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Mandarin Morphosyntax Development in Bilingual Mandarin-English Children with and Without SLI

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Mandarin Morphosyntax Development in Bilingual Mandarin-English Children with and Without SLI

by

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Dedication

This thesis is dedicated to my beloved family: my father Jibao Du who encouraged me to pursue my passion as a speech language pathologist, my mother Xianhua Cao who bravely gave birth to my bilingual Mandarin-English sister at 47 years old of age, and my sister Anna Du who inspired and motivated me to continue my research on bilingual children. I would also like to show my gratitude to my fellow colleagues, the faculty and staff in the Communication Sciences and Disorders department at UT Austin who supported me with invaluable knowledge and skills throughout the two years of my graduate program.

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Abstract

Mandarin Morphosyntax Development in Bilingual Mandarin-English Children with and Without SLI

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Over the past decade, there have been diverse theoretical perspectives and increasing empirical literature on bilingualism and specific language impairment (SLI), some of which highlighted the complex nature of accurately diagnosing SLI in bilingual populations. The goal of the current study is to enhance our understanding of morphosyntax development in an understudied bilingual population - Mandarin-English children who are growing up in an L2-dominant environment (English) in the United States. The study included a total of 55 bilingual Mandarin-English children between the ages of four and seven years, including 53 typically developing (TD) children and 2 children diagnosed with SLI. Using a newly developed screening test - the Bilingual English-Mandarin Oral Screener (BEMOS), we compared Mandarin performance in both TD and SLI children on 7 morphosyntax tasks which respectively measure passive -bei,

possessive -de, prepositional phrases, noun classifiers, quantifier and scope, aspects (imperfective "-zai" and perfective "-le"), and sentence repetition. Our analysis of TD bilingual children revealed a trend towards a significant age effect in the total score and a near-significant effect in the preposition and the aspect sub-sections of the screener. When age was considered, perceived Mandarin proficiency by parents was associated with TD bilingual children's performance. All students performed poorly on the classifier section, but our error analysis showed a predominant response pattern of imitation, suggesting bilingual children have growing sensitivity and are attentive to semantic similarity of nouns. Overgeneralized use of the general classifier "ge" was also observed in the errors. Both children with SLI scored lower overall compared to their age- and gender-matched TD peers, especially in the classifier and quantifier & scope sections. Reliable clinical markers were not identified due to the two SLI children's distinct performance. Clinical implications and future research needs were also discussed.

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INTRODUCTION

ACQUISITION OF MOROPHOSYNTAX KNOWLEDGE AMONG BILINGUALS

Researchers have attempted to understand bilingual language development from many theoretical perspectives. From a constructivist point of view, Gathercole (2007) proposed that when hearing input from different languages in different contexts, a bilingual child built up two separate networks or systems during second language acquisition compared to a monolingual child. Based on a study examining English-Spanish bilinguals in Miami and English-Welsh bilinguals in North Wales, the researcher argued that morphosyntactic differences across two groups were more pronounced at younger ages than at older ages. The more input a child has, the more likely he or she is to develop a given structure earlier. Bedore and Peña (2008) further proposed that knowledge in one language influences morphosyntactic production in the other, resulting in different rate and order of acquisition for specific structures. Regardless of the language children are learning, by about age 5, they should have a well-established foundation in the morphological and syntactic rule systems.

The ability to manipulate morphosyntactic structures with correct lexical-semantic choices demonstrates a child's ability to convey communication intent. Bohman et al. (2010) assessed the factors that contribute to Spanish and English language semantic and morphosyntactic development among 757 Hispanic prekindergarten and kindergarten-age children. They used a screening test called Bilingual English-Spanish Oral Screener (BESOS), and revealed several factors associated with building knowledge including age, parent education, input/output, free and reduced lunch, and school district - which may be

regarded as proxy for socioeconomic status. Results also showed that morphosyntax development relied on both input and output. Thus, in order to correctly assess bilingual language development, researchers must disentangle normal language variation in bilingual individuals in order to further determine patterns of language impairment (Bedore & Peña, 2008).

CHALLENGES IN ASSESSING BILINGUAL CHILDREN WITH SLI

Language impairment can be defined as "the inability to learn language as manifested by deficits in expressive and or receptive language skills relative to age-matched peers who have comparable language exposure" (Bedore & Peña, 2008). Specific language impairment (SLI) is another commonly used term in the language impairment literature (Leonard, 1998). This diagnostic label emphasizes the fact that affected children usually have intact sensory abilities, neurological functions, and nonverbal cognitive skills; hence their impairment is specific to language development. SLI is manifested at different levels of linguistic processing. Previous studies across languages have reported areas of deficits such as delayed or impaired morphophonological and prosodic processes, delays in acquisition of words and word retrieval, difficulties with morphosyntactic representations and syntactic structures, as well as deficits in certain narrative, discourse, and pragmatic skills (Armon-Lotem, 2012, 2014). With the rising number of children being raised bilingually in the United States, researchers, educators and practitioners face a diagnostic dilemma in accurately assessing bilingual children with SLI. Theoretically, accounts for SLI fall into two categories: 1) linguistically based accounts, which assume that children with LI are unable to formulate

specific aspects of the grammar of their native language due to generalized delays in language development, and 2) processing-based accounts, which assume that these children have language learning difficulties because they process linguistic information (auditory and/or visual) less efficiently than their TD peers (Bedore & Peña, 2008). Challenges in assessment also lie in the two by two experiment design that is necessary to compare four different possible groups of children: bilingual and monolingual with typical language development (TLD) and with SLI (Armon-Lotem, 2012).

The majority of the current bilingual studies focused on aspects of morphosyntactic representation as a key direction of research. Kohnert and Ebert (2010) suggested looking beyond the level of morphosyntax when differentiating bilinguals with and without SLI. First, previous studies comparing grammatical skills in typically developing (TD) L2 learners to monolingual speakers with SLI showed far more similarities than differences in both type and number of morphosyntactic errors. Armon-Lotem (2014) further specified that the errors in bilinguals' linguistic production might reflect both (partial) transfer from their L1 during grammatical development, as well as a competition between two representations of L1 and L2. Second, Kohnert and Ebert (2010) reported that SLI-like deficits on morphosyntactic tasks has been simulated in TD monolingual children and in adult L2 learners by increasing general cognitive processing demands. In other words, both linguistic manifestation and levels of cognitive processing levels needed to be considered. Third, Kohnert and Ebert also pointed out that morphosyntax might not be as severely affected in children with SLI in all inflected languages.

Given the aforementioned challenges, developing a test that can best assess a child's linguistic ability in a given content area is crucially important. Tests with high sensitivity and specificity can reduce the high frequency of bilingual children being misdiagnosed with SLI (Crocker & Algina, 2006; Komeili & Marshall, 2013). The primary purpose of the present study was to investigate the utility of the Mandarin subtest of a preliminary screening test, the Bilingual English Mandarin Oral Screener (BEMOS) and its specificity in differentiating between bilingual Mandarin-English children with typical development and with SLI.

DEVELOPMENT OF BILINGUAL ENGLISH-MANDARIN ORAL SCREENER (BEMOS)

In designing assessment activities, both the morphosyntactic structures to be assessed and the nature of the task need to be considered (Bedore, 2001). The present study aimed to assess bilingual Mandarin-English children, a rapidly increasing population in North America (Sheng, Lu, & Kan, 2011). Based on previous research, the BEMOS included tasks measuring eight morphosyntactic structures in Mandarin: passive -bei (be), possessive -de ('s), prepositional phrases, noun classifiers, quantifier and scope, aspects (imperfective "-zai" and perfective "-le"), relative clauses, and sentence repetition. The relative clause section was included in the test battery but excluded from the current analysis, due to difficulties in scoring. We reviewed each morphosyntax structure and the associated literature below.

1) Passives –bei (be/get)

Previous literature suggested English-speaking children with SLI have difficulty

with passives due to the following three factors: a) the noncanonical patient-verb-agent word order of passive sentences, b) verb morphology of "ed", and c) means by which the noncanonical word order might occur, such as the linguistic operations required in sentences with *get*-passives. Paradis & Crago (2000) compared morphosyntactic skills among three groups including French-speaking children with SLI (n=10), monolingual TD French-speaking children (n=10), and English-speaking children learning French as a second language (n=15). The results showed that tense-marking difficulty was too broad a category for an effective clinical marker, when assessing both monolingual and bilingual children in the bilingual children's L2**.** Unlike English and French, Chinese languages such as Mandarin and Cantonese do not employ tense or agreement. The same verb form is used for both active and passive sentences. The most important passive marker in Chinese is "bei", which functions like "be/get" plus past participle in English passives (Xiao et al., 2006). Leonard et al. (2005) investigated a group of 36 TD monolingual English-speaking children who served as age or Mean Length of Utterance (MLU) matches for 18 children with SLI (11 boys, 7 girls, average age 4;0-6;6) and another group of 30 TD monolingual Cantonese-speaking children who served as age or MLU matches for 15 children with SLI (12 boys, 3 girls, average age 4:2-6:8) using a past tense sentence elicitation task. For 16 test items, participants were required to provide passive participle inflection -ed and -(en). Researchers concluded that the differences between children with SLI and their TD peers in the use of passive sentences were not the same across Cantonese and English. The findings for Cantonese showed no differences between the SLI and TD groups that were matched in MLU; whereas in

English, the children with SLI were less proficient in using grammatically accurate passive forms containing a by-phrase, than TD children who were age-matched and MLU-matched. Guo and Chow (2013) further explored passive constructions in Mandarin by illustrating how Mandarin "bei" passives have evolved diachronically with possible respect to English. Based on 3,414 tokens of passive constructions in Chinese linguistic history, the findings revealed a cross-linguistic contact might have contributed to the grammaticalization of the morpheme "bei" as well as the process of passivization in Mandarin Chinese. Because Mandarin passive structure is complex and distinctly different from English, the present study soughted to include passive -bei.

2) Possessive –de ('s)

In Mandarin, complex relational noun phrases include a possessive -de as an associative marker attached to the 'possessor' in order to link the 'possessed'. The same particle -de also carries a heavy grammatical load in Mandarin, and can be used in several other major grammatical roles to form 'left-branching' relative clauses, attributive adjectival modification, and both 'situational cleft' and equational, pseudocleft sentences (Thompson & Chappell, 1992). Single case studies on pronominal systems among bilingual Mandarin-English children reported that the Mandarin possessive marker -de was never transferred to be used in occurrence with English nominative pronouns, nor were English pronominal form and function mapping features ever transferred to Mandarin (Qi, 2010). These findings further warrant the need to assess possessive –de among bilingual Mandarin-English children with and without SLI because of the grammatical importance of possessives and the lack of direct cross-linguistic transfer of

this structure between Mandarin and English.

