Language input in Cantonese-English bilingual preschoolers with language impairment
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Abstract

Differences in language input in Cantonese-English bilingual preschool children with a language impairment are compared to typically developing bilingual preschool peers. A total of 50 participants were examined in the first study who were primarily exposed to Cantonese (L1) from birth and started to learn English (L2) in preschool. Twenty-five participants were bilingual with a language impairment (LI) and another twenty-five were typically developing (TD) bilingual peers. Parent questionnaires were used to collect data from caregivers for all participants about language input across family members and activities. Results indicate that, both groups used Cantonese the most. However, families from the TD group had a higher overall use of Cantonese, whereas some families of the LI group incorporated more English at home. The second study used LENA (Language ENvironment Analysis) recording devices, recording one child with LI and another TD child. The findings of study one and two indicate that there are differences in L1 and L2 use among children with LI, TD children and their caregivers. These differences in language input are preliminary findings in a field of study that would benefit from more research. The clinical implications of this study are that some parents might be confused with the language (L1 or L2) they should use at home. Family programs are desperately needed for parents of children with language impairment. Parents of children with an LI should also be proactively provided with information about strategies to create a linguistic environment full of opportunity for discourse and language development.

Introduction

The purpose of this study is to examine the language input of Cantonese-English sequential bilingual preschool children with language impairments. Sequential bilingual children are children who learn one language (L1) at home from birth and start to learn a second language (L2) during their childhood (Kohnert, 2010). Currently, there are no clear diagnostic methods to effectively identify bilingual children who have language deficits. In this study, the term "language impairment" is intended to include bilingual children who might have a formal diagnosis of specific language impairment, language delay, or who have signs of specific language impairments but do not have a formal diagnosis. Specific language impairment (or primary language impairment) is a term used when children have a deficit in language skills but have normal intelligence (Kohnert, 2010; Leonard, Eyer, Bedore, & Grela, 1997). This study aims to provide content that will help caregivers of children with an LI better understand the importance of language input and ways to enhance their language environment.

In this study, I want to examine whether there is a difference in language input and use between bilingual children who have language impairments and their typically developing peers in their home and school language environments. Specifically, do parents change their language strategies when they learn that their child might have a language impairment (LI)? The strategies that parents use, also called language input, is the language that a child is exposed to. This could be language experienced in the home or school environment. I examined the patterns of language input that sequential bilingual children speaking a minority language receive at home and at school. It is these patterns of language input that I am comparing between typically developing children and those with a suspected or confirmed LI.

With the use of questionnaires and auditory recording, I examined patterns in the amount of L1 and L2 language input between typically developing children and those with an LI. A

growing number of studies have shown that bilingual children's vocabulary development is greatly related to their language experience in each language (e.g., Branum-Martin, Mehta, Carlson, Francis, & Goldenberg, 2014; Hammer, Miccio, & Wagstaff, 2003; Thordardottir, 2011, 2015; Thordardottir & Brandeker, 2013). Indeed, recent studies suggest that language input should be taken into consideration when speech-language pathologists make clinical diagnosis and treatment plans for children who are from linguistically diverse backgrounds (e.g., Bohman, Bedore, Pena, Mendez-Perez, & Gillam, 2010; Kohnert, 2010; Thordardottir & Brandeker, 2013). Children's language experiences at home also occur within broad cultural and social contexts, which must be considered throughout the diagnostic and treatment process (Branum-Martin et al., 2014). Although previous studies of children in linguistically diverse communities appear to assume that children are mainly exposed to the home language at home (L1), recent studies indicate that children are likely inadvertently exposed to some L2.

Little research has been done looking at the language input patterns in bilingual children with a language impairment who learn a minority language at home. I will examine language input patterns in sequential bilingual children with language impairments. The results could contribute to our understanding of the language learning contexts and practices in minority families. In turn, this may help practitioners to effectively develop treatment plans and training programs to enhance family involvement in their children's language development in the home.

Language Development in Typically Developing Sequential Bilingual Children

Bilinguals are very diverse in terms of how they learn two languages. Children that have repeated exposure to two languages during the lengthy period of language development that takes place in early childhood are known as bilingual individuals (Bialystok, 2010; De Houwer & Bornstein, 2016; Kohnert, 2010). Children that learn one language from birth (L1) and are exposed to another language in early childhood (L2) are known as sequential bilingual children

(Kohnert, 2010). These children may use their L1 (e.g., Cantonese) primarily at home and their L2 (e.g., English) primarily at school. This is merely one scenario for language use, though there are many variations. It is not uncommon that L1 is a minority language (Cantonese) and L2 is a majority language (English) (Kohnert, 2010). This is the case in the current study. As a result, this study focuses on children that learn one language at home (L1-Cantonese) and one language in school (L2-English).

Bilingualism has been shown to have a variety of positive and negative effects. Provided that there is active use of both languages, the positive effects are primarily cognitive and linguistic (Bialystok, 2010). Peal and Lambert (1962) tested English and French bilingual children and compared their performance to that of English monolingual children. They found that bilingual participants performed better on nearly all of the tests and demonstrated cognitive advantages like mental flexibility, superior concept formation, and diverse mental abilities. This debunked previous research claiming that there were disadvantages, even deficits, in learning two languages. These results were ahead of their time, as many researchers at the time still believed that being bilingual was a big disadvantage compared to being monolingual. Bialystok's (2010) research also supported Peal and Lambert's (1962) discoveries, demonstrating an overall bilingual advantage in tasks such as nonverbal executive control, selective attention, inhibiting distractions and switching between tasks. Some suspected disadvantages associated with learning two languages from a young age include slower language development and lower measures of linguistic proficiency and overall processing when compared to monolingual children (Bialystok, 2010). Although this is described as a disadvantage, I believe it is a neutral consequence of learning two languages at once. Bilingual children go back and forth between two languages (both mentally and verbally) depending on the environment and their linguistic partners. Another potential disadvantage associated with children learning two languages at an early age is that

they have a smaller vocabulary in each language (Bialystok, 2010; Vagh, Pan, & Mancilla-Martinez, 2009). When put together, their vocabulary in each language is equal to the size of a developing monolingual vocabulary. This can be a negative effect when comparing a bilingual child's language ability in only one language with a typically developing monolingual child's vocabulary that is twice as large. Research about the positive and negative effects of bilingualism are important to understand when working with bilingual populations, much like the current study.

In this study, I focus on the language development of sequential bilingual preschool children. In terms of language acquisition, sequential bilingual children have different language outcomes as a result of learning two languages (e.g., using a mixture of English and Cantonese) at two different times (Bialystok, 2010; Kohnert, 2010). In order for these children to become proficient in both languages, continuous literacy and use in both languages is necessary (Duursma et al., 2007). This continued exposure could be in the form of conversational use with family members or more structured use during school. For many bilingual children, language instruction in their home language (L1) is useful for those either learning or struggling with their nonnative language (L2). Research has shown that home language use during instruction can improve L2 performance as well as overall literacy development in both languages (Branum-Martin et al., 2014). In the current study, sequential bilingual children receive language instruction in both Cantonese (L1) and English (L2). The Cantonese instruction provides extra help to those learning or struggling with English, similar to Branum-Martin (2014). In general, the amount of exposure to each language is related to vocabulary learning and growth in that specific language (Duursma et al., 2007; Marchman, Martínez, Hurtado, Grüter, & Fernald, 2006).

Testing bilingual children requires special considerations. It is important to remember that the overall vocabulary the child possesses in each language is similar to that of a monolingual child. This means that testing in one language is not truly representative of a bilingual child's total language ability. Research by Kohnert (2010) has shown that bilingual children may perform worse on some tasks and better on others. This is thought to be common in bilingual children who are still developing their use of both languages with partners in a variety of different settings (Kohnert, 2010). This echoes the development of monolingual children's language skills and knowledge. Differences in language input could account for this difference in performance. Bilingualism is becoming more common and it is necessary to understand how language input and language development interact. Overall, the development of both languages is dependent on the child's exposure and continued use throughout their home and school environments.

Language Input

It would be remiss to discuss language impairment and parent perceptions of LI without first explaining language input and its importance. Language input is the language that a child experiences through encounters with individuals in his or her life (Duursma, 2007). Examples include a child's mother engaging them with age appropriate language, asking them questions, making comments or expanding on what their child has said. Language input can be implicit, such as a casual conversation or watching TV. It can also be intentional, such as planned literacy activities. These interactions, whether intentional or not, expose the child to diverse language opportunities and enrich their overall development. Language input is important for children because it helps them learn, understand and acquire the grammar rules of any language. The more advanced the language input is, the more opportunities there are for language growth.

