

Early grammatical acquisition in children adopted from China as infants/toddlers

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ABSTRACT

Children adopted internationally have a special course of exposure to language as they abruptly switch from hearing the sounds of their birth language, to which they typically are not further exposed post-adoption, to the sounds of a new language (Glennen, 2002; Roberts et al., 2005). The quick transition to a new language and rapid attrition of the birth language is a challenge developmentally. This study looked at the English grammatical development of children adopted from China in comparison to that of norms based on non-adopted peers. Age at time of adoption had a significant impact on grammatical development. Children adopted from China acquired English bound morphemes in the same sequential order as non-adopted peers, but were delayed in their acquisition due to their later onset of exposure to English. The older children were at the time of adoption, the faster they acquired bound morphemes and complex sentences. However, because older children had more grammar to learn in order to catch up to non-adopted peers, they lagged further behind.

INTRODUCTION

Children adopted internationally have a unique experience acquiring language as exposure to their birth language is brief, and a quick transition is made to the language in their new environment. Little, if any, additional exposure to the birth language is typically maintained. Current research on children adopted internationally has largely focused on children's acquisition of vocabulary (e.g, Glennen & Masters, 2002; Pollock, 2005; Krakow, Tao, & Roberts, 2005). It has been shown that children adopted at a chronologically older age

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understand and produce vocabulary at a faster rate than children adopted at a younger age (Krakow, Tao, & Roberts, 2005; Pollock, 2005). However, the older children have more vocabulary to acquire in order to be at an age appropriate level when compared to the norms of North American born peers.

Fewer studies have examined grammatical acquisition in children adopted internationally. Glennen et al. (2005) looked at the grammatical development of children adopted from Eastern Europe to determine if the exposure to the birth language delayed or furthered grammatical acquisition in the new language. The age at adoption and the sequential order in which grammatical morphemes were obtained was studied. They concluded that grammatical morphemes were acquired in the same sequential order as North American born peers, and previous exposure to the birth language did not appear to result in any linguistic benefit or detriment to grammatical acquisition in the new language.

Glennen and Masters (2002) studied vocabulary acquisition, mean length of the three longest utterances, and use of four bound grammatical morphemes through parent report of children adopted from Eastern Europe. They concluded that these children had the same pattern of acquisition as typically developing North American born peers. Children adopted at an earlier age reached the same level of language development as their typically developing North American born peers in a short amount of time. However, children adopted at a later age required more time to catch up to their typically developing peers across all three measures studied. Children adopted at an older age acquired expressive language shortly after adoption, but their acquisition of language continued to lag significantly behind typically developing peers. In terms of mean length of the three longest utterances, children adopted at an older

age lagged further behind same aged peers than children adopted at an earlier age.

Grammatical morpheme development was also analyzed, and results showed that children adopted from Eastern Europe followed the same developmental trajectory as native born children; however, they lagged behind their non-adopted peers in this measure as well. Across expressive vocabulary, mean length of three longest utterances, and grammatical morpheme acquisition, children adopted from Eastern Europe developed language along the same developmental path as non-adopted peers. However, the older the age at adoption, the further they lagged behind their peers in terms of matching expectations based on normative data.

The order of grammatical morpheme acquisition in English has been extensively researched in the literature. Prominent researchers in this area, Brown (1973) and deVilliers and deVilliers (1973), found that the first morphemes children acquire in the English language are plural ‘-s,’ preposition ‘in,’ preposition ‘on,’ and possessive ‘-s’. The next morphemes to develop are articles followed by regular past ‘-ed,’ irregular past, third person present ‘-s,’ and contractible copula. The final morphemes to typically be acquired are contractible auxiliary be, uncontractible copula be, uncontractible auxiliary be, and irregular third person singular. This sequential order of morpheme development seems to occur because children learn the easier nominal morphemes first and learn the more difficult verbal morphemes later in development.

Within the literature, there is limited research on the grammatical development of children adopted internationally, particularly children adopted from China. This study looked at the acquisition of bound morphemes, sentence complexity and utterance length in a relatively large longitudinal database of children adopted from China (Pollock, 2005, 2011). The purpose of this study was to expand research on children adopted from China to include early

grammatical development. The normative reference data in this study are intended to provide a point of comparison for grammatical development in children who were internationally adopted.

METHODS

Participants

Participants were 145 infants/toddlers, 144 girls and 1 boy, who had been adopted from China into families throughout Canada and the United States. These are the same participants included in Pollock (2005), however, preliminary data was used at that time and the full sample was used in this study. These infants/toddlers joined the longitudinal study through exposure to information on the Families with Children from China (FCC) website, adoption agencies, and parent support groups. The participants ranged from 7.6 to 43.5 months old ($M = 13.2$ months, $SD = 5.5$ months) at the time of adoption. Participants were separated into subgroups in accordance with their chronological age at the time of adoption. These subgroups were 7-12 months, 12-18 months, 18-24 months, and greater than or equal to 24 months at the time of adoption. The number of participants in each subgroup was 79, 48, 11, and 7 respectively. All of the participants had lived in an orphanage prior to being adopted, although some had reportedly also spent some time in foster care. English was the primary language spoken in each participant's home post-adoption.

Materials and Data Analysis

The longitudinal survey consisted of parent-based reports of each child's background information, medical history, developmental history, and the *MacArthur-Bates Communicative*

Development