3) Prepositional Phrase

Prepositions have been widely studied across different bilinguals, and different types and numbers of errors have been reported among bilinguals and monolinguals with SLI. Linguistically, prepositions may not only contribute to the meaning of the sentence (e.g., locatives, directionals, temporals) but also serve a grammatical function of case assignment. Using sentence completion and sentence repetition tasks, Armon-Lotem (2014) compared 25 Russian-Hebrew TD bilingual children from age 5 to 7, 11 English-Hebrew TD children, and 7 Hebrew-speaking children with SLI, also explored two types of errors – omissions and substitutions – for both TD bilingual children and monolingual children with SLI. The study reported that the two populations - Hebrew-speaking monolingual children with SLI and TD bilingual Russian-Hebrew children - were clearly distinguished both by the quantity and the type of errors. TD bilingual children had substitution errors that were believed to be motivated by the their L1 Russian, whereas monolingual children with SLI made more omission errors involving whole morpheme or feature reduction, with significantly more omission errors on restricted prepositions. Similar errors of omission made by bilingual children with SLI also were noted in other languages in TD bilingual children. Using a compound production task, Nicoladis (2002) also studied prepositions in Noun-Preposition-Noun (NPN) structures in French-English bilingual children and reported misordered French compounds and omission of prepositions. After comparing 25 French-English bilingual children to 25 English monolingual children, she indicated that bilingual children did not consider French

prepositions as meaningful elements within NPNs, nor did they take advantage of the fact that meaning was marked in morphology for French. Given the equivocal findings from previous studies, we decided to include prepositional phrases in BEMOS to further learn about how bilingual Mandarin-English children acquire prepositional phrase in L1 and how bilingual children with SLI might perform differently.

4) Noun Classifiers

In Chinese, classifiers are morphemes that precede the noun when characterizing or referring to a specific object. Classifiers are commonly used in several Asian languages but rarely used in English. Research has reported that Chinese children first learn classifiers formally as a grammatical system, but the ability to use the correct classifier for individual nouns grows as children expand their vocabulary and semantic knowledge. The reason behind this is that individuals have to pay attention to the animacy, shape, function, and many other salient conceptual aspects of the nouns prior to figuring out how classifiers categorize nouns. Nevertheless, the classifier-noun pairing is sometimes arbitrary and knowing the meaning of a noun and the meanings of a range of sortal classifiers would not necessarily allow one to select the proper classifier. As Hsu (2009) claimed, the central features in the meaning of Chinese sortal classifiers were not represented as concrete examples but as abstract prototypical images shaped and re-shaped all the time by their interaction with referents and the perspectives of humans who use them. Therefore, children need repeated exposures to different classifier-noun pairings to solidify these connections and as a result, acquisition of classifiers takes a long time.

As young as age four, Mandarin children may use half as many specific classifiers as adults. They know that a classifier is required for a noun quantified by a numeral, that it is positioned between the two; they do not omit or misorder classifiers, except for persistent overuse of the general classifier "ge" (Wei & Lee, 2001; Erbaugh, 2006). Numerical classifiers include five subtypes: 1) measure classifiers such as "里 li3" for "mile of", 2) collective classifiers describing arrangements of objects such as "叠 die2" for "a pile of", 3) kind classifiers such as "种 zhong3" for "kind of", 4) event classifiers such as "场 chang3" for "a showing of", 5) sortal classifiers such as "张 zhang1" for "a sheet of" (Cheung, 2009). Some researchers also suggested that there are only two general types of classifiers in Chinese: "sortal classifiers" and "mensural/measure classifiers" (Li et al., 2010). The difference between these two types of classifiers is that sortal classifier is used to individuate the kind of entity, whereas mensural classifier is used to individuate quantity when referring to a noun (Hsu, 2009). Sortals were also reported to be twice likely as general classifiers to appear for a first mention grammatical object (Erbaugh, 2006). Thus we focused on sortal classifiers in our classifier section of BEMOS Mandarin Morphosyntax to investigate how bilingual children acquire sortal classifiers.

Due to the complex structure and use associated with Chinese classifiers, overgeneralized usage of classifiers by semantic category has been widely reported among monolingual TD children in both Mandarin and Cantonese. It is important to note that in Chinese, approximately 40% of all nouns (e.g. large, distant or unique objects) can only take the general classifier "ge" (Erbaugh, 2006). Mandarin speakers commonly use

the general classifier "ge" in place of specific classifiers in a discourse setting, and this phenomenon is very frequent in Mandarin speaking children's early speech productions (Chang-Smith, 2010). By analyzing Cantonese data from 34 Chinese–English bilingual children aged between 5 and 16 years, Wei & Lee (2001) found that all of the bilingual children (except for the two with limited spoken Cantonese) overgeneralized "go3" (a classifier equivalent to the general classifier "ge" in Mandarin), placing it in front of nouns which required more specific classifiers. Although the productive repertoire of Cantonese classifiers among these 34 children was very limited, there was also a slow age-related progression with a larger repertoire of classifiers in older children. Erbaugh (2006) indicated that since classifier omission was 40 times more often in language-delayed Cantonese-speaking children than their age-matched peers, classifiers could be a fairly reliable symptom of language delay or disorder. However, considering the fact that many TD bilingual children overuse the general classifier, overgeneralization of "ge" should not be considered as the only marker of language delay or disorder by itself. In the present study we were interested in how bilingual Mandarin-English children may produce sortal classifiers to construct noun phrases, and if there were any overgeneralization of classifiers.

5) Quantifier and Scope

"Dou" is a Mandarin quantifier used with plural noun phrases that precede it. Researchers Zhou and Crain (2011) investigated how Mandarin-speaking children understand the quantifier "dou" using a new Question-Statement task in two studies. From 30 Mandarin-speaking children between ages of 3.5 and 4.9 years old in study 1,

researchers reported that at age four, these Mandarin-English children understood "dou" as a universal quantifier, similar to the age at which English-speaking children understood "every". From 45 Mandarin-speaking children ranging in age from 3.5 to 5.0 years old in study 2, researchers indicated that by age 4 years at least, Mandarin-speaking children analyzed "dou" as a Q-adverb with scope restriction that can bind *wh*-words. Previous studies were limited in that they either lacked control trials of sentences without "dou" or were single person case studies only (Zhou & Crain, 2011). Regardless, existing studies on Chinese L1 acquisition also suggested that monolingual children have difficulties in understanding quantifier scope.

Bilingual children have been reported to experience similar difficulties during quantifier acquisition. Wei & Lee (2001) studied conversations and narrative data from 34 TD Cantonese-English children from ages 5 to 16, and found only 17 children used some form of quantification in Cantonese. The analysis also showed that many children used avoidance strategies when expressing quantification. Researchers argued that such processing difficulties with the Cantonese quantification were due to incomplete L1 learning rather than language loss. Other researchers also addressed the needs to consider factors such as a) sociolinguistic structuring of the community surrounding bilingual children, b) social, cultural, and educational status of the individuals concerned, and c) other linguistic aspects of their two languages when assessing bilinguals using quantifiers (Wei & Lee, 2001). Knowing the challenges in assessment, we were particularly interested in finding similarities or differences in performance between our bilingual Mandarin-English children group and bilingual children in the studies done by Wei and

Lee (2001) and Zhou and Crain (2011). We also want to find out whether there is a comparable performance between our bilingual groups and the youngest 4-8 years old group in the previous studies.

6) Aspects (imperfective "-zai" and perfective "-le")

Differing from English, Mandarin and Cantonese have no temporal system or grammatical morphemes used to mark past tenses. Acquisition of temporality is not comparable to the acquisition of grammatical morphology in languages such as English or German. In the child language acquisition literature, researchers have adopted two different approaches to interpret temporality in Mandarin Chinese. The "form-oriented" approach focuses on how children acquire temporality by temporal markers such as grammatical aspect markers; the "meaning-oriented" or "concept-oriented" approach focuses on how children acquire the concept of time with or without explicit linguistic forms. Mandarin aspect markers include the perfective marker "–le", the experiential marker "–guo", the progressive/imperfective marker "-zai", and the durative marker "-zhe". There has been very little research in the acquisition of temporality by second language learners of Chinese or bilingual speakers of Chinese (Huang, 2006).

Li and Bowerman (1998) implemented a sentence-picture matching task (similar to the one used in BEMOS) to assess comprehension of aspect markers "zai, le, zhe" among 135 Mandarin children from age 4-6 (n=45 in each age group). The result showed that perfective –le has often been characterized as a marker of completion and the comprehension of aspect markers increased steadily with age. To assess the same set of aspect markers in production, 99 Mandarin children from age 3-6 were asked to describe

18 situations enacted with toys. The results indicated the imperfective marker "zai" occurred almost exclusively with atelic verbs (activities and semelfactives) while the perfective marker "–le" occurred predominantly with telic verbs (accomplishments and achievements). Researchers also concluded that from at least age three, Mandarin children almost always combine achievement verbs with "–le" and not "zai", suggesting an integration of temporal meaning into verb knowledge.

Cheung (2005) further studied the use of aspect markers in Mandarin-speaking children with SLI by an elicitation task and a standardized picture comprehension test. Cheung concluded that cross-linguistic variations in grammatical deficit in SLI children should be taken as a function of the languages being learned. His results indicated limited production in using aspect markers among Mandarin-SLI children ages six and seven. When compared with controls, the seven-year-old Mandarin-SLI children performed at a similar level compared to TD four-year-olds in most areas, with an exception in the comprehension of aspect. Therefore, children's difficulties in using aspect markers should not be considered only as a delay. Similar findings were also reported in Cantonese-speaking children with SLI. Fletcher et al. (2005) investigated the aspect marker performance in three groups of 45 Cantonese-speaking children (n = 15 in each group) composed of preschoolers with SLI, TD same-age peers, and younger TD peers. Their results indicated that children with SLI were less likely to produce both perfective and imperfective aspect markers. The present study aimed to compare the performance on aspect markers imperfective "-zai" and perfective "-le" between both bilingual children with and without SLI.

7) Sentence Repetition

Sentence repetition (SR), also referred to as "sentence recall, sentence imitation (SI)", has been widely used in standardized tools for language impairment assessments such as the Clinical Evaluation of Language Fundamentals-Revised (CELF-R), Test of Language Development-Primary (TOLD-P) as well as in general ability assessments (Stokes et al., 2006). SR has also been proposed as one of the best clinical marker of SLI, but other studies also have revealed that SR tasks did not distinguish children with SLI from other language impairments or attention deficit/hyperactivity disorder (Stokes et al., 2006).

Stokes and colleagues (2006) investigated how nonword repetition (NWR) and sentence repetition (SR) tasks could be used to discriminate between monolingual Cantonese children with SLI and their TD peers who are age-matched or younger. They designed two sentence types (8 with subject, verb, aspect, object; 8 with passive "bei", agent NP + V) and recruited 14 Cantonese-speaking children with SLI, 30 TD peers who were age-matched or language-matched. The experiment used a scoring system that awarded points to only correct responses. The results were proved to be effective in diffentiating children with and without SLI. Researchers further concluded that SR has the potential to be a useful clinical marker of SLI in Cantonese.