A child's development and overall maintenance of language and literacy skills are highly dependent on the amount of support and enrichment opportunities that surround them (Branum-Martin et al., 2014; Kohnert, 2010; Marchman et al., 2016). Providing a home environment rich in language input is very important to the development of L1 and L2. These early interactions provide linguistic knowledge, processing skills, and cognitive development for both monolingual and bilingual children (Marchman et al., 2016). Supporting the use of both languages from an early age can enrich L1 development and also help maintain the majority of L2 (Kohnert, 2010). The earlier interactions start, the better off children are in terms of language development.

Language input can be thought of as a data set for the child. The more data there is, the more they can use and experiment. A bilingual child would therefore have two data sets, providing twice as much data and use necessary to make sense of everything they are exposed to. Language input in the home environment is complicated, especially for bilingual families. The language use by each family member is dependent on their personal language preferences (Branum-Martin et al., 2014). For example, the parents may use a combination of L1 and L2, grandparents may prefer to use L1 exclusively, and siblings may choose to use mostly L2 with only a little L1. These interpersonal preferences and the balance of family language use can greatly influence the child's home language use and literacy skills, as well as their school language and literacy skills (Branum-Martin et al., 2014; Duursma et al., 2007). With so much variability, the child must use different amounts of each language for different tasks (i.e., speaking versus listening) (Branum-Martin et al., 2014). In addition to member-specific language use, there are factors such as parent education, socioeconomic status, and cultural background that can affect language development. These factors have the power to shape the resources available for the child and the opportunities to practice language use and literacy skills. Clearly

there are many important facets to language input that help make overall language development occur.

Overall, previous studies show that there is a positive relationship between language input and language development in typically-developing bilingual children (Branum-Martin et al., 2014; Kohnert, 2010; Marchman et al., 2016). Early and frequent language interaction is vital for providing children with a rich linguistic environment. Home language and literacy are rather variable across families but the diverse opportunities presented to the child will help their language output evolve. In general, interacting with children in the home is imperative for language to develop. This is especially true for children with a specific language impairment because their language development differs from typically developing peers. Little is known about how the perception of LI changes language input and use at home. This study looks at differences between language input in children with language impairment and typically developing children.

Language Impairment in Bilingual Children

There is no clear diagnostic criteria for language impairment in bilingual children. Along with some professional diagnosis, parent and teacher reports are taken into account in the process of identifying atypical language patterns in children who are at risk for language impairment. In the current study there is a broad group of children that have a range of language impairments. In the literature, there are more studies looking at children with SLI. Many of the participants in the current study have the characteristics associated with SLI but not a formal diagnosis. When a child does not develop language use or linguistic processing skills typically but exhibits normal intelligence, they have a language impairment (LI) or specific language impairment (SLI) (Bialystok, 2010; Kohnert, 2010). Having a specific language impairment means that children process language differently than typically developing peers. In some cases, children with LI

process language more slowly and less effectively. For bilingual children in particular, both languages are affected by the language impairment, which makes them learn both languages differently than their typically developing bilingual peers (Kohnert, 2010).

Sharon Armon-Lotem (2017) provides useful information and overall insight regarding bilingualism and language impairment. Her research indicates that the areas of particular difficulty for children with language impairment include recognizing the abstract concepts required for language acquisition. This results from an impaired linguistic representation despite extensive language exposure. Upon further research, Armon-Lotem (2017) reported that the amount of exposure to language(s) is independent from the input that children need to acquire features of said language(s) (e.g., syntax, phonology and morphology). In the end, the child's overall ability to parse out relevant input has to do with their inner abilities (i.e., language impairment). This information provides a better foundation and overall understanding as to the problem areas associated with language impairments.

Children with an LI have differences in their language skills. These differences do not have a specific cause. LI also tends to affect monolingual and bilingual children at similar rates (Kohnert, 2010). Some researchers believe that the general bilingual environment (i.e., exposure and acquisition of two languages) does not put bilingual children with LI at a disadvantage compared to monolingual children (Kohnert, 2010). However, the way in which the language impairment manifests during testing may differ between bilinguals and monolinguals. Armon-Lotem (2017) found that sentence repetition tasks (SRT's) were the best tool when screening for language impairment in bilingual children. SRT's were thought to be the most sensitive and specific method. This is mainly because sentence repetition tasks challenge a child's syntactic abilities in whatever language they are being tested. Although the reason for these differences is

largely unknown, it is important to attain appropriate testing if a language impairment is suspected.

Exercising home language use and literacy skills is very important for overall language development. This is especially true for children with a specific language impairment because there is an aspect of their language development that differs from typically developing peers. I believe it is important to ensure that parent strategies do not change prematurely when a language impairment is suspected. Of course, appropriate changes may be necessary with the recommendation of a speech language pathologist or implementation of an individualized education plan (IEP) under appropriate circumstances.

Parent Strategies and Child Directed Speech

Changing parent strategies are one reason why there might be differences in the amount of L1/L2 use at home between bilingual children with and without language impairments. It's not new that caregivers change their talking strategies when speaking to their children, for both monolingual and bilingual children (De Houwer & Bornstein, 2016; Goldman & DeNigris, 2015; van Balkom, Verhoeven, & van Weerdenburg, 2010). Many caregivers adjust their speaking style in order to better fit the ability or needs of the child's communication skills (Goldman & DeNigris, 2015). In some cases, this can serve as a way to increase communication. Parents and caregivers in general are one of the most stable sources of language input in a child's life (De Houwer & Bornstein, 2016).

The language input that bilingual children receive is highly dependent on the language choices of the caregivers. Parents and other caregivers do not necessarily speak the same amount in both languages, providing various amounts of input in each language spoken at home (Branum-Martin et al., 2014; De Houwer & Bornstein, 2016). Language choice and overall parent strategies can change for a variety of reasons. These reasons may include, but are not

limited to, medical professionals advising parents to modify their language strategies, parents deciding that there is a benefit of speaking one language versus two languages to children, the overall language development of the child, and/or the specific language strategies used by the child (De Houwer & Bornstein, 2016). Although these tactics can affect parent strategies, it is the child directed speech (CDS) that influences language development and child language learning as a whole (De Houwer & Bornstein, 2016). Early interactions help develop language skills from a young age and these skills depend on caregiver language choice.

Goldman and DeNegris (2015) focused on parent strategies involved in eliciting memories in children with Autism Spectrum Disorder, developmental language disorders, and typically developing children. For the purposes of this study, I focused on the parent strategies used with children that had a developmental language disorder. In their study, two main parent strategies were observed when parents tried to elicit memories from their children (i.e., the parents wanted their children to recall the past). The first parent communication style was classified as paradigmatic, in which parents directly or repeatedly asked questions. The second communication style was classified as narrative, in which parents mainly elaborated on comments (providing opportunities for expansion and extension of an utterance). These different styles of communication are model examples of how child directed speech can change depending on the parent strategy being used. I found this relevant to the current study because child recall of events happens in parent conversation every day. It occurs when parents ask their children what they did at school, which games they played with their friends, what they bought for lunch, etc. This knowledge of telling personal stories and recalling past events is developed through early interaction and play based scenarios, both of which occur through various parent strategies in child directed speech.

Another study by De Houwer and Bornstein (2016) focused on bilingual mother's language choices in child directed speech. This study used 31 bilingual mothers over a four-year period and found that the maternal language use patterns remained largely the same during this time. They had age appropriate changes in child directed speech, though most of the mothers were consistent with the language(s) they used with their child involved in the study. This study was done with typically developing children and although the findings are useful, there is less information about these patterns for children that do not have typically developing language skills.

The current study focuses on what we know little about, the use of child directed speech with bilingual children that have language impairments. There was one article in particular that provide useful information in this area of interest. Van Balkom, Verhoeven, and van Weerdenburg (2010) focused on conversational behavior between children with a language delay and their caregivers. Eighteen parent-child dyads were used for a period of eighteen months. Free play sessions were held during this study every two months. Twelve of the dyads included children with a developmental language delay (DLD) and six of the dyads included typically developing (TD) children. The study established that children with a DLD have communicative intent but they struggle with topics of conversation, turn-taking, and synchronized communication intentions. As a result, these children often turn to communication devices (some of which are nonverbal) that show awareness and active participation in a given conversation but an avoidance to further the conversation on a deeper linguistic level. In some cases, there may be a general lack of understanding. Common communication tactics used by children with a DLD mentioned above include backchannels (i.e., nodding, smiling, frowning), tag-questions and ellipsis. With some background on child communication techniques, the main area of interest, child directed speech, can be better understood.

