rather, participants are influenced by their older siblings’ language use practices in the area of L1 (Cantonese) fast mapping. Previous research has been conducted regarding parental language use at home, and it has been widely accepted that parents should not decrease their use of L1, as the language that they are most comfortable speaking will provide a richer language experience for their children (Place & Hoff, 2016). However, not much research has been conducted pertaining to the sibling role in bilingual homes. I originally thought that siblings might hold a different role than parents because they are closer in age to their younger siblings, may share a social bond that parents do not, and typically use more of the unfamiliar language (L2) at home (Bridges & Hoff, 2014; Brody, 2004). While further research is needed to draw conclusions, my data suggests that strong L1 use in the home, not just by

parents but also by siblings, is more beneficial to young language learners than increasing the use of L2.

### **Discussion**

My research focuses on the language effects in the areas of vocabulary and fast mapping in bilingual Cantonese-English speaking preschoolers resulting from varied L1-L2 language input from older siblings. Results indicate insignificant differences between Groups 1 and 2 in vocabulary measures. Fast mapping measures yielded a group x language effect indicating significantly higher scores in the ‘Mostly Cantonese’ group for fast mapping skills in Cantonese.

The results that I found were inconsistent with my hypothesis that preschool children with older siblings speaking more of L2 (English) would perform better on English tests across the board. However, the findings from this study were not completely inconsistent with the idea that older sibling’s language use might affect second language skills in preschool children.

Pairwise comparison between language and modality for fast mapping skills indicated that Group 1 participants outperformed Group 2 participants in Cantonese fast mapping tests. English fast mapping tests demonstrated no significant difference between Groups 1 and 2. This means that participants with older siblings in the ‘Mostly Cantonese’ group benefitted from the exposure to L1, while neither the ‘Mostly Cantonese’ group nor the ‘50/50’ group benefitted from older sibling language input for English tests. Current studies that show greater benefit for bilingual children from parents speaking the native language might explain these results. The lack of significant differences between groups on vocabulary skills tests also raises some questions. Why do participants in the ‘Mostly Cantonese’ group outperform participants in the ‘50/50’ group in Cantonese fast mapping tests but not in Cantonese vocabulary tests?

### **Native speaker input**

As explained by Place & Hoff (2016), language input from a native speaker improves the quality of the language input for young bilingual learners while non-native speakers of a language have an opposite effect on the language sample's quality (Place & Hoff, 2016). Pearson (2007) also stresses the importance of having input from monolingual speakers of the minority language to support proper language acquisition in L2 (Pearson, 2007). The results of my study, and their implications for older sibling language input, support this claim.

Another explanation as to why Group 2 fast mapping Cantonese scores fall below those of participants in Group 1 could be the impact of language mixing by family members. It has been found that “exposure to language mixing might obscure cues that facilitate young bilingual children's separation of their languages and could hinder the functioning of learning mechanisms that support the early growth of their vocabularies” (Byers-Heinlein, 2013). Furthermore, in a study of Spanish- English bilingual learners comparing proficiency in both languages and home language use, results implied that “bilingual home language environments that maintain high levels of Spanish use are associated with additive bilingualism whereas bilingual home language environments with high levels of English use are associated with subtractive bilingualism” (Cha & Goldenberg, 2015). When applied to my study, this conclusion might propose that older siblings using L1 more would result in additive bilingualism, while older siblings using L1 and L2 equally in the home would result in subtractive bilingualism.

The ‘weaker links hypotheses’ also supports findings of my study because the differences seen between the ‘Mostly Cantonese’ group and the ‘50/50’ group parallel the idea that “because bilinguals are exposed to two languages, there are some qualitative aspects of the early bilingual environment that do not have monolingual analogues” (Byers-Heinlein, 2013;

Gollan et al., 2008). All language samples for monolingual children use the same language in every environment, which is similar to how the 'Mostly Cantonese' group in my study might experience language. For bilingual children, there is a much more varied use between L1 and L2 in different environments, which is similar to how the '50/50' group in my study might experience language. For this reason, the differences between bilingual language performance and monolingual language performance in L1 becomes extremely relevant to my study.

### **Vocabulary and fast mapping as language measures**

One question that the results from my study provokes is as follows: why is there not an L1 effect for vocabulary if there is an L1 effect for fast mapping? Studies suggest that the answer to this question lies in the difference between vocabulary skills and fast mapping skills. While vocabulary testing looks at a child's more static language repertoire - the words that he or she knows and has committed to memory, fast mapping is much more dynamic. Fast mapping is more about an ever-developing 'map' that a child is able to use in order to make sense of something that is unfamiliar. Language input plays a particularly crucial role in fast mapping because experiencing a language from others allows children to develop representations for incoming words in order to categorize and master them. This synthesis of unknown to known only requires the participant to be able to remember the word 2 or 3 times. It is quite possible that a participant will forget some of the words they had learned in a fast mapping test a couple of months later. Vocabulary, on the other hand, is a more concrete measure, requiring participants to be very familiar with the words in their repertoire, suggesting that children need more input and practice to solidify a word long term. Vocabulary learning is also influenced by many factors. It is possible that the vocabulary test does not measure their entire vocabulary, or contains a lot of words they are unfamiliar with because they don't use the language as much in a

certain context. This could possibly account for the difference between vocabulary and fast mapping results.