Study by Komeili and Marshall (2013) focused on comparing overall repetition accuracy and error patterns in sentence repetition tasks between monolingual and bilingual children. A total of 18 monolingual English children (mean age = 8;8) and 18 Farsi-English bilingual children (mean age = 8;2) were assessed using 8 different

sentence types from the School-Age Sentence Imitation Test-English 32 (SASIT-E32). Researchers found that when receptive vocabulary scores were taken into account, there was no group difference between monolingual and bilingual children on overall sentence repetition accuracy. Bilingual children and monolingual children showed no significant difference in repetition accuracy between content and function word. Differing from monolingual children, bilingual children did produce more substitution and addition errors on function words compared to content words. This may put TD bilingual children at risk for being misdiagnosed as SLI, considering the fact that the most characteristic error in SLI is omission of function words.

Thordardottir and Brandeker (2012) designed two studies using SR to assess bilingual French-English children. Study 1 assessed 5-year-old children including 16 monolingual English children, 19 monolingual French children, and 49 bilingual French-English children, in order to study the effect of the amount of bilingual exposure on performance of nonword repetition (NWR) and sentence imitation (SI). All children were tested using both a French adaptation and an English version of the Recalling Sentences in Context subtest of the CELF-Preschool (CELF-P). Study 2 aimed to study the diagnostic accuracy of the French version among 4 groups of French-English bilingual children with SLI, French-English bilingual TD children, French-speaking monolingual children with SLI, and French-speaking monolingual TD children (n=14 per group). Results indicated that bilingual children performed differently than children with SLI on NWR and SI. In the present study, we used three sentence repetition items to assess how bilingual Mandarin-English recall different elements in these target sentences.

PRESENT STUDY

In summary, the purpose of this study was to investigate the development of Mandarin morphosyntax among bilingual Mandarin-English children from ages 4 to 7. To test the aforementioned structures, an oral language screener - Bilingual English-Mandarin Oral Screener (BEMOS) - was developed and implemented. The BEMOS contains four subtests: Mandarin semantics, English semantics, Mandarin morphosyntax, and English morphosyntax. In this study, we focused on the Mandarin morphosyntax subset and sought to address the following research questions:

(a) How do background factors such as age, gender, language use, and proficiency affect typically developing (TD) bilingual children's performance on BESOS Mandarin morphosyntax section?

(b) How will bilingual children with specific language impairment (SLI) perform similarly or differently compared to TD bilingual children in terms of total score and section score?

(c) What are potential clinical markers that distinguish bilingual children with SLI from bilingual TD peers who are age-matched?

METHODS

PARTICIPANTS

Fifty-five bilingual Mandarin-English children (29 boys, 26 girls) between ages 4;2 (years; months) to 7;7 participated in the study. Twenty-five children were between the ages of 4 and 5 (the younger group) and 30 children were between the ages of 6 and 7 (the older group). Among all 55 children, 53 children had no history of speech and language impairment, and 2 boys (from the younger group) were diagnosed with SLI. All children resided in Austin, TX at the time of testing, and were raised in families where both parents were native speakers of Mandarin. All children were tested by researchers and graduate students affiliated with the Language Learning and Bilingualism Laboratory at the Department of Communication Science & Disorders at the University of Texas at Austin. To obtain demographic information, caregivers (a parent) were required to fill out a questionnaire (Appendix A) that asks them to rate children's oral language proficiency in the areas of vocabulary, grammar, sentence length, speech pronunciation, and listening comprehension using a five-point scale (1 = low proficiency, 5 = high proficiency). Scores in these five domains were averaged for each child to derive an overall oral proficiency rating. Each question on the questionnaire was printed in both English and Mandarin Chinese to facilitate the parents' understanding. Information about individual participants' age, gender, language use, averaged language proficiency rating, and calculated language dominance (based on reported language use) were presented in Table 1.

Table 1. *Participant Characteristics*

Participant	Age (Month)	Gender	English Use (%)	Mandarin Use (%)	English Proficie-ncy	Mandarin Proficienc-y	Language Dominance
1	81	F	0.64	0.36	5	4	B
2	55	M	0.64	0.36	4.25	3.75	B
3	59	F	0.45	0.55	4.5	4.5	B
4	87	M	0.64	0.36	5	4	B
5	68	M	0.47	0.53	4	4	B
6	63	F	0.49	0.51	2.75	4.75	B
7*	62	M	0.41	0.59	2.5	3.5	B
8*	50	M	0.33	0.67	2.25	4.5	B
9	79	F	0.53	0.47	4	4	B
10**	73	M	0.83	0.17	4.75	4	E
11	74	M	0.53	0.47	4.25	4	B
12**	82	M	0.8	0.2	4.5	3.75	E
13	71	F	0.77	0.23	4.5	3	B
14	75	M	0.49	0.51	4.25	4.5	B
15	61	M	0.61	0.39	3.25	5	B
16	90	F	0.69	0.31	4.25	2	B
17	83	M	0.73	0.27	5	4.75	B

Table 1 (Continued)

18	**70**	**M**	**0.68**	**0.32**	**4.25**	**4.25**	**B**
19	81	F	0.6	0.4	5	3.75	B
20	81	F	0.57	0.43	4.5	4	B
21	70	F	0.75	0.25	4.75	3.75	B
22	71	F	0.53	0.47	4.5	4.25	B
23	63	M	0.64	0.36	4.5	3.75	B
24	78	F	0.78	0.22	4.75	3	B
25***	78	F	0.78	0.22	5	4	B
26**	73	M	0.89	0.11	4.25	3	E
27	51	F	0.61	0.39	4	3.5	B
28	80	F	0.73	0.27	4.75	3.75	B
29	61	F	0.66	0.34	4.25	4.25	B
30	78	F	0.72	0.28	5	4	B
31**	78	M	0.82	0.18	5	3.25	E
32	82	M	0.71	0.29	4.25	3.5	B
33	65	F	0.61	0.39	4.5	4	B
34	77	M	0.51	0.49	3.75	4.5	B
35	91	M	0.77	0.23	5	3.25	B
36	75	M	0.59	0.41	4.33	4.75	B
37	78	F	0.61	0.39	3.75	3.75	B

Table 1 (Continued)

38	62	F	0.21	0.79	3.5	3.25	B
39**	89	M	0.89	0.11	4.25	3	E
40	67	F	0.62	0.38	3.75	3.75	B
41	86	M	0.37	0.63	3.75	5	B
42	61	F	0.52	0.48	4.5	4.25	B
43	78	M	0.57	0.43	4.75	4.5	B
44	71	F	0.54	0.46	3.5	4	B
45	90	F	0.72	0.28	4.25	3.25	B
46	65	M	0.3	0.7	2.33	4.25	B
47	67	M	0.68	0.32	3.75	4	B
48***	50	F	0.68	0.32	2.75	3.25	B
49	84	F	0.46	0.54	4.5	4.25	B
50	55	M	0.35	0.65	3.75	3.5	B
51	74	M	0.46	0.54	4	4.75	B
52**	59	M	0.19	0.81	4	5	M
53	84	M	0.42	0.58	4.75	4.75	B
54	55	F	0.52	0.48	3.5	4.75	B
55	83	M	0.59	0.41	4.6	4.6	B

**Children with SLI. **Children who were either English-dominant or Mandarin-dominant. ***Low performing Children. Note: Children were arranged according to the order being assessed. Both language use and proficiency ratings (averaged based on* five domains using *a five-point scale: 1 = low proficiency, 5 = high proficiency) were*

reported from parents. All children acquired Mandarin as a first language (from birth) in the home or in China. B= bilingual (at least 20% use for each language); E=English dominant (>=80% English use); M= Mandarin dominant (>=80% Mandarin use).

For the purpose of this study, six typically developed (TD) bilingual children whose language dominance was calculated as either Mandarin- or English-dominant (using our algorithm) were excluded from our 53 TD bilingual children participant samples. Two TD bilingual children who were considered as low-performers (scoring below 20 points out of 72 total points) were also excluded, due to their inability to complete the entire screener. The remaining 45 TD bilingual children were first grouped into 2 age groups: the younger group (48-71 months) and the older group (72 month and above). These two age groups were further divided into four gender groups: young male, young female, old male, and old female. Demographic information for all 4 groups was shown in Table 2.

Table 2. *Demographic Information of Four Groups of Bilingual TD Children*

	Young Male (n=8)	Young Female (n=13)	Old Male (n=13)	Old Female (n=11)
Mean Age (month)	63	63.6	80.7	81.8
Age Range (month)	55-70	51-71	74-91	78-90
% of Mandarin Use	0.45	0.44	0.43	0.36
% of English Use	0.55	0.56	0.57	0.64
Mandarin Proficiency Rating	4.1	4.0	4.4	3.7
English Proficiency Rating	3.8	4.0	4.4	4.5

STIMULI AND PROCEDURE

The newly developed Bilingual English-Mandarin Oral Screener (BEMOS) aimed to elicit production of morphosyntax structures through black-and-white and colored line drawings. The BEMOS (Mandarin) included 7 sections of 30 test items total: 3 passive items, 3 possessive items, 2 prepositional phrase, 6 noun classifiers, 5 quantifier and scope items, 4 aspect items, 4 relative clauses, and 3 sentence repetition items. Target items for each section and associated stimuli were presented in Appendix B. For the purpose of this paper, relative clause items were administered but excluded from the

analysis due to difficulties in scoring. All morphosyntax structures in the screener were previously studied among bilingual children with and/or without SLI, as described in the introduction. Participating children were individually administered the BEMOS Mandarin morphosyntax screener at their home by trained graduate students and researchers whose native language is Mandarin.

During testing, participants were asked to provide verbal responses to picture stimuli shown on an iPad device or a personal computer (PC) screen. For most items that required a verbal response, two pictures were presented simultaneously on the screen. The examiner pointed to the picture and verbally modeled the target structure with a sentence or phrase, and then pointed to the picture on the right and invited the child to finish her sentence with a response that would go with the picture. Each section began with two practice items to help familiarize the participant with the structure and instruction. For every question answered, participants were praised with neutral verbal reinforcement such as “nice work, nice try, you worked hard” in Mandarin. Participants were asked to answer all items with no more than three times of prompting. There was no discontinuation point or ceiling for this screener. Data collection for both children’s testing sessions and parental interview sessions were recorded in writing on the testing form and audiotaped for data entry later.

During testing sessions, caregivers (a parent) were asked to complete a background questionnaire including questions for demographic background, language environment, and child proficiency rating (vocabulary, speech, sentence length, grammar, comprehension). A face-to-face interview was conducted with the parent(s) to document

the child's hour-by-hour language use. Parents were asked to describe their child's typical weekday and weekend schedule, including activities the child participated in, people the child may interact with, and language used with conversational partner(s). Using a built-in formula on an excel spreadsheet, the child's percentage of input (amount of time hearing a language) and output (amount of time speaking a language) were calculated. Both the questionnaire and interview have been widely used in previous studies among bilingual children to best capture a child's language profile (based on Gutiérrez-Clellen & Kreiter, 2003; and Restrepo, 1998).