There is evidence demonstrating that parents change their strategies in conversation with their children when they perceive the child as having an LI. In van Bulkom et al. (2010), there were examples of this. In terms of specific parent strategies observed in the free play sessions during the study, researchers used the following categories to code child directed speech between the dyad: backchannels, formulaic correlations, re-introduction, re-initiation, recasts, and interruptions. After looking at the data, researchers found unbalanced conversational contributions between children with a DLD and their caregivers (the parent making a greater conversational effort) when compared with interactions between TD children and their caregivers. Nonverbal initiations and back-channeling methods, such as smiling, frowning, and nodding were also found to be more common in parent-child interaction among the DLD group. In addition, parents of children with a DLD were found to initiate topics more frequently during discourse compared to parents of TD children. During the course of this study, parents of children with a DLD used more clarification requests, self-repetitions, formulaic corrections, topic reintroductions, interruptions, and incoherent responses than parents of TD children. These methods are examples of how parents adjust their speaking strategy in order to better fit the ability or needs of the child's communication skills (Goldman & DeNigris, 2015). In some cases, parents corrected their children frequently. Despite the good intentions of these specific conversational strategies, over correcting a child with a language impairment can do more harm than good for the language and conversation development in the child with a DLD.

Van Bulkom et al. (2010) demonstrated that parent strategies from the DLD group are indeed different than strategies employed by parents of TD children. In some cases, it showed that these strategies consisted largely of control and repair methods, focusing on form instead of content. There are no studies looking at how bilingual minority families/caregivers might change their strategies when they talk with their children who might have an LI. This current study

attempts to explore if there are in fact changes in terms of the amount of home language use or second language use when a child has a suspected or confirmed LI.

The Current Study

The purpose of this study is to compare the language input of sequential bilingual preschool children with a suspected or a confirmed language impairment to that of their typically developing peers. To begin this study, I posed the research question, "Do parent language strategies differ between children with a suspected/confirmed language impairment and typically developing children?" My hypothesis is that the language input strategies used by parents of children with a suspected or a confirmed language impairment are in fact different from those used by parents with typically developing children.

As I furthered my research, I developed two studies. In the group study (Study 1), I wanted to look at the different strategies of language use across family members and the different strategies of language use across activities. In the case study (Study 2), I wanted to look at the specific length of discourses across activities and between speakers. I developed hypotheses for these other areas of research. I believe that the language strategies across family members and across activities used with children that have a suspected or confirmed LI will differ from their typically developing bilingual peers. I also believe that the specific length of discourse (i.e., conversation time) for these situations (across family members and activities) with children that have a suspected/confirmed LI will be shorter than discourses of typically developing bilingual peers in the same categories.

For the first study, questionnaires were administered to participant's parents and returned to researchers upon completion. These questionnaires provide vital information about the language input habits found in these children's home environment. This information includes the percentage of use in each language across family members and activities, as well as other

information. These questionnaires also provide information about parent language strategies, as well as language strategies used by other family members. Previous research has shown that child directed speech can influence language development (Branum-Martin et al., 2014; De Houwer & Bornstein, 2016; Duursma et al., 2007; Kohnert, 2010; Marchman et al., 2016; van Balkom, Verhoeven, & van Weerdenburg, 2010). This first study is broader, providing more quantitative information about participants.

The second study employed the use of LENA (Language ENvironment Analysis) recording devices. These devices captured the language input that a child received throughout a typical week day. This information included both home and school environments. Children participating in the second study wore the recording device in a shirt pocket for an entire day, ranging anywhere from 6-10 hours. This study uses two recordings, one from a child with a confirmed language impairment and another from a child that is typically developing. The information was then coded by research assistants into different categories. These categories were broken up into home and school environment. As the sound file was listened to, each interaction was sorted into one of these two broader categories and then placed into a more specific sub-category. The sub categories used for home environment information include commute time, eating time, play/free time, TV time, and bed/story time. The sub-categories used for the school environment include commute time, education time, eating time, free time, naptime, outside/play time, and TV time. These categories provide specific information about the circumstances of each interaction that the child had. The interlocutor in these situations, either an adult or peer, is also recorded. The duration of these interactions is noted in the coding of these recordings using Praat. For the purpose of study two, data that focused on adult and child interactions was used. This data was analyzed upon completion and provided percentages of

adult language input and child language output that occurred throughout the child's day in both English and Cantonese.

<center>**Study One**</center>

Methods

   Participants. Table 1 (below) shows a total of 50 children (22 girls, 28 boys) that participated in this study. These children were chosen because they were preschool children

    Table 1. *Participant Gender and Language Use*

	LI	TD
Number of girls	10	12
Number of boys	15	13
Cantonese at home	Yes	Yes

exposed to systematically learned English in a classroom setting at Kai Ming Head Start in San Francisco, CA. The parents of these children (41 mothers, 7 fathers, 1 grandmother, and 1 unknown) provided information via questionnaires. These children were divided into two groups: those with a confirmed or suspected language impairment (LI = 25 children) and those that were typically developing (TD = 25 children). The typically developing group was age matched to the language impairment group. Both groups of children ranged in age from 36 to 60 months old (*M of LI = 48.48, M of TD = 48.52, SD of LI group = 7.67, SD of TD = 7.47*). Information about the parents' highest education was also obtained. For the father's highest education in the language impairment group, nine said college, 11 said high school, four said junior high/middle school and one said elementary school. For the mother's highest education in the language impairment group, nine said college, seven said high school, seven said junior high/middle school, one said elementary school, and one did not respond. For the father's highest education in the typically developing group, four said college, 13 said high school, seven said junior high/middle school, and one did not respond. For the mother's highest education in the typically developing group,

one said graduate school, three said college, 13 said high school and eight said junior high/middle school.

Of the children in the language impairment group, 20 children were born in the U.S., four children were not, and one was unclear. The language spoken at home (and languages of interest) for these children include English (2 families), Cantonese (14 families) or both (9 families). Other languages that were spoken include Zhong and Shan. However, the language that these families felt most comfortable speaking could be different (English = 4, Cantonese = 19, both = 2). In the typically developing group, 18 children were born in the U.S. and seven children were not. The language spoken at home (and languages of interest) for these children were also English (0 families), Cantonese (23 families) or both (1 family). There was one family that spoke both Cantonese and Mandarin. Again, the language that these families felt most comfortable speaking could be different than what they reported they were capable of speaking (English = 0, Cantonese = 24, both = 0, other = 1).

The language impairment group was further divided into two subgroups: type 1 (no IEP in place) and type 2 (IEP in place), IEP standing for individualized education plan. The parents of children with a language impairment were asked if they had any concern about their child's speech or language, 23 said yes, 2 said no. Of the group of parents that said yes, 12 had concerns about speech, 3 had concerns about language, and 8 had concerns about both. This subdivision represents either the "confirmed" or "suspected" aspect of language impairment.

All of the children in this study attend a Cantonese-English bilingual head start program in San Francisco, California. In order to be in this head start program, certain requirements were met regarding family income, indicating that all 50 children come from a similar socioeconomic background.

Procedures. The guardians (mother or father) of the participants were asked to participate in this study and given a brief description of the study. Parents interested in participating then filled out a questionnaire created by Shirley Cheung, a former research assistant in Dr. Pui Fong Kan's Child Language Learning Lab (Cheung, 2015). This form was filled out at school or at home by the patents and contained a consent form on the last page. The questionnaire contained six pages in English with a Cantonese translation for each section. This allowed parents to choose which language they felt most comfortable filling out the form in. The instructions given to the parents were:

1. Fill out the form completely

2. Fill out the form as accurately as possible

The questionnaire collected specific data about the parent's background, along with information relating to other family remembers living in the home environment of the child participant. These family members could include older siblings, younger siblings, grandmothers, grandfathers, and an "other" category. The questionnaire also gathered information regarding the communication between family members. This included the specific language(s) that are capable of being spoken, Cantonese or English, as well as the language(s) that family members prefer to speak.

Lastly, the questionnaire looked at communication across activities. This included information about the amount of hours spent per week on these activities as well as the percentage of each language (Cantonese or English) the child had exposure to. The activities included reading out loud to the child, telling stories out loud to the child, breakfast, lunch, dinner, watching TV/videos, playing games involving learning new words, playing with household members at home, and playing with friends at home. Specific scales were used to code this information once it was collected.

To record the hours spent on each activity per week, high numbers (i.e.,7) indicated more hours doing each activity and low numbers indicated fewer hours spent doing each activity (i.e.,1).

The following scale was used in this data set:

1 = 0 - 5 hours

2 = 6 - 10 hours

3 = 11 - 15 hours

4 = 16 - 20 hours

5 = 21 - 25 hours

6 = 26+ hours

For the percentage of each language the child was exposed to, a lower number (i.e.,1) indicates use of English and higher number (i.e.,7) indicates use of Cantonese. The mean value (i.e., 4) represents a balanced preference of both English and Cantonese. The following scale was used in this data set:

1 = 100% English

2 = 20% Cantonese 80% English

3 = 40% Cantonese 60% English

4 = 50% Cantonese 50% English

5 = 60% Cantonese 40% English

6 = 80% Cantonese 20% English

7 = 100% Cantonese

Overall, the questionnaire provided information regarding the amount of language input Cantonese-English bilingual preschool children receive from home and at school (Cheung,

2015). This information helped create two groups into which the child participants were divided: typically developing or having a language impairment.