Research pertaining to brain activation in bilinguals also support theories as to why the ‘50/50’ group was outperformed by the ‘Mostly Cantonese’ group in this study. Román et al (2015) compares neural activity in monolinguals and bilinguals during comprehension tasks in participants’ native language. It was found that “early bilingualism shapes the brain and cognitive processes in sentence comprehension even in their native language” (Roman et al., 2015). This provides evidence that bilingual language learners promote L1 in a different way than monolinguals do. Pellikka et al (2015) used magnetoencephalography to measure speed of semantic access in sequential Finnish-English bilinguals. These response times yielded evidence that “support the view that language switching costs may reflect deactivation of words in the actual language systems and not (only) competing language schemas involving the executive control system” (Pellikka, Helenius, Makela, & Lehtonen, 2015). In other words, it is possible that for bilinguals, specific words in the language that is not being used might be deactivated in the brain in order to promote performance in the language that is being used. This might alter how a bilingual language learner’s vocabulary skills in terms of the specific lists of words that they know in each language are represented. The subjection to inhibitory influence further suggests that the suppression of L1 while using L2 might, in fact, have a negative influence on L1 due to less activation in comparison with monolinguals.

### **Clinical implications**

The clinical implications of my study are concerned with the role of older siblings. Though further research is required, the finding that siblings using ‘Mostly Cantonese’ are perhaps more beneficial to their younger siblings in terms of L 1, and that those siblings using a

‘50/50’ spread of L1 and L2 at home do not impact their younger siblings’ knowledge of L1 or L2 in a positive way, suggest that older siblings would be more beneficial aids to language if they spoke the family’s first language. This coincides with research by Place & Hoff (2016) indicating that native input as opposed to non-native input, as well as number of native speakers are both positive quality indicators for language input to young bilingual learners (Place & Hoff, 2016). A clinical response to these results might be finding ways to communicate this to families, so that older siblings might be encouraged to use the first language at home with younger siblings, rather than forcing use of L2, which they are not as experienced speaking.

### **Limitations**

One limitation of this study was a lack in detail as to how the siblings specifically interacted with the participants. Parent questionnaire forms did not include information such as the age gap between the two siblings, which, for social reasons, may change the dynamic between the siblings and perhaps the type of language that they share with each other. The hours that the siblings interact with each other throughout the day were not recorded in the parent questionnaire either, again making the relationship and amount of language input between participants and his/her older siblings more of a mystery. If I had this information, it is possible that participants who receive minimal to no input from older siblings could be taken out of the study in order to control for sibling effects. Another limitation of the current study is that it is quite difficult to isolate sibling input for preschool-age children in order to determine effects that may arise from only older siblings. Inevitably, input from other family members, such as grandparents or parents, as well as the child’s friends, are influencing the participants along with the older siblings, which might be causing some of the variability in the language scores. While there was a section in the parent questionnaires, where parents recorded “playing with home

members hours”, for the purpose of my study, it would have been very helpful to have a section where the parents could record “playing with older sibling(s) hours”. This would have given me the ability to create more groups based on the amount of time that the preschool age children spend with their older sibling(s), giving a stronger indication of the amount of variance that may be explained by such interactions.

### **Further research**

Based on the results of my study and the questions that they provoke, I believe that there is a call for further research in many areas of the bilingual research field. First of all, there is still a shortage of sibling studies in the field of bilingualism. Much more can be done by accounting for the strength of relationships between siblings, using more concrete measures of time spent interacting with each other, and comparing the influence of language input from siblings at various stages of life. Furthermore, possible further research exists in examining the differences in bilingual language performance based on input from parents as compared with older siblings. Another area of further research is that of the influence of native-speaker input to bilingual language learners as compared with non-native-speaker input. Studies that demonstrate greater agreement between vocabulary and fast mapping measures which would be able to elicit a more accurate representation of children's' vocabulary skills would be very beneficial to the field, and would perhaps eliminate effects seen in my study, for which vocabulary and fast mapping scores between groups do not compare.

### **Conclusion**

In summary, language input from older siblings has a different effect on bilingual 3 to 4 year olds than I originally anticipated. By combining evidence from current research on sibling dynamics and language input, I hypothesized that greater L2 input from older siblings in the



‘50/50’ group would yield better vocabulary and fast mapping results than the ‘Mostly Cantonese’ group, which experienced less L2 input from older siblings. In doing so, I was missing a subset of bilingual research that became almost more relevant to my study than siblings themselves, which includes the importance of native input, as it pertains to the ‘weaker links hypothesis’, as well as differences between vocabulary and fast mapping as ways to measure bilingual language learners. I believe that my study has clinical implications in the way of encouraging L1 use by older siblings which seems more effective than trying to incorporate L2 in the home. This study also calls for further research in order to better understand how siblings might specifically influence bilinguals, as well as finding better ways to measure vocabulary levels in bilinguals to analyze more accurately how differences in language input might affect language skills.

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















































## Appendix A

*Fast mapping test form.*

Subject ID: \_\_\_\_\_ Examiner: \_\_\_\_\_ Test Date: \_\_\_\_\_

Language: ☐ Cantonese ☐ English Session: ☐ 1 ☐ 2 ☐ 3 ☐ 4

Language Order: ☐ Cantonese -> English ☐ English -> Cantonese

Block #	Objects	Words		Production Task		Comprehension Task (circle the response)						
		Cantonese	English	Correct	Incorrect				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR	
Block 1 (grocery)	1		feoi2	meep		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	2		士多啤梨	strawberry		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	3		koi1	dabe		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
Block 2 (lunch)	1		粟米	corn		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	2		daau2	tede		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	3		bou3	noob		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
Block 3 (grocery)	1		mik6	noke		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	2		西瓜	watermelon		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	3		poi3	pog		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
Block 4 (lunch)	1		提子	grapes		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	2		pip1	mide		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR
	3		kok3	borne		Response: <input type="checkbox"/> DK <input type="checkbox"/> NR <input type="checkbox"/> Check Recorder				Other novel	Other familiar	<input type="checkbox"/> DK <input type="checkbox"/> NR

Comments: \_\_\_\_\_