CODING AND SCORING

All responses were recorded verbatim during testing as either correct or incorrect, and audiotaped for later transcription. Children's responses to each of the 30 items were examined to ensure that they were scorable. Both coding of participant background data and scoring of responses were done in a spreadsheet file. It included the following characteristics of each participant: birthday, age (by month), gender, language use (by hour), language proficiency rating. Parents' information was collected including both mother's and father's occupation and language proficiency. In all sections except the section on grammatical aspect, participants received 1 point for a correct response, and 0 point for a wrong or "don't know" response. For the aspect section, correct responses received 2 points, partially correct responses received 1 points, and wrong or no response received 0 points. Scoring rubric for the revised sections was attached in Appendix C.

RESULTS

BILINGUAL TD CHILDREN'S TOTAL AND SECTION SCORE

The first analysis dealt with the question of whether typically developing (TD) bilingual children's performance was affected by age and gender in terms of total score on the BEMOS Mandarin morphosyntax screener. We compared the average total scores among all four groups using a two way analysis of variance (ANOVA) with age and gender as the independent variables. The results showed that the age effect was approaching significance, $F(1, 41) = 3.43$, $p = .07$. The effect of gender and the interaction between age and gender were not significant, $p > .20$. As seen in Figure 1, the older groups achieved higher score on this screener than the younger groups when males and females were collapsed, but this difference did not reach statistical significance.

Table 3. *BEMOS Mandarin Morphosyntax Mean of Total Score*

	Young Male	Young Female	Old Male	Old Female
Mean of Total Score	50.25	51.08	56.15	53.18
S.D. of Total Score	0.15	0.14	0.12	0.10
C.I. of Total Scores	4.87	3.01	5.06	3.33

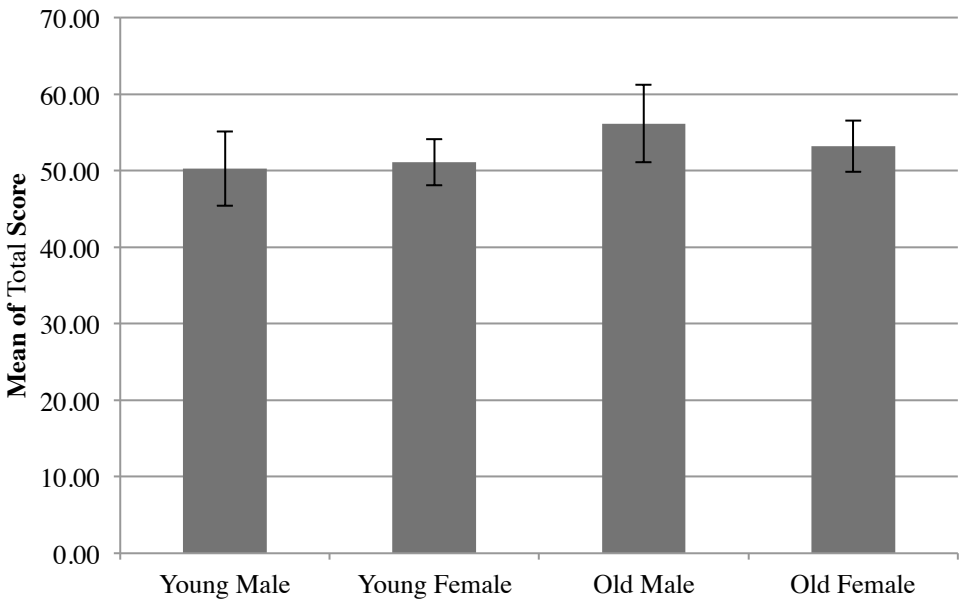
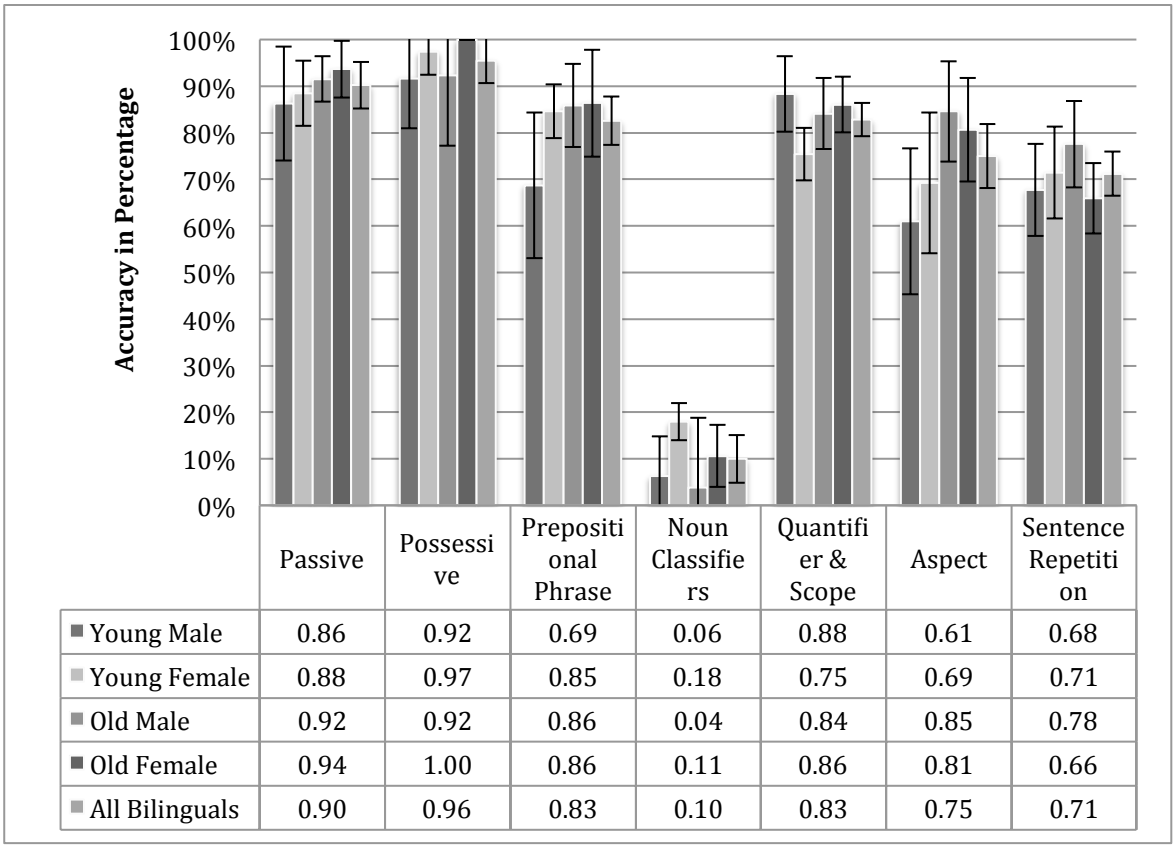


Figure 1. Average BEMOS Mandarin Morphosyntax Total Score (Total Score = 72 points)

The second set of analyses dealt with the question of whether the four groups may score differently within each section of BEMOS Mandarin Morphosyntax. Mean scores for all sections of the screener for the four groups of bilingual TD children were shown in Table 4. As viewed in Figure 2, when the confidence intervals of the means were considered, there was large between group overlap on the sections targeting passive, possessive, and sentence repetition skills. Therefore, we performed ANOVA on prepositional phrase, classifier, quantifier and scope, and aspect sections only to explore possible age and gender effects. For the preposition section, the age effect approached significance, $F(1,41) = 3.30$, $p = .08$. For the quantifier section, there was a significant interaction between age and gender, $F(1,41) = 4.31$, $p = .04$, with males performing better than females for the younger groups, but this gender difference was not seen in the

older groups. For the aspect section, there was a significant age effect, F (1,41) = 6.48, p = .01, with the older groups performing higher than the younger groups. To summarize, TD bilingual children performed well on all sections with the average accuracy level exceeding 60% for all groups and all sections with the exception of noun classifiers, which appeared to be difficult for all groups. Age effect was seen for the aspect section and to some extent, also seen for the prepositional phrase section. Gender effect was seen for the quantifier section for the younger children only. However, this age by gender interaction should not be over-interpreted given the small sample size and the lack of gender differences in the other sections.



	Passive	Possessive	Prepositional Phrase	Noun Classifiers	Quantifier & Scope	Aspect	Sentence Repetition
Young Male	0.86	0.92	0.69	0.06	0.88	0.61	0.68
Young Female	0.88	0.97	0.85	0.18	0.75	0.69	0.71
Old Male	0.92	0.92	0.86	0.04	0.84	0.85	0.78
Old Female	0.94	1.00	0.86	0.11	0.86	0.81	0.66
All Bilinguals	0.90	0.96	0.83	0.10	0.83	0.75	0.71

Figure 2. BEMOS Mandarin Morphosyntax Individual Section Accuracy Score

CORRELATIONAL ANALYSIS: TOTAL SCORE VS. MANDARIN USE AND PROFICIENCY

We examined the data to determine whether bilingual TD children's Mandarin morphosyntax development is related to their Mandarin use and proficiency as reported by parents. We first ran a correlation between age in months and children's total score. This correlation was significant, $r = .37$, $r^2 = .14$, $p = .013$. We then conducted partial correlations between background factors (Mandarin use, Mandarin proficiency) and performance while factoring out the effect age. The results showed that once age was factored out, Mandarin use and total score were not correlated, $r = .04$. The correlation between Mandarin proficiency and total score were approaching significance, $r = .26$, $r^2 = .07$, $p = .09$. These patterns are illustrated in Figure 3 and Figure 4.