Results

      Structure of language use across family members. Table 2 (below) describes the language use patterns of L1 and L2 across family members within the language impairment (LI) group. This table indicates that exclusively Cantonese (no English) is used most by grandparents that live in the home. A total of 86.96% of grandmothers and 86.67% of grandfathers used 100% Cantonese. Fathers (50%) are the next highest users of 100% Cantonese, though they also use some English (22.73% of fathers used 80% Cantonese, 20% English). Older siblings have lower use of Cantonese only at 16.67%. Both older and younger siblings use varying amounts of both
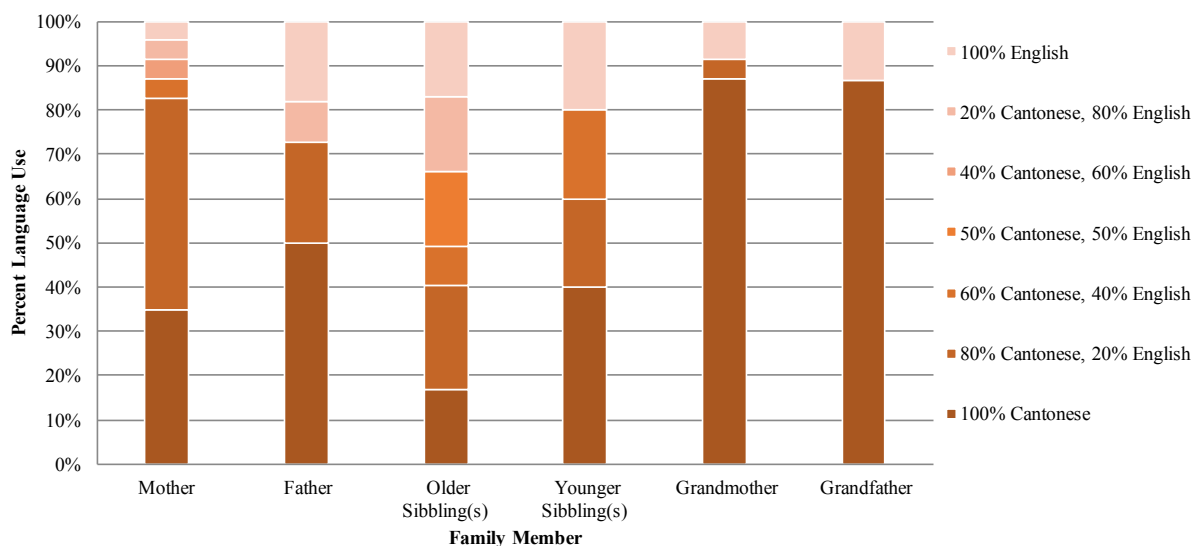
Table 2. *L1/L2 Use Across Family Members of Children with Language Impairment*

	Number reported	100% C (7)	80% C, 20% E (6)	60% C, 40% E (5)	50% C, 50% E (4)	40% C, 60% E (3)	20% C, 80% E (2)	100% E (1)
Mother	23	34.78%	47.83%	4.35%	0.00%	4.35%	4.35%	4.35%
Father	22	50.00%	22.73%	0.00%	0.00%	0.00%	9.09%	18.18%
Older Sibling(s)	12	16.67%	23.08%	8.33%	16.67%	0.00%	16.67%	16.67%
Younger Sibling(s)	5	40.00%	20.00%	20.00%	0.00%	0.00%	0.00%	20.00%
Grandmother	23	86.96%	4.35%	0.00%	0.00%	0.00%	0.00%	8.70%
Grandfather	15	86.67%	0.00%	0.00%	0.00%	0.00%	0.00%	13.33%

English and Cantonese. This table gives us a clear idea about language use patterns used with children with LI in their home environment.

Figure 1 (see below) depicts the information found in Table 2 in a graph format, clearly identifying language use patterns across family members in the LI group. This graph reinforces the findings provided in Table 2 but provides a visual aid that illustrates these ideas in a clear

Figure 1. *L1/L2 Use Across Family Members of Children with Language Impairment*

manner. For example, Figure 1 reinforces the idea that the Grandmother and Grandfather have the highest use of "100% Cantonese," indicated by the darkest shade of red.
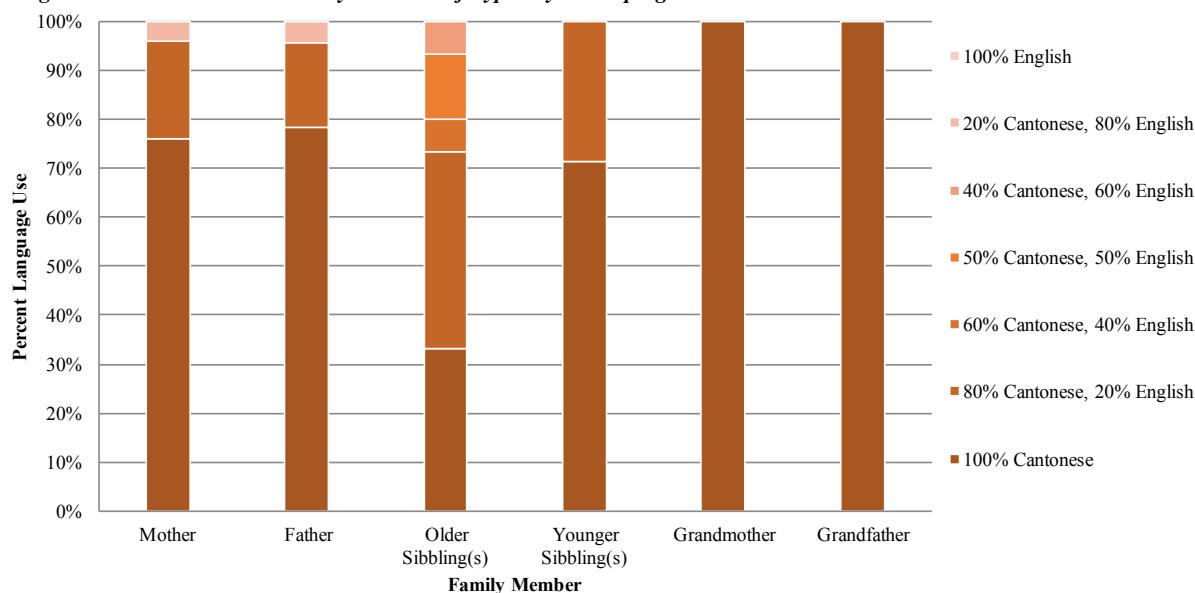
Table 3 (below) describes the language use patterns of L1 and L2 across family members within the typically developing (TD) group. This table depicts high use of only Cantonese across multiple family members. Grandmothers and grandfathers used exclusively Cantonese 100% of the time while at home. Mothers (76%) and fathers (78.26%) were the next highest users of exclusively Cantonese. There was slightly more variation in language use among older and younger siblings.

Table 3. *L1/L2 Use Across Family Members of Typically Developing Children*

	Number reported	100% C (7)	80% C, 20% E (6)	60% C, 40% E (5)	50% C, 50% E (4)	40% C, 60% E (3)	20% C, 80% E (2)	100% E (1)
Mother	25	76.00%	20.00%	0.00%	0.00%	0.00%	4.00%	0.00%
Father	23	78.26%	17.39%	0.00%	0.00%	0.00%	4.35%	0.00%
Older Sibling(s)	15	33.33%	40.00%	6.67%	13.33%	6.67%	0.00%	0.00%
Younger Sibling(s)	7	71.43%	28.57%	0.00%	0.00%	0.00%	0.00%	0.00%
Grandmother	20	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Grandfather	17	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Figure 2 (below) depicts the information found in Table 3 in a graph format. This identifies language use patterns across family members in the typically developing (TD) group. This graph reinforces the findings of Table 3, showing the distribution percent language use in a clearer manner.

Figure 2. *L1/L2 Use Across Family Members of Typically Developing Children*

Independent-Samples Mann-Whitney U Tests were used to examine whether there were differences between TD and LI groups in the language input across family members. Results showed that there were differences in the distribution of percent language use across certain family members. Significant group differences were found in the report of "percent mother" (p <.001), and "percent father" ($p < .05$). These results indicate that the mothers and fathers of the LI group used relatively more L2 at home than the parents in the TD group. However, no group differences were found in older siblings ($p = .08$), younger siblings ($p = 0.27$), grandmothers ($p = 0.1$), or grandfathers ($p = 0.53$). The findings suggest that there was not a difference in their amount of L1 and L2 used by siblings and grandparents between children in the TD and LI groups.