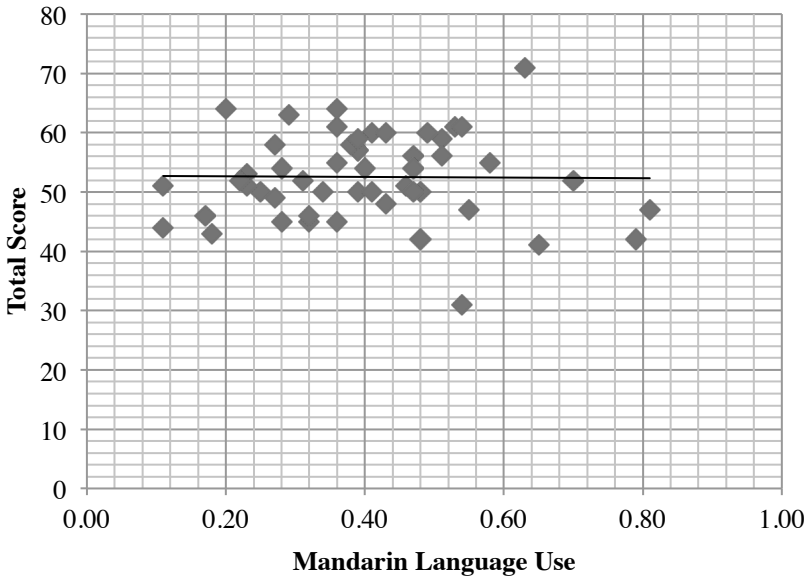


Figure 3. Total Score Correlation with Mandarin Use in Four Groups

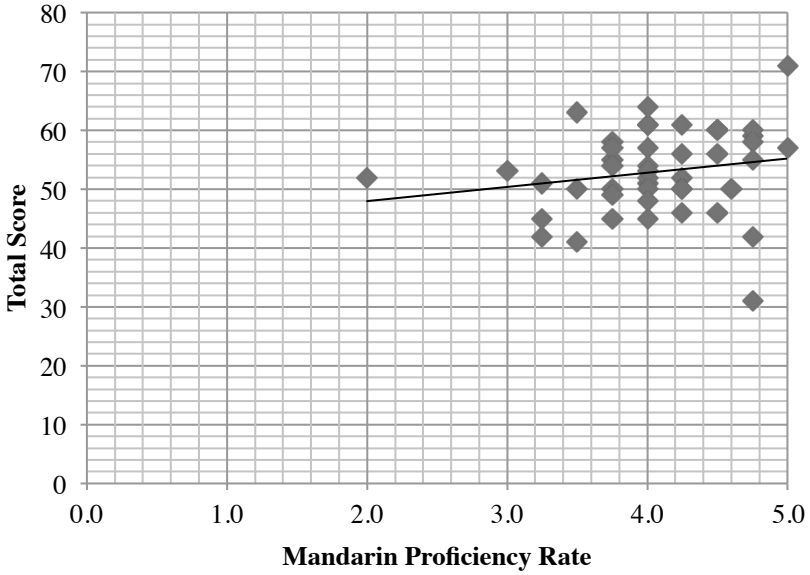


Figure 4. Total Score Correlation with Mandarin Proficiency Rate in Four Groups

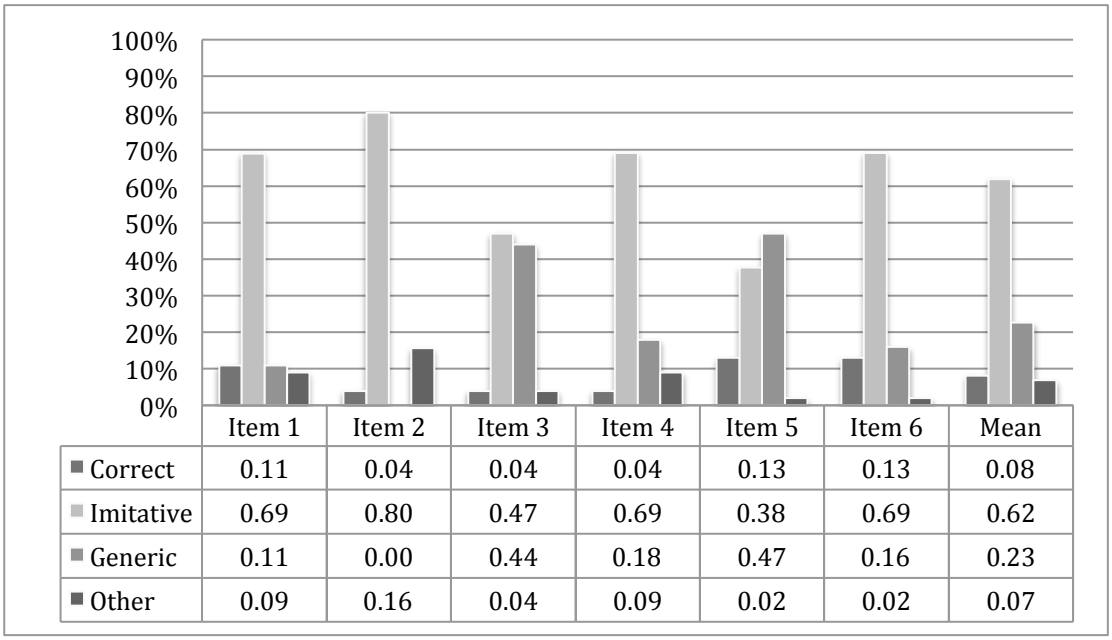
ERROR ANALYSIS: CLASSIFIER

An error analysis was conducted for the classifier section in order to better understand the low performance of bilingual TD children on this section. Table 4 lists all six classifiers targeted in this section and the accompanying classifiers modeled by the examiner. All six items were sortal classifiers. As seen in Table 4, for each item, the nouns denoted by the model and the target classifiers always belonged to the same semantic category but they required different classifiers. Since sortal classifiers are morphemes used to specify nouns, they do not have direct translation equivalents in non-classifier languages such as English.

Table 4. *Classifier Section: Examiners' Model Classifiers and Participants' Target Classifiers*

Items	**Semantic Category**	**Model Classifier (CL)**	**Target Classifier (CL)**
Item 1	Animals	zhi1 [只]: classify animals yi zhi mao one $CL_{只}$ cat 'a cat'	tou2 [头]: classify animals yi tou niu one $CL_{头}$ cow 'a cow'
Item 2	Fruits	ge3 [个]: generic classifier liang ge pingguo two $CL_{个}$ apples 'two apples'	gen1 [根]: rigid oblong objects liang gen xiangjiao two $CL_{根}$ bananas 'two bananas'
Item 3	Transportations	liang4 [辆]: classify vehicles liang liang qiche two $CL_{辆}$ cars 'two cars'	jia4 [架]: classify other transportations liang jia feiji two $CL_{架}$ airplanes 'two airplanes'
Item 4	Clothing	jian4 [件]: classify clothes san jian yifu three $CL_{件}$ clothes 'three pieces of clothing'	tiao2 [条]: classify branch-like objects san tiao kuzi three $CL_{条}$ pants 'three pairs of pants'
Item 5	Object with flat surface	zhang1 [张]: sheet of yi zhang xiangpian one $CL_{张}$ photo 'a photo'	ben3 [本]: classify book yi ben shu one $CL_{本}$ book 'a book'
Item 6	Liquid	bei1 [杯]: cup of liang bei kafei two $CL_{杯}$ coffee 'two cups of coffee'	ping2 [瓶]: bottle of liang ping shui two $CL_{瓶}$ water 'two bottles of water'

We assigned four different codes to children's responses: correct – when participants answered with the target response), imitated - when participants used the classifier modeled by the examiner, generic – when participants used the general classifier "ge" to replace the more specific target classifier, and other – when participants produced a wrong response that cannot be categorized into the previous groups). As shown in Figure 5, our result showed that imitated responses were the predominant response type for 4 out of 6 items (Item 1, Item 2, Item 4, and Item 6), making it the most common response when averaged across the entire section. The generic classifier "ge" was used more than 40% of the time in 2 out of 6 items (Item 3 and Item 5). For Item 5 - 'a book', 47% of children used the generic classifier "ge4", making it the most common response type for this item. Finally, none of the children made classifier omission errors across all items.

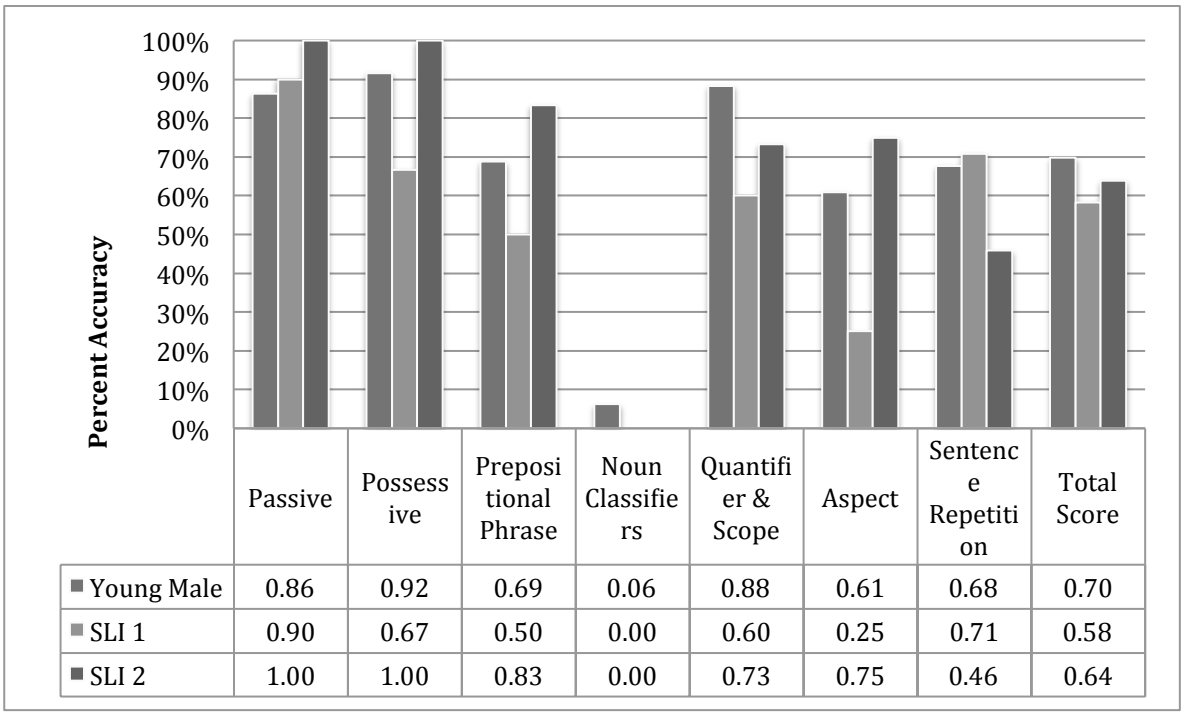


	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Mean
Correct	0.11	0.04	0.04	0.04	0.13	0.13	0.08
Imitative	0.69	0.80	0.47	0.69	0.38	0.69	0.62
Generic	0.11	0.00	0.44	0.18	0.47	0.16	0.23
Other	0.09	0.16	0.04	0.09	0.02	0.02	0.07

Figure 5. Overgeneralization Comparison of All Six Items on the Classifier Section

PERFORMANCE BETWEEN SLI CHILDREN AND AGE-MATCHED PEERS

Lastly we compared performance between the two boys with SLI and their peer group of young male bilingual children. Figure 6 showed both SLI children's performance in comparison to the same young male group of TD bilingual children. Both SLI children showed lower total scores compared to the group of age- and gender-matched children. One SLI child (SLI 1) did poorly compared to the comparison group on 5 out of 7 sections. He showed strength in passive and sentence repetition, but was weaker on possessive, prepositional phrase, classifier, quantifier and scope, and aspect sections. The other child (SLI 2) was equal to or better than the comparison group on 4 out of 7 sections. He showed strength in passive, possessive, prepositional phrase, and aspect sections, but was weaker in classifier, quantifier and scope, and sentence repetition sections. Both SLI children scored lower in the classifier (SLI 1 & SLI 2 = 0) and quantifier sections (SLI 1 = 0.60, SLI 2 = 0.73) than the comparison group (TD mean for classifier = 0.06, and for quantifier & scope = 0.88).



	Passive	Possessive	Prepositional Phrase	Noun Classifiers	Quantifier & Scope	Aspect	Sentence Repetition	Total Score
Young Male	0.86	0.92	0.69	0.06	0.88	0.61	0.68	0.70
SLI 1	0.90	0.67	0.50	0.00	0.60	0.25	0.71	0.58
SLI 2	1.00	1.00	0.83	0.00	0.73	0.75	0.46	0.64

Figure 6. All TD Young Males vs. Two Bilingual SLI Young Males Performance

DISCUSSION AND IMPLICATIONS

Using the BEMOS Mandarin Morphosyntax screener, our study showed that this tool has some sensitivity to age differences in TD bilingual children's L1 grammatical skills. First, there was a trend towards a significant age effect in the total score. Second, certain sections of the screener, such as the preposition and aspect items, revealed significant or near-significant age effect. Third, a significant correlation was found between age and total score. It is possible that with a larger sample size and a revised pool of test items, we will be able to capture age differences in L1 grammar skills in this group of bilingual children. On the other hand, the lack of age-related progression in L1 grammar could be a real finding. Previous studies examining lexical development of the minority first language in US bilingual children have repeatedly reported a lack of age effect or a much reduced age progression in L1 as opposed to L2. This has been documented among speakers of Spanish, Cantonese, Hmong, and Mandarin (Sheng, 2013; Sheng et al., 2011; Hammer et al, 2008; Cobo-Lewis et al, 2002; Kan and Kohnert, 2005; Uchikoshi, 2012). Sluggish L1 vocabulary development might have a cascading effect on children's ability to formulate sentences to answer the test questions in the BEMOS Mandarin morphosyntax screener.

Our correlation analysis indicated that when age was accounted for, Mandarin usage was not related to TD bilingual children's performance, but perceived proficiency by the parents was associated with the performance. This suggests that clinicians should consider parents' judgment of their children's proficiency when screening bilingual children. Proficiency information is also relatively easier to collect than language use

information and could be integrated when obtaining case history during assessment.

Our error analysis on the classifier section revealed several interesting patterns. First, omission of the classifier was never presented, indicating that bilingual children were well aware of the obligatory nature of classifiers in noun phrases. Second, although all groups of children scored low in this section, the majority of children's responses were imitations of the classifiers modeled by examiners in the prompting process. Recall that the nouns in the model and the target pictures were always from the same semantic category. In this context, the prevalence of imitated responses suggests that children were paying close attention to the semantic category of the nouns and noticed the semantic similarity between the nouns in the model and target pictures. Because the use of sortal classifiers is linked to semantic features of the noun, imitation of modeled classifiers was an effective strategy employed by these bilingual children. This finding is consistent with previous report that preschool Chinese children and foreign students of Chinese used classifiers with growing sensitivity to discourse features that are not explicitly taught (Erbaugh, 2006). Third, on average, 23% of children's classifier responses involved the use of the general classifier "ge" in place of the more specific classifiers required by the noun. In particular, item 3 ("airplane") and item 5 ("book") elicited many "ge" responses, with over 40% of the responses constituting using "ge" to replace the specific classifiers. These results are consistent with previous research documenting the overuse of the general classifier in monolingual Chinese children (Erbaugh, 2006; Wei & Lee, 2001). Future analyses may focus on error types in different age groups to see if there are age-related changes in the classifier errors children make when they are unable to produce the

targets.

Two bilingual children with SLI were compared to their TD age-matched peers in terms of total score and section scores. The two children showed distinct profiles from each other, consistent with the characteristics of SLI as a highly variable language disorder. Although it was difficult to identify reliable markers of SLI based on data from only two children, both children with SLI scored below average on the classifier and quantifier and scope sections. These two syntactic structures may hold promise in differentiating children with and without language impairment. On the other hand, the items assessing the passive –bei appeared to be insensitive to language status and should be removed or modified and presented in a more challenging manner in future studies. For instance, the child may be presented with two pictures (a boy riding a bike and a girl riding a horse) simultaneously and asked "这两张图里，什么被谁骑？In these two pictures, what is ridden by whom?" In order to receive full score, the child will have to answer "自行车被男孩骑 The bike is ridden by the boy" and "马被女孩骑 The horse is ridden by the girl".

Our current study revealed many challenges related to the development of BEMOS Mandarin morphosyntax screener and bilingual assessment tools in general. For efficiency purpose, the test was relatively short and contained only 30 items. In order to achieve good reliability, validity, and discriminatory power, revision of the test should aim to increase the item pool. We also need to develop more difficult test items to reduce ceiling effect seen for some of the sections (e.g., passive). In addition, our scoring system only allowed correct or incorrect answers. As such, it did not capture responses that

indicate emerging knowledge of the syntactic structures. For future research, we suggest the use of a multi-point scoring system, such as assigning 2 points for a correct response, 1 point for an emerging response, and 0 point for a wrong or "do not" know response. Finally, we had a relatively small sample of participants with homogenous demographic characteristics. A larger sample size of TD bilingual Mandarin-English children from a different geographic location may yield different performance patterns. Our sample size for age-matched bilingual children with and without SLI was also too small for quantitative analysis, which hindered us from further analysis of specific clinical markers that we could develop to better assess bilingual children with SLI.

Based on results in this preliminary study, we concluded that focusing on Mandarin alone will not provide clinicians a comprehensive picture about TD bilingual Mandarin-English children's language development, nor will it provide definitive information about the child's developmental status. Assessment in the second language (English) is also needed to fully evaluate these children's language ability, especially because many of these children were more English-dominant in terms of their daily language use. Appropriate assessment tools for the bilingual Mandarin-English population, including a reliable parental report measure, can be crucial for future assessment of bilingual Mandarin-English children.

Appendix A: Parent Questionnaire

Appendix A: Paren Questionnaire

Parent Questionnaire

In this questionnaire, we are specific about the different dialects of the Chinese language, such as Mandarin, Cantonese, Shanghaiese, Taiwanese, etc. Please indicate the dialect whenever applicable.

回答问卷时, 请您尽量区分汉语的各种方言, 例如普通话, 粤语, 上海话, 台语等。

I. General Background/生活背景

Child's name/孩子姓名_____ DOB/出生年月日_____ Sex/性别_____

Child's birthplace/出生地_____ Date arriving in the US/到达美国日期_____

Grade/年级: Daycare/托儿所 Preschool/幼儿园 Kindergarten/学前班 1/一年级 2/二年级 3/三年级 4/四年级

Name of informant/填表人姓名_____ Relationship to child/与被试儿童的关系_____

Mother's name/母亲姓名_____, Age/年龄____, Birthplace/出生地_____,

Dialect/所持方言_____, Date arriving in the U.S./到达美国日期_____.

Father's name/父亲姓名_____, Age/年龄____, Birthplace/出生地_____,

Dialect/所持方言_____, Date arriving in the U.S./到达美国日期_____.

Years of education/受教育年限: father/父亲_____ mother/母亲 _____

Present Occupation/目前职业: father/父亲_____ mother/母亲_____

How well do you read and write English? Please circle one./请圈出以下符合您的英文读写能力的选项:

Father/父亲: excellent/优秀 good/良好 fair/一般 poor/较差 not at all/不具备该能力

Mother/母亲: excellent/优秀 good/良好 fair/一般 poor/较差 not at all/不具备该能力

Is the child an only child?/孩子是独生子女吗? Yes/是__ No/否__

If not, please list the name and birthdate of the child's siblings:/如答案为否，请列出兄弟姐妹的姓名及生日:

_____

_____

_____

What other people does your household include?/是否有其他家庭成员与你们同住?

Relationship/关系_____, Age/年龄___, Dialect Spoken/所持方言_____

Relationship/关系_____, Age/年龄___, Dialect Spoken/所持方言_____

Relationship/关系_____, Age/年龄___, Dialect Spoken/所持方言_____

Has your child ever lived outside the U.S. for more than three months at a time?/孩子是否在美国之外的地方居住过三个月以上? Yes/是__ No/否__. If yes, where, when, and for how long?/如果答案为是, 请注明时间, 地点, 及持续时间。

_____

_____

_____

II. Language Environment/语言环境

What is the primary language/dialect (language used more than 75% of the time) of communication between you and your spouse at home?/您和您的配偶在家交谈通常(75%以上的时间)用何种语言/方言?_____

What is the primary language/dialect of communication in your household?/您的家庭成员之间交谈通常(75%以上的时间)用何种语言/方言?_____

Has you child ever been enrolled in a Chinese language school?/您的孩子是否上过中文语言学校? Yes/是__ No/否__.
If yes, please indicate the following/如果答案为是, 请注明:
Name of school/学校名称_____ Location/地点 _____ Date enrolled/上学日期 _____

Has your child ever been enrolled in a bilingual school?/您的孩子是否上过中英文双语学校? Yes/是__ No/否__.
If yes, please indicate the following/如果答案为是, 请注明:
Name of school/学校名称_____ Location/地点 _____ Date enrolled/上学日期 _____

Has your child ever been enrolled in an English language school?/您的孩子是否上过英文语言学校? Yes/是__ No/否__.
If yes, please indicate the following/如果答案为是, 请注明:
Name of school/学校名称_____ Location/地点 _____ Date enrolled/上学日期 _____

Has your child ever been enrolled in an ESL (English as a second language) school?/您的孩子是否上过英语作为第二语言的语言学校? Yes/是__ No/否__. If yes, please indicate the following/如果答案为是, 请注明:
Name of school/学校名称_____ Location/地点 _____ Date enrolled/上学日期 _____

Your child watches English TV and videos/您的孩子看英文电视或录像节目的频率为:
very often/经常 __ sometimes/有时 __ occasionally/偶尔 __ never/从不 __

Your child watches Chinese TV or videos 您的孩子看中文电视或录像节目的频率为:
very often/经常 __ sometimes/有时 __ occasionally/偶尔 __ never/从不 __

You and other family members read English books with your child 您或您的家庭成员跟孩子阅读英文书籍的频率为:
very often/经常 __ sometimes/有时 __ occasionally/偶尔 __ never/从不 __

You and other family members read Chinese books with your child 您或您的家庭成员给孩子阅读中文书籍的频率为:
very often/经常 __ sometimes/有时 __ occasionally/偶尔 __ never/从不 __

Your child plays with other English-speaking children/您的孩子与其他说英文的孩子玩耍的频率为:
very often/经常 __ sometimes/有时 __ occasionally/偶尔 __ never/从不 __

Your child plays with other Chinese-speaking children/您的孩子与其他说中文的孩子玩耍的频率为:

very often/经常 __ sometimes/有时 __ occasionally/偶尔 __ never/从不 __

III. Child Proficiency Rating/孩子语言熟练程度估测

We would like you to rate how well your child uses his or her languages. Rate the child's proficiency in each language using the following scales./请您参照以下量表给您孩子的中文和英文熟练程度分别估测。

Vocabulary Proficiency refers to how often the child uses home vocabulary (e.g., food or clothing names) and academic vocabulary (e.g., science terms) in each language.