Structure of Language Use Across Activities at Home. Table 4 (below) describes the

children's language use of L1 and L2 across home activities within the LI group. Activities that

all had high percentages of 100% Cantonese include dinner (47.83%), playing with family

(39.13%), telling stories (31.82%), and playing with friends (30.43%). Breakfast and lunch were

excluded from the table because the results resembled that of dinner. Other activities with high

Cantonese use (80% Cantonese 20% English) include reading out loud (37.50%), playing word

games (36.36%), playing with family (30.43%), playing with friends (34.78%), and telling

stories (31.82%). Watching TV had the highest percentage of 100% English at 43.48%. This

percentage of exclusively English was much higher than any other activity, the closest of which

was telling reading out loud at 20.83%.

Table 4. *L1/L2 Use Across Home Activities of Children with Language Impairment*

	Number reported	100% C (7)	80% C, 20% E (6)	60% C, 40% E	50% C, 50% E	40% C, 60% E (3)	20% C, 80% E	100% E (1)
Reading Out Loud	24	20.83%	37.50%	0.00%	12.50%	4.17%	4.17%	20.83%
Telling Stories	22	31.82%	31.82%	4.55%	4.55%	4.55%	0.00%	13.64%
Dinner	23	47.83%	21.74%	4.35%	4.35%	4.35%	0.00%	17.39%
Watching TV	23	26.09%	13.04%	4.35%	4.35%	0.00%	8.70%	43.48%
Playing Word Games	23	27.27%	36.36%	4.55%	13.64%	0.00%	9.09%	13.64%
Playing with Family	23	39.13%	30.43%	0.00%	13.04%	0.00%	8.70%	8.70%
Playing with Friends	23	30.43%	34.78%	0.00%	8.70%	4.35%	8.70%	13.04%

Figure 3 (see below) shows the information used in Table 4 but in a graph format. Again,

it reflects that dinner had the highest percentage of 100% Cantonese use. It also shows that

watching TV had the highest percentage of 100% English use. This figure illustrates the findings

in Table 4 in a more visually appealing way, making it easy to see what the different patterns of
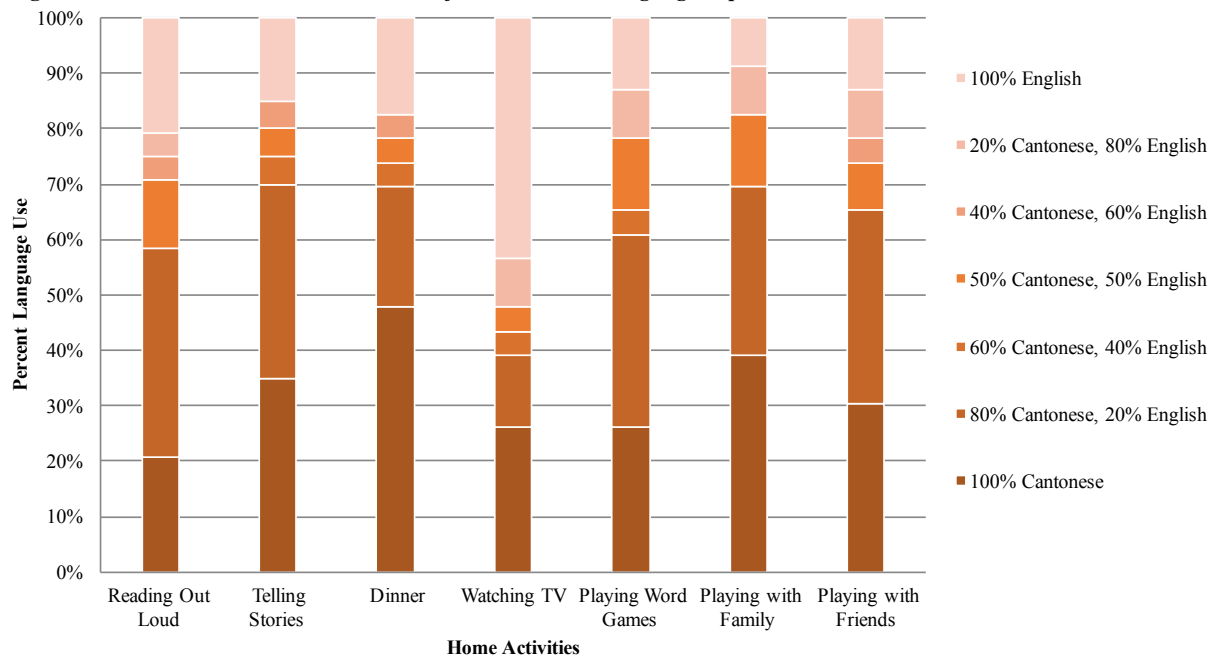
language use across home activities.

Figure 3. *L1/L2 Use Across Home Activities of Children with Language Impairment*

Table 5 (below) describes the children's language use of L1 and L2 across home

activities within the typically developing (TD) group. All activities had a high percentages of
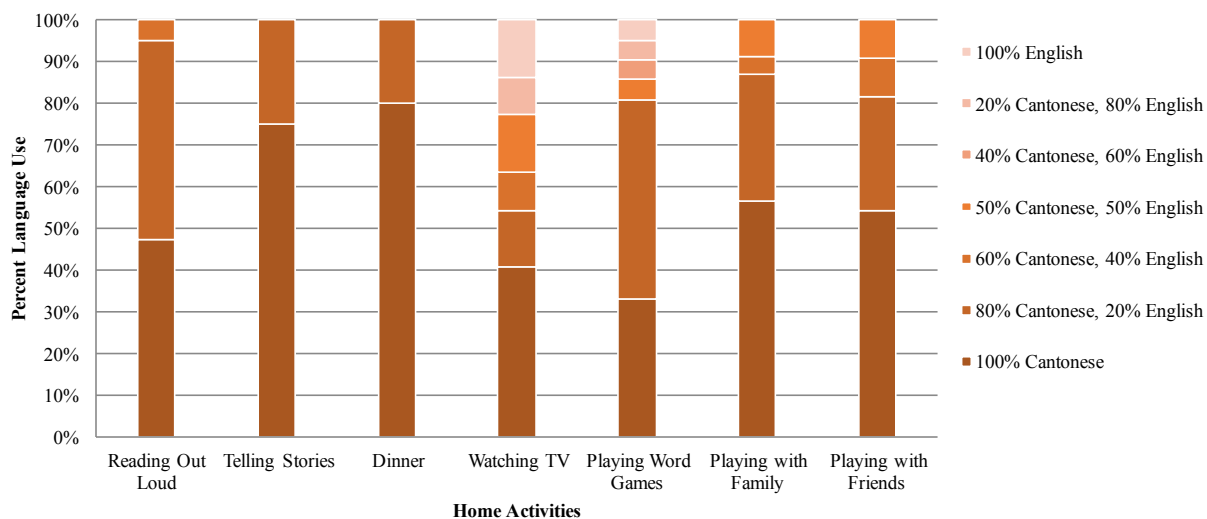
Table 5. *L1/L2 Use Across Home Activities of Typically Developing Children*

	Number reported	100% C (7)	80% C, 20% E (6)	60% C, 40% E	50% C, 50% E	40% C, 60% E (3)	20% C, 80% E	100% E (1)
Reading Out Loud	21	47.62%	47.62%	4.76%	0.00%	0.00%	0.00%	0.00%
Telling Stories	20	75.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dinner	20	80.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Watching TV	22	40.91%	13.64%	9.09%	13.64%	0.00%	9.09%	13.64%
Playing Word Games	21	33.33%	47.62%	0.00%	4.76%	4.76%	4.76%	4.76%
Playing with Family	23	56.52%	30.43%	4.35%	8.70%	0.00%	0.00%	0.00%
Playing with Friends	22	54.55%	27.27%	9.09%	9.09%	0.00%	0.00%	0.00%

100% Cantonese. This includes dinner (80%), telling stories (75%), playing with family

(56.52%), playing with friends (54.55%), reading out loud (47.62%), watching TV (40.91%),

and playing word games (33.33%). There was also high use of 80% Cantonese, 20% English for

a few groups, including reading out loud (47.62%) and playing word games (47.62%).

Figure 4 (below) shows the information provided in Table 5 in a visually appealing format. It reinforces the idea that dinner had the highest use of 100% Cantonese among other patterns described with Table 5.