词汇水平指的是孩子用中文或英文表达日常词汇（例如食物或衣服名称）和学术词汇（例如科学术语）的频率。

Put a check mark in the appropriate level for each language. 请选择您孩子对每种语言的词汇掌握程度。

	How much English vocabulary does your child use from the words she/he learns at home (e.g., food, clothing) or school (e.g., science terms)? 在家里学的词汇（例如食物、衣服类的词）或学校里学的词汇（例如科学术语）中，您的孩子用英语表达的词汇有多少？	How much Mandarin vocabulary does your child use from the words she/he learns at home (e.g., food, clothing) or school (e.g., science terms)? 在家里学的词汇（例如食物、衣服类的词）或学校里学的词汇（例如科学术语）中，您的孩子用汉语表达的词汇有多少？
0.	Does not speak in the indicated language./不能用英语表达	Does not speak in the indicated language./不能用汉语表达
1.	A few words/几个英文词	A few words/ 几个中文词
2.	A limited range of words/ 有限范围内的英文词	A limited range of words/ 有限范围内的中文词
3.	Some words / 一些英文词	Some words / 一些中文词
4.	Many words/ 很多英文词	Many words/ 很多中文词
5.	Extensive vocabulary/ 英文词汇量很大	Extensive vocabulary/ 中文词汇量很大
	DK- Do not know/不知道	DK- Do not know。不知道

Speech Proficiency refers to how easily the child can be understood in each language.

发音水平指的是孩子周围的人是否能听懂孩子说话。

Check the indicated for each language in the table below. 请在每种语言下标出符合您孩子情况的选项。

	How often can you understand your child's speech in English? Difficulties in this area might be noted when a child mispronounces a sound such a /r/ or /s/, a cluster of sounds (e.g., /sk/) or omits part of a word (e.g., says "evator" for "elevator") 您多大程度上能听懂您孩子的英文？下列情况有可能对听者造成困难：例如孩子不能正确发出 /r/ 或 /s/音，不能连续发出两个辅音(如 /sk/)，或漏掉单词中的部分音素(例如把"elevator" 说成"evator")。	How often can you understand your child's speech in Mandarin? Difficulties in this area might be noted when a child mispronounces a sound such a /n/ or /l/, or omits part of a word. 您多大程度上能听懂您孩子的中文？下列情况有可能对听者造成困难：例如孩子不能正确发出 /z, ch, sh/ 或 /r/的音，或漏掉单词中的部分音素(例如把说成 "花蝴蝶"说成 "花蝶")。
0-	Does not speak in the indicated language./不能用英语表达	Does not speak in the indicated language./不能用汉语表达
1-	Never/完全听不懂	Never/完全听不懂
2-	Rarely/很少能听懂	Rarely/很少能听懂
3-	Sometimes/有时能听懂	Sometimes/有时能听懂
4-	Very often/经常能听懂	Very often/经常能听懂
5-	Always/都能听懂	Always/都能听懂
	DK- Do not know/不知道	DK- Do not know/不知道

Sentence Production Proficiency refers to the usual length of the child's sentences when he or she is conversing, responding in class, or telling a story.

句子水平 指的是孩子在对话、回答课堂问题或讲故事中所包含句子的一般长度。

Put a check mark in the level for each language. 请选择您孩子对每种语言的句子运用程度。

	How long are your child's sentences in English typically? (Remember that children commonly use sentences of a certain length but regularly use sentences that are shorter when they are answering a question such as "Would you like a cookie?" or longer than the usual length) 一般情况下您孩子说多长的英文句子？（请注意：孩子通常用一定长度的句子，但在回答例如 "你想吃曲奇饼么？" 这样的问题时会很简短，而在回答另外一些问题的时候所用句子会比通常情况长一些。）	How long are your child's sentences in Mandarin typically? (Remember that children commonly use sentences of a certain length but regularly use sentences that are shorter when they are answering a question such as "Would you like a cookie?" or longer than the usual length.) 一般情况下您孩子说多长的中文句子？（请注意：孩子通常用一定长度的句子，但在回答例如 "你想吃曲奇饼么？" 这样的问题时会很简短，而在回答另外一些问题的时候所用句子会比通常情况长一些。）
0-	Does not speak in the indicated language. /不能用英语表达	Does not speak in the indicated language. /不能用汉语表达
1-	1-2 words/1 到 2 个词	1-2 words/1 到 2 个词
2-	2-3 words/2 到 3 个词	2-3 words/2 到 3 个词

3-	3-4 words/3 到 4 个词	3-4 words/3 到 4 个词
4-	4-5 words/4 到 5 个词	4-5 words/4 到 5 个词
5-	5 or more words/5 个词以上	5 or more words/5 个词以上
	DK- Do not know/不知道	DK- Do not know/不知道

Grammatical proficiency refers to the grammatical acceptability.

语法水平指的是语法使用的正确性。

Put a check mark in the level for each language. 请在每种语言下标出符合您孩子情况的选项。

	How often does your child produce well formed sentences in English when conversing or telling stories? Some forms that may be difficult in English are past tense forms (e.g., walked) or present tense forms (e.g., walks). 在您孩子用英语交谈或讲故事时，他/她在多大程度上能运用合乎语法的句子？例如，孩子可能不能正确运用动词过去时形式（例如 walked）或动词现在时形式（例如 walks）。	**How often does your child produce well formed sentences in Mandarin when conversing or telling stories?** In Mandarin, children might have trouble with grammatical markers indicating the completion or ongoing status of activities. 在您孩子用汉语交谈或讲故事时，他/她在多大程度上能运用合乎语法的句子？例如，孩子可能会省略表达进行体或完成体的语法元素 “妈妈很忙，妈妈洗衣服”（正确形式为“妈妈**在**洗衣服”），“宝宝吃饭了”（正确形式为“宝宝吃**完**饭了”）。
0-	Does not speak in the indicated language. 不能用英语表达	Does not speak in the indicated language. 不能用汉语表达
1-	Never/从来不能	Never/从来不能
2-	Rarely/很少能	Rarely/很少能
3-	Sometimes/有时能	Sometimes/有时能
4-	Very often/ 经常能	Very often/经常能
5-	Always/总是能	Always/总是能
	DK- Do not know/不知道	DK- Do not know/不知道

Comprehension Proficiency refers to how easily the child understands each language.

理解水平指的是孩子对每种语言的理解程度

Put a check mark in the level for each language. 请在每种语言下标出符合您孩子情况的选项

	How often does your child understand what is said in English? Difficulties in this area might be noted when she/he frequently asks for repetition or only attends to part of what you say (e.g., last part of a story, one part of a series of instructions).	**How often does your child understand what is said in Mandarin?** Difficulties in this area might be noted when she/he frequently asks for repetition or only attends to part of what you say (e.g., last part of a story, one part of a series of instructions).

	您的孩子多大程度上能听懂别人说的英文？对英文话语理解有困难的行为包括：孩子经常要求您重复已经说过的话，孩子经常只听懂了一句话的前半句或后半句。	您的孩子多大程度上能听懂别人说的中文？对中文话语理解有困难的行为包括：孩子经常要求您重复已经说过的话，孩子经常只听懂了一句话的前半句或后半句。
0.	Does not understand the indicated language. 不能用英语表达	Does not understand the indicated language. 不能用汉语表达
1.	Never/从来不能	Never/从来不能
2.	Rarely/很少能	Rarely/很少能
3.	Sometimes/有时能	Sometimes/有时能
4.	Very often/经常能	Very often/经常能
5.	Always/总是能	Always/总是能
	DK- Do not know/不知道	DK- Do not know/不知道

Are you concerned about the way your child talks?/您对孩子的语言表达能力有担心或忧虑吗？ Yes /有 No/没有

If yes, please describe your concern. /如果答案为有，请描述您的忧虑。

We know that your child is exposed to English and Chinese. How important is it to you that your child be bilingual?/您孩子的成长在中英文环境下。您的孩子能否成为双语儿童对您来说：

Very important/很重要 Somewhat important/有一些重要 Not at all important/一点也不重要

IV. Language Use/语言使用 (this section will be conducted in a face-to-face interview/这部分将采用访谈形式)

Ages	At home	At School/Preschool/Daycare
0-1	Mandarin, English, Both +	Mandarin, English, Both, NA
1-2	Mandarin, English, Both +	Mandarin, English, Both, NA
2-3	Mandarin, English, Both +	Mandarin, English, Both, NA
3-4	Mandarin, English, Both +	Mandarin, English, Both, NA
4-5	Mandarin, English, Both +	Mandarin, English, Both, NA
5-6	Mandarin, English, Both +	Mandarin, English, Both, NA
6-7	Mandarin, English, Both +	Mandarin, English, Both, NA
7-8	Mandarin, English, Both +	Mandarin, English, Both, NA
8-9	Mandarin, English, Both +	Mandarin, English, Both, NA
9-10	Mandarin, English, Both +	Mandarin, English, Both, NA

Home Language Profile/在家使用语言记录: During Week/工作日 (This should be done over for each interview/这部分)

Time/ 时间	Activity/活动	Participants/参与者	Language(s)/ 使用语言	
			Participant INPUT/参与者	Child OUTPUT/ 孩子
7am			M E B	M E B
8am			M E B	M E B
9am			M E B	M E B
10am			M E B	M E B
11am			M E B	M E B
12pm			M E B	M E B
1pm			M E B	M E B
2pm			M E B	M E B
3pm			M E B	M E B
4pm			M E B	M E B
5pm			M E B	M E B
6pm			M E B	M E B
7pm			M E B	M E B
8pm			M E B	M E B
9pm			M E B	M E B
10pm			M E B	M E B
11pm			M E B	M E B

Directions: For activity, include what the child is engaged in (e.g., breakfast, play, etc). For participants, include who is interacting with the child in the given activity (e.g., mother, grandfather, siblings, etc.). For language(s), use M for Mandarin, E for English, B for Both.
说明: 活动包括孩子做的事情（例如吃早餐，玩游戏等）。参与者包括和孩子一起做事情的人（例如母亲，爷爷，兄妹等）。使用语言包括汉语（M），英语（E），汉语和英语（B）。

Home Language Profile/在家使用语言纪录: Weekend/周末

Time/ 时间	Activity/活动	Participants/参与者	Language(s)/ 语言使用	
			Participant INPUT/参与者	Child OUTPUT/ 孩子
7am			M E B	M E B
8am			M E B	M E B
9am			M E B	M E B
10am			M E B	M E B
11am			M E B	M E B
12pm			M E B	M E B
1pm			M E B	M E B
2pm			M E B	M E B
3pm			M E B	M E B
4pm			M E B	M E B
5pm			M E B	M E B
6pm			M E B	M E B
7pm			M E B	M E B
8pm			M E B	M E B
9pm			M E B	M E B
10pm			M E B	M E B
11pm			M E B	M E B

Directions: For activity, include what the child is engaged in (e.g., breakfast, play, etc). For participants, include who is interacting with the child in the given activity (e.g., mother, grandfather, siblings, etc.). For language(s), use M for 汉语, E for 英语, B for 汉语和英语
说明: 活动包括孩子做的事情（例如吃早餐，玩游戏等）。参与者包括和孩子一起做事情的人（例如母亲，祖父，兄妹等）。使用语言包括汉语（M），英语（E），汉语和英语（B）。