Figure 4. *L1/L2 Use Across Home Activities of Typically Developing Children*

Independent-Samples Mann-Whitney U Tests were used to examine the group differences in the amount of L1/L2 use across activities at home. Results indicated that a handful of activities had a difference in language use. These activities include reading out loud ($p < 0.01$), telling stories out loud ($p < 0.01$), breakfast ($p < 0.05$), dinner ($p < 0.05$), and playing with friends ($p < 0.05$). The results showed that more L2 was used across these activities in the families of the LI group. There was one activity that was exactly significant with a value of 0.050, which was lunch. However, some activities were not significantly different between the two groups. These activities include watching TV ($p = 0.09$), playing word games ($p = 0.3$), and playing with family members ($p = 0.11$).

Discussion

Study One

Structure of language use across family members. The language use patterns of L1 and L2 across mothers and fathers were indeed different between the language impairment and typically developing groups. There is evidence in this study that there are differences in the amount of L1/L2 used at home between families of children with and without language impairment. These findings were consistent with my hypothesis that there would be differences in language use among family members between the LI and TD group.

The overall trend found in this data was a difference in language use among the mothers and fathers of the TD and LI group. Overall, more Cantonese was used across both groups. Mothers of the TD group used mostly Cantonese, while mothers of the LI group used mostly Cantonese with some English. Fathers of both children in the TD and LI groups use a mixture of English and Cantonese. Parents in these groups may have different preferences of language use. These preferences could stem from professional advice, personal preference, or occupation based language requirement.

There were no significant differences in language use among siblings and grandparents in either group. Siblings in both the TD and LI group used a combination of English and Cantonese. These siblings may be less aware of their language choices, causing them to care less about which language they use around the child participant. Grandparents in both the TD and LI group ended up using almost exclusively Cantonese, with small exceptions. This pattern of language use may result from limited proficiency in English or personal preference of using only Cantonese. For greater discussion of differences in language use among the TD and LI group across family members, refer to the general discussion section.

Based on the results provided by this data, there are in fact differences between typically developing and language impairment groups in this study. Due to the variability of language use at home, generalizations about this data should not be made. Research addressing bilingual language use patterns of children with LI and their caregivers is still lacking. With the rising number of bilingual children in the United States this is a worthwhile area for continued research. More longitudinal data is needed to study differences in language use patterns over time across family members in the same bilingual home environment.

Structure of language use across activities at home. Language use patterns of L1 and L2 across certain activities were different between the language impairment and typically developing group. This data provides additional support regarding the supposition that language input strategies differ between the language impairment and typically developing group in this study. These findings were consistent with my hypothesis that there would be differences in language use across activities between the LI and TD group.

For certain activities, such as reading out loud, there were differences between the TD and LI group. The LI group displayed a more balanced use of English and Cantonese. The TD group displayed use of mostly Cantonese. Other activities that had differences in language use included telling stories out loud, dinner and playing with friends. For these activities, the LI group displayed a more balanced use of English and Cantonese. The TD group used almost exclusively Cantonese. The differences between a few activities may exist as a result of idealistic parent estimates, parent language preference, as well as other reasons (de Houwer & Bornstein, 2016). For greater investigation of these reasons, refer to the general discussion section.

These patterns of language use further identify that there are differences between the language impairment and typically developing groups within this study. These activities provide

a glimpse into the lives of bilingual families speaking a minority language and the language use patterns that they practice.

Study 2

Methods

Participants. As Table 6 (below) illustrates, a total of two participants were used in this study. One child had a confirmed language impairment and the other was typically developing. Both children were bilingual preschool children attending Kai Ming Head Start. The child with an LI was from study one and the second child was a peer that attended the same preschool, but was not involved in study one. Based on the questionnaire filled out by the mother of the language impaired child, a variety of information was collected. The child with an LI was indicated to be 57 months old, male, and born in the U.S. This child was put into the type 1 language impairment group, meaning that there was parent concern about Speech and Language and that an individualized education plan (IEP) was put into place. The information provided by this questionnaire indicated that the father's highest level of education was junior high school and that the mother's highest level of education was high school. The language that is spoken at home is Cantonese, specifically a Cantonese dialect called Toisan. The language that all individuals feel most comfortable speaking at home is also Cantonese. As mentioned in study one, this individual attended a head start program, which requires a specific income level to be met. This indicates that all participants, in study one and two, come from similar socioeconomic backgrounds.

Table 6. *General Participant Information*

	LI	TD
Age in months	57	48
Gender	Male	Female
Cantonese used at home	Yes	Yes
Born in U.S.	Yes	Yes
Mother language use	100% Cantonese	100% Cantonese
Father language use	100% Cantonese	100% Cantonese
IEP in place	Yes	No

The second participant in this study was determined to have typically developing language. Although this participant was not involved in study one, questionnaire data was filled out by the parents. This typically developing child was indicated to be 48 months old, female, and born in the U.S. The father's and mother's highest level of education were both indicated to be high school. The language that is spoken at home is Cantonese. The language that all individuals feel most comfortable speaking at home is also Cantonese. This participant attended Kai Ming Head Start. This child was not age matched but attended the same preschool during the time that the information was collected for this study.

Procedures. The LI and TD children's caregivers filled out the questionnaire described in study one. The caregivers of each child participant were then given a LENA recording device used to record and collect language samples from the children and their surrounding environment. These devices were used for one entire weekday for each participant, a total of two recordings were completed for study two.

In the beginning of the day, the recording device was inserted into a special shirt worn by the children. These shirts had a pocket on the front that held the LENA recording device securely. The children wore the shirt with the device in it all day, during school and at home. The recording device were supposed to be shut off at the end of the day and then collected from the

parents the next morning (when the children was dropped off at Kai Ming). The amount of data collected for these two participants ranged from 6.5 to 7.6 hours. The adult language input collected by these recordings consisted of adults from the home environment and school environment (teachers). The child with an LI had a total of 7.6 hours of data on the LENA device. The TD child's LENA device recorded a total of 6.5 hours of data. Due to the nature of these LENA devices, there was no need for breaks during recording since the data being collected consisted of spontaneous language samples.

After collection, the LENA devices were then sent to the University of Colorado Boulder, where research assistants downloaded the information as sound files and began coding them in Dr. Pui Fong Kan's Child Language Learning Lab (Brickman, 2017). The sound files were accessible through a hard drive within Dr. Kan's lab. The specific files that we used were opened with a program called Praat. The same process for coding was used with both sound files involved in this study. Using a program called TextGrid, trained volunteer research assistants helped create different categories according to the varying speakers and environments that the children encountered throughout their day. Each of these sound files had six different "tiers" within them into which the information was categorized. These six different categories include "Adult Cantonese, Adult English, Child Cantonese, Child Cantonese, Peer Cantonese, and Peer English." For the purposes of study two, I only focused on the data regarding adults and the child, excluding the peers. The categories used to describe the different environments include school activities such as "circle time," which include educational time during school, "eating/snack time," "free time," "nap time," "outside play time," and "TV time." The categories created for home activities include "commute home," or any time spent in the car, "eating/dinner time," "free play time," "TV time," and "bedtime/story time." As previously mentioned, this study focuses on the language exchange between the adult-child dyad. The coding method and

overall data helped uncover interactions between adults and the children involved in this study using spontaneous language samples.

Coding the sound files for study two using the method described above took careful precision. As volunteers and I coded the sound files, we had to pay close attention to any change in activity, which would indicate a need to switch TextGrids. For example, I had to pay close attention to environmental and verbal cues, such as what was being talked about and other sounds, in order to gauge which activities the child was participating in. During this coding process, the task was to listen to speakers on the recording and place them in the different tiers they fell into. From there, the goal was to determine whether the language from each speaker was relevant to the child's language input. Child directed speech and child-initiated speech were of special interest. Language input that took place near the child was determined to be of use on a case by case basis according to proximity, loudness and content. The duration of each utterance determined as relevant was recorded. In essence, the task at hand included thinking about language from the children's perspective--what would be relevant to their language input and development and what would not.

Once completed, the coded sound files were analyzed and summarized using Praat. These summaries provided information about the children's percentage of speech throughout the total length of the sound file, as well as the percentage of language input from adults. This information is also specific to each language, providing information such as which language the children spoke more often and what language adults spoke to the children in. This information offers comparison between both languages, between different speakers, varying contexts and between a typically developing child and one with a language impairment.

Results

The results from the second study demonstrated language use patterns of adults in two children's lives during the course of one day. These language patterns were collected using LENA recorders as mentioned in the methods section (Brickman, 2017). One of the children that participated in study two had a confirmed language impairment and the other was typically developing.

After analyzing the data, the following results were found for the child with LI. Adults spoke Cantonese to the child for 12% (or 57 minutes) of the entire 7.6 hour recording. Adults then spoke English to the child for 8% (or 35 minutes) of the entire recording. Overall, adult language input comprised 20% of the entire 7.6 hours recording. The child spoke Cantonese for 7% of the entire recording and English for another 2% of the entire recording. Both the parent and child spoke more Cantonese than English. These findings are presented in Table 7 (below).

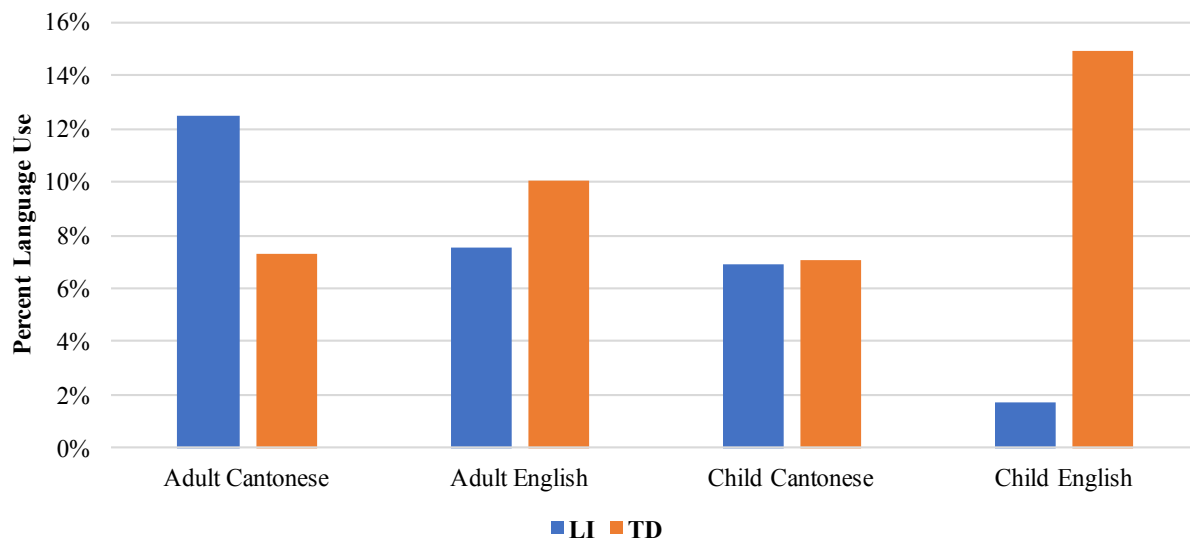Table 7. *Language Use of Child with LI and Caregivers*

	Time (min)	Percentage
Adult Cantonese	58	12%
Adult English	35	8%
Child Cantonese	32	7%
Child English	8	2%
Total sound file	460 (or 7.6 hrs)	

The following results were found for the TD child. Adults spoke Cantonese to the child for 7% of the entire 6.5 hour recording. Adults then spoke English to the child for 10% of the entire day. The total amount of adult input made up 17% of the entire recording. The child spoke Cantonese for 7% of their day and English for another 15% of the recording. The child and adult both spoke a higher percentage of English throughout the day compared to the LI group. These results can be found in Table 8 (below).

Table 8. *Language Use of TD Child and Caregivers*

	Time (min)	Percentage
Adult Cantonese	29	7%
Adult English	40	10%
Child Cantonese	28	7%
Child English	58	15%
Total sound file	392 (or 6.5 hrs)	

Overall, the child with LI received slightly more language input from adults (3% more). The adults in the LI dyad used more Cantonese than English as depicted in Figure 5 (below). The adults in the TD dyad used more English than Cantonese. The child output data gathered for both the child with LI and TD child in study two includes language directed at all individuals in their

Figure 5. *Language Use of Child with LI, TD Child and Their Caregivers*

lives. This means that the language they used was not limited to adults. Instead, it included language use when interacting with peers and also language use if the children talked to themselves. The TD child spoke for a total of 25% of their 6.5 hours recording, whereas the child with LI spoke for 9% of their 7.6 hour recording. Overall, the TD child spoke more than the child with an LI. The language use patterns of the LI adult-child dyad and the TD adult-child

dyad are displayed in Figure 5 (above). This figure depicts the percentage of language use across the children with LI, TD children, and the adults in their lives.

Discussion

Language use patterns of two bilingual preschool children provided useful information about the breakdown of specific language patterns used by individuals in these children's lives. One child had a language impairment and the other was typically developing. Each interaction was categorized according to the interlocutor: adult or the child themselves. This data provided information about overall language use in two bilingual children throughout the course of one day.

The overall trend in the data for this study was that the child with language impairment received a similar amount of language input from adults compared to the typically developing child. The child with LI and the adults in their life spoke more Cantonese than English, whereas the TD child and the adults in their life spoke more English than Cantonese. It is important to note that the adult language input collected in this study included all adults at home and in school. The child with LI spoke less (9%) than the TD child (25%). These differences could exist for various reasons. Some explanation for this difference could be a difference in child demeanor and their overall comfort in conversation based situations, or differences in coding on behalf of researchers. For greater discussion of these possible reasons, see the general discussion section.

The explanations describing the differences between overall adult input and child output are not to be taken as fact. Instead, they are possible reasons that might explain differences in language input that exists between the TD child and the child with LI. This study gives us a general idea of language input patterns used with these two children. This study should not be generalized to explain language input in all typically developing and language impaired children.

More research should be done in this area, where a greater number of participants are compared in order to see more general trends in language input and use.

General Discussion

The general needs of children with an LI are important to understand. Parents of children with an LI should stay connected with teachers. This may help parents be more involved and have a better understanding of individualized education plans (IEPs) that are put in place if necessary. In some cases, less language input is given to children after parents find out their child has an LI. This is counterintuitive because language input for children with an LI is very important and decreasing exposure to language input is not productive in the child's development of language skills.

The results of study two contradict the results of study one. In study one, both the LI and TD group used mostly Cantonese. The LI group incorporated a little more English overall. However, in study two, the TD group used much more English than Cantonese, which was unexpected. This difference may exist because of different language preferences at home (Branum-Martin et al., 2014; de Houwer, 2016). Different preferences of home language use would therefore give us different results. Other reasons for these differences include the parents being advised to change their language habits by a professional, the parents themselves deciding that one language would have greater benefit to their child than the other or the child's personal language preferences for one or both languages spoken at home (de Houwer & Bornstein, 2016). These examples demonstrate that there are many possibilities as to why the differences in this data exist.

Study One

    Structure of language use across family members. In study one, language use patterns across family members were investigated. There appeared to be differences between the language impairment group and the typically developing group as shown by the data.

    Overall trends in the data include mothers in the LI group using mostly Cantonese but including a slightly larger variety of language that incorporated English. Mothers in the TD group used almost exclusively Cantonese and very little English with the exception of one individual. The fathers of the LI group also used mostly Cantonese but included English use as well. The fathers in the TD group used almost exclusively Cantonese, with one individual using English. These results could be explained by mothers and fathers making conscious choices about language input when they have a child/children with a suspected or confirmed language impairment (Goldman & DeNigris, 2015). Several studies documented that professionals advised parents to change their language use habits if their child had an LI, suggesting greater use of L2 (English) (De Houwer & Bornstein, 2016). It might be possible that some of the parents in the current study within the LI group were given similar recommendations. In some cases, caregivers are less proficient in English since it is their L2. As a result, non-fluent English might be used. This could explain the different amount of L1 and L2 use at home. Another reason why there may be language differences among fathers could be that they use more English due to professional circumstances. If a job requires greater use of both languages, it is possible that both languages are also incorporated in home language use.

    Younger and older siblings from both groups, LI and TD, demonstrated a variety of English and Cantonese use. Overall, there was no significant difference in language use patterns among siblings. This pattern could exist because these siblings are exposed to both Cantonese and English at school, assuming they also attend(ed) the head start program. Another explanation

is that they are less aware of language choice, attributing less thought to which language they use.

Grandmothers and grandfathers from both LI and TD groups demonstrated use of almost exclusively one language (Cantonese in all cases). There were slight differences in language use in the LI group, in which three grandmothers and two grandfathers reported minimal English use. For the majority of grandparents, the language use of mainly Cantonese might be explained by weaker English skills.

These trends in home language input in children with LI are indeed different from home language input in TD children across family members. These findings are relevant but do not provide clear answers to the research question at hand. This study could be used as a baseline on which larger and longer studies are done in order to find out more regarding home language input in children with LI.

Structure of language use across activities at home. Language use patterns across activities showed differences between the typically developing and language impairment group. These differences are in support of the hypothesis that there are differences in language input among TD and children with LI at home. Although this study's results support the above hypothesis, further research should be done in this field.