Appendix B: BEMOS Mandarin Morphosyntax Screener

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BEMOS: Mandarin Morphosyntax Screener

Tester: _____ **Participant I.D.**_____ **Date:** _____

小朋友（名字），这里有两幅图。老师/阿姨说左边的图，你学着阿姨的话说右边的图，好吗？

PASSIVES 被动语态				
Dem. Items	**A. *E:*** 这只狗被猫踢。那么这只猫呢？□ **被狗踢** **B. *E:*** 这个胡萝卜被小白兔吃了。那么这个胡萝卜呢？□**被小老鼠吃了**			
[1] 22 (BESA)	这个宝宝被妈妈抱着。那这个宝宝呢？ □ **被爸爸抱着**	1	0	NR
[2] 25 (ME)	这只猫被狗咬住了尾巴。那么这只狗呢？ □ **被猫咬住了尾巴**	1	0	NR
[3] 23 (BESA)	这扇窗户被男孩打碎了。那么这扇窗户呢？□ **被女孩打碎了**	1	0	NR
POSSESSIVE'S				
Dem. Items	A. *E:* 看这儿有一个叔叔，这个是叔叔的钱包。这儿有一个阿姨，这个是 *C:*_____ **(阿姨的钱包)** B. *E:* 看这里有一只大狗狗，这一根是大狗狗的骨头。这里有一个小狗狗，这一根是 C:_____ （**小狗狗的骨头**）			
[4]	E: 看这里有一只黑猫，这个是黑猫的床。这里有一只白猫，这个是 **C:**_____**(白猫的床)**	1	0	NR
[5]	E: 看这儿有一个老师，这一副是老师的眼镜。这儿有一个医生，这一副是 **C:**_____**(医生的眼镜)**	1	0	NR
[6]	E: 看这里有一个哥哥，这个是哥哥的书包。这里有一个弟弟，这个是 C:_____ **(弟弟的书包)**	1	0	NR
PREPOSITIONAL PHRASE				
Dem. Items	A. *E:* 看这幅图, 这个小女孩坐在椅子上。那再看这幅图，这个小女孩站在哪里呢？她站 C:_____ **(在椅子的后面)** B. *E:* 这一幅图里女孩站在哪里？她站 C:_____**(在门的旁边)**			
[7]	**E:** 这一幅图里，女孩躲起来了。她躲 **C:** _____ **(在床底下)**	1	0	NR
[8]	**E:** 这一幅图里女孩站在哪里？她站 **C:**_____**(在桌子前面)**	1	0	NR
NOUN CLASSIFIERS				
Dem. Items	A. *E:* 这里有两只狗。那么这里呢？这里有 *C:*_____ (**两匹马**) B. *E* 这里有三朵花。那么这里呢？这里有 *C:*_____ (三**棵**树)			
[9]	E: 这里有一只猫。那么这里呢？这里有 **C:**_____(一**头**牛)	1	0	NR
[10]	E: 这里有两个苹果。那么这里呢？这里有 **C:**_____(两**根**香蕉.)	1	0	NR
[11]	E: 这里有两辆汽车。那么这里呢？这里有 **C:**_____(两**架**飞机.)	1	0	NR
[12]	E: 这里有三件衣服。那么这里呢？这里有 **C:**_____(三**条**裤子.)	1	0	NR
[13]	E: 这里有一张相片。那么这里呢？这里有 **C:**_____(一**本**书.)	1	0	NR
[14]	E: 这里有两杯咖啡。那么这里呢？这里有 **C:**_____(两**瓶**水.)	1	0	NR
[15]				
QUANTIFIER AND SCOPE				
Dem. Items	A. *E:* 看这里，每一只小猫都在喝水。那么这里呢？ C:_____**(每一只小猴都在吃香蕉。)**			

	B. E: 看这里，每一只小老鼠都在吃奶酪。那么这里呢？ *C:*_____**(每一只小羊都在吃草。)**			
[16]	E: 看这里，每一个小哥哥都坐着。那么这里呢？ C:_____**(每一个小姐姐都站着。)**	1	0	NR
[17]	E: 看这里，每一个小哥哥都在写字。那么这里呢？ C:_____**(每一个小姐姐都在看书)。**	1	0	NR
[18]	E: 看这里，所有的小哥哥都不爱吃梨。那么这里呢？ C:_____**(所有的小姐姐都不爱吃苹果)。**	1	0	NR
[19]	E: 这里有两幅图。哪一幅图是每一只小鸟都不在笼子里？ □一只小鸟在笼子里，三只不在　□**四只小鸟都不在笼子里**	1	0	NR
[20]	E: 这里有两幅图。哪一幅图是所有的小朋友都坐在床上。 □**三个小朋友都坐在床上，第四张床空着**　□三个小朋友坐在床上，一个坐在椅子上	1	0	NR
	Aspect（imperfective -zai）			
Dem. Items	**A.** *E:* 看这幅图里，叔叔喝了一杯水。那么这幅图里呢？ C:_____**(叔叔在喝一杯水。)** **B.** E: 看这里，小朋友盖了一座房子。那么这里呢？ *C:*_____**(小朋友在盖一座房子。)**			
[21]	E: 看这里，叔叔跑了步。那么这里呢？ C:_____**(叔叔在跑步。)**	1	0	NR
[22]	E: 看这里，小朋友画了一枝花。那么这里呢？ C:_____**(小朋友在画一枝花)。**	1	0	NR
	Aspect（perfective -le）			
Dem. Items	**A.** *E:* 看这幅图里，叔叔在踢那头猪。那么这幅图里呢？ C:_____**(叔叔踢了那头猪。)** **B.** E: 看这里，叔叔在游泳。那么这里呢？ *C:*_____**(叔叔游了泳/游完泳了。)**			
[23]	E: 看这里，叔叔在读一本书。那么这里呢？ C:_____**(叔叔读了一本书。)**	1	0	NR
[24]	E: 看这里，叔叔在上楼。那么这里呢？ C:_____**(叔叔上了楼)。**	1	0	NR
	RELATIVE CLAUSE			
Dem. Items	A. *E:* 看这里，小猫在追背红书包的小女孩。那么这里呢？小猫 C:_____**(**在追**背蓝书包的小女孩)** B. E: 看这里，系黄围巾的小朋友在吃冰淇淋。那么这里呢？ C:_____**(系绿围巾的小朋友**在吃冰淇淋。)			
[25]	E: 看这里，穿红裙子的阿姨在跳舞。那么这里呢？ C:_____**(穿黑裙子的阿姨**在唱歌。)	1	0	NR
[26]	E: 看这里，戴着白帽子的小哥哥在挥手。那么这里呢？ C: _____**(戴着红帽子的小哥哥**在挥手。)	1	0	NR
[27]	E: 看这里，小姐姐抱着穿红毛衣的老奶奶。那么这里呢？小姐姐 C: _____**(**抱着**穿黑毛衣的老奶奶。)**	1	0	NR
[28]	E: 看这里，小白兔顶着装满苹果的篮子。那么这里呢？小白兔 **C:**_____(顶着**装满葡萄的篮子**。)	1	0	NR
	SENTENCE REPETITION TASK			

Examiner: 下面我们做一个游戏。我说一句话，然后你照着我的说。我说什么你就跟着说什么，好不好？你一定要跟我说的一模一样哦。记住要听我说完了，你再开始。准备好了吗？ *(If necessary, examiner may point to child when it is his turn for each target sentence).*

Dem. Items	E: 小朋友在洗脸。 E: 姐姐喜欢唱歌吗？	T: 小朋友在洗脸。 T: 姐姐喜欢唱歌吗?	C:_____ C:_____

29-34. 有个阿姨洗了每件衣服。
C: _____

[29]	有个			
[30]	阿姨			
[31]	洗了	1	0	NR
[32]	每	1	0	NR
[33]	件	1	0	NR
[34]	衣服			

35-43. 小朋友在看电视之前必须先把作业做完。
C: _____

[35]	小朋友	1	0	NR
[36]	在	1	0	NR
[37]	看电视	1	0	NR
[38]	之前	1	0	NR
[39]	必须			
[40]	先			
[41]	把			
[42]	作业			
[43]	做完			

44-50. 因为小女孩生病了所以妈妈带她去看医生。
C: _____

[44]	因为	1	0	NR
[45]	小女孩	1	0	NR
[46]	生病了	1	0	NR
[47]	所以	1	0	NR
[48]	妈妈	1	0	NR
[49]	带她			
[50]	去			
[51]	看			
[52]	医生			

Total_____

Appendix C: BEMOS Morphosyntax Mandarin Scoring Rubric

*For the purpose of this study, we accepted code-switch of English as correct responses.

Passives **Total Points = 10** **Wrong/No Response = 0 point** **Correct/Acceptable Response = 1 point**		
Items	**Target**	**Other Acceptable Responses**
Item 1	被	
	爸爸	
	抱着	
Item 2	被	
	猫	
	咬住了	咬到了, 咬住, 咬了
	尾巴	
Item 3	被	
	女孩	女生，女孩，妹妹
	打碎了	打坏了，打破了

Prepositional Phrase **Total Points = 6** **Wrong/No Response = 0 point** **Correct/Acceptable Response = 1 point**		
Items	**Target**	**Other Acceptable Responses**
Item 1	在	进
	床	床上，床的

	底下	下，下边，下面，下头，底
Item 2	在	Under*
	桌子	Table*
	前面	前，前头

Quantifier & Scope **Total Points = 15** **Wrong/No Response = 0 point** **Correct/Acceptable Response = 1 point**		
Items	**Target**	**Other Acceptable Responses**
Item 1	每一个	每个
	小姐姐	姐姐，妹妹，女孩，小妹妹， 小女孩，Sister*
	都	
	站着	在站着，在 stand*
Item 2	每一个	每个
	小姐姐	姐姐，妹妹，女孩，女孩子，小妹妹， 小女孩，Sister*
	都	
	在看书	在看本，看着书，在读书
Item 3	所有的	所有
	小姐姐	姐姐，妹妹，女孩，女孩子，小妹妹， 小女孩，Sister*
	都	
	不爱	不喜欢
	吃苹果	苹果，Apple*

Item 4	四只小鸟都不在笼子里	
	三个小朋友都坐在床上，第四张床空着	

Aspect (-zai & -le) **Total Points = 8** **Wrong/No Response = 0 point** **Partial Response = 1 point** **Correct/Acceptable Response = 2 points**			
Items	**Target**	**Partial Response**	**Acceptable Response**
Item 1	叔叔在跑步	(叔叔) 又／还跑步	(叔叔) 正在跑步／跑着步
Item 2	小朋友在画一枝花	(小朋友) 又画／还画	(小朋友) 正在画／画着
Item 3	叔叔读了一本书	(叔叔) 不在／没有(读书)	(叔叔) 读了／读完／读好／读过(书)
Item 4	叔叔上了楼	(叔叔) 不在／没有(上楼)	(叔叔) 上了楼／上完楼／已经上楼上楼了

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