Reading out loud had differences between the two testing groups. The language impairment group had a larger use of both languages (Cantonese and English). The typically developing group used mostly Cantonese, with ten individuals using 100% Cantonese, ten individuals using 80% Cantonese and 20% English, and one individual using 60% Cantonese and 40% English. These differences could result from parent language preference (typically developing group), instructions to use one language versus another by a professional (language

impairment group), or parents trying to fit the needs of their child's communication skills (De Houwer & Bornstein, 2016; Goldman & DeNigris, 2015).

The remaining categories that showed evidence of language difference across activities include telling stories out loud, dinner and playing with friends. These categories all showed similar patterns of use close to those seen in reading out loud. The trend across these activities was mixed English and Cantonese, with a slight emphasis in purely Cantonese use in the language impairment group. These patterns of language use could exist because caregivers are aware that their child has differences in language learning. These differences may inspire the parents to incorporate a larger variety of language use in activities such as telling stories and reading out loud. In the typically developing group, the language use across these activities was predominantly only Cantonese or mostly Cantonese with a small amount of English. The use of mostly Cantonese could be due to cultural norms practiced by the family such as speaking Cantonese at dinner. The interpersonal preferences of family language could also influence home language use (Branum-Martin et al., 2014; Duursma et al., 2007). Some pre-literacy activities, such as reading out loud, are conducted more frequently by parents as opposed to grandparents or siblings. The parent language choices for this activity would therefore impact the child's language input and development in this area. The differences between a few activities may also exist as a result of parents estimating language use for certain activities that occur during the school day which they are not present for (i.e., lunch). There are a variety of possible reasons that differences between the TD and LI group exist. Although generalizations about this data should not be made, these speculations help give way to more investigation.

Language use across activities showed differences between the LI and TD group just like language use across family members. This information is helpful in creating a general idea about language use patterns for individuals involved in this study.

Study Two

The language input patterns between one typically developing child and one child with a language impairment were in fact different in this study. These differences are not parent estimates since LENA recording devices were used. These differences in language use are reflected by real percentages of language used by the two children in this study and the adults in their lives.

The child with a language impairment received 20% of their daily language input from adults (speaking mostly Cantonese), whereas the TD child received 17% of their daily language input from adults (speaking mostly English). The percentage of language that adults use in these children's lives are somewhat similar. The difference is in the specific language, English or Cantonese, that is used. There are various reasons why this difference may exist. Perhaps parents of the child with LI changed their speaking habits or overall language as a result of professional advice (De Houwer & Bornstein, 2016). They may be using their most preferred language in order to promote a diverse language environment for their child. Adults may also be aware that child with LI 1 has a language impairment, making them change their interactions or language use with the child. The child with LI also might have been aware that this device was recording him/her. In this case, an unwillingness to speak or have conversations may have reduced the overall language output for that day. Another reason for the differences seen in study two could be error on the part of researchers coding the recordings. Each interaction has to be judged as relevant or irrelevant to the child's language input. In most cases these interactions are easy to categorize, though there are some situations in which it is not clear if an adult is talking to the child or not, leaving the research assistant or volunteer to make the judgment for themselves. The differences in language input and language output between the two participants could also be explained by the demeanor of each child. If one child is more outgoing, they will likely put

themselves in situations where discourse is more common. If another child is shy, they will likely put themselves in situations where discourse is less likely. Lastly, the child with LI could have simply been overlooked by adults, both at preschool and at home. In the preschool, there are many children that need tending to and the needs of the other children could have overshadowed the interactions of the child with LI and adults. Overall, the English skills of the child with the LI were lower compared to the TD child. This could be because of children's different ages for example, or perhaps because they are two entirely different children. It is clear that there are many different reasons that could explain the results obtained in the current study.

This study provides specific information about language input of one TD child and one child with an LI, both of which are bilingual preschoolers. This information is more reliable since it is from a recording and not from a parent report form, which can be accurate but sometimes idealistic (de Houwer & Bornstein, 2016; Marchman et al., 2016). However, the information from study two is less precise, in that the category "adults" lumped all adult individuals in the children's lives together. This could have influenced the results depicted study two. In future research, longitudinal data, and perhaps longer recordings, would be beneficial in seeing patterns of language use over time. This would provide more opportunities in which differences in language use are observed between preschool bilingual children with a language impairment and their caregivers. Although I found patterned differences in my studies, it raises the question: Do parents speaking English at home make it look like their children have a language impairment or do the parents perceive language impairment and then change their language use patterns? The current data set cannot answer this question and more data is needed. Perhaps other data could show other aspects of the child's language characteristic such as processing and speaking rate.

Limitations

Parent Questionnaires

The use of parent questionnaires provided this study with detailed information about language use across family members and across activities at home. This method of data collection is used in many studies and is cost effective (Branum-Martin et al., 2014; de Houwer & Bornstein, 2016; Duursma et al., 2007; Goldman & DeNegris, 2015; Kohnert, 2010; Marchman et al., 2016; Vagh et al., 2009). Parent questionnaires also provide a reliable source of information about amounts of L1 and L2 use at home since parents are consistently part of the home language environment. However, parent reports can sometimes be idealized which can affect the accuracy of the data (de Houwer & Bornstein, 2016; Marchman et al., 2016). Some parents may feel pressured to answer in a way that fulfills the study's "expectations" or ideas about rating scales may differ across caregivers (Cheung, 2014). Despite these consequences, the use of parent questionnaires provided detailed information about home language use that made study one possible.

Audio Recording Devices

LENA recording devices provided spontaneous language samples over a long period of time for the participants involved in study two. These audio recording devices are easy to use, highly portable, and the files are easy to download. One drawback of this device is that there is no visual accompaniment to the recording, leaving volunteers to distinguish between speakers based on auditory cues alone (Cheung, 2015). The vibrant environment of preschool classrooms and home environments added difficulty in distinguishing between speakers in some cases during coding. This limitation leaves room for variability across volunteer coding and general error of coding. Although this data is captured in natural language environments, information across speakers and activities is not as specific as parent report forms. For example, there were

not distinguished categories of adults like there were in the parent questionnaires. Questionnaires provided different adult categories such as mother, father, grandmother, and grandfather. In the LENA recordings, these individuals (in addition to teachers and teacher's aides) were lumped into one category: adults. The presence of the LENA device at the time of recording may also have affected the outcome of results. Adults or participants that were aware of the recording device may have felt uncomfortable and therefore changed their speaking habits.

Both parent questionnaires and audio recording devices have positive and negative aspects associated with them. Using parent questionnaires and LENA devices in tandem provides detailed information about home language use as well as spontaneous language use in natural environments.

Conclusion and Clinical Implications

In summary, the data in study one suggested that mostly Cantonese was used among both the language impairment and typically developing groups. However, the language impairment group incorporated some English into their language use. Mothers and fathers in the language impairment group were found to have different patterns of speaking than those in the typically developing group. There were also differences in language use between the two groups in activities such as reading out loud, telling stories out loud, breakfast, dinner, and playing with friends. These results proved to be very interesting, though specific reasons for these differences in each case are unclear.

In study two, the overall findings were that the amount of adult language input across one bilingual preschool child with a language impairment and one that was typically developing were very similar. The differences ended up being about the specific language used, and the amount of language used by the children. The child with LI and caregivers spoke more Cantonese than English, whereas the TD child and caregivers spoke more English. The typically developing

child had a larger amount of language output than the language impaired child. The TD child's English skills also seemed to be more evolved. Specific reasons for the results in study two are unknown, though speculations such as differences in age or personal language preference can help give possible insight to these differences.

The clinical implications of these studies are as follows: If a family has a child with a language impairment, using L2 (English) is not highly recommended because Cantonese is used most in the home environment. This happens to be the primary language of many caregivers in this study, indicated by the questionnaire data. Caregivers of children with an LI should work to create an environment rich in linguistic interaction. Engaging more with children that have an LI provides opportunities for them to develop their language skills, despite this difference from their typically developing peers. Caregivers should also engage the child in the language that they (the parents) are most comfortable speaking. Child directed speech is a vital component of child language development. The more language input a child receives, the better.

In future studies involving bilingual preschool children and their language input, longitudinal data would provide more information over a greater period of time. This could enhance the validity and accuracy of findings. Longitudinal studies may also prove to be more helpful if generalizations are to be made about the results of the study. In future studies, similar to the second study in this paper, age matching peers would also make child comparisons more accurate. Audio recordings longer in length and more specific to individuals speaking would enhance the results of studies similar to study two. In addition, recordings from multiple days, as opposed to just one day, would be preferable. There are many aspects of study one and two that could be enhanced in future studies. Given that adequate time and materials are provided, future studies with the above enhancements could pave the way for research regarding language input in bilingual children with language impairments.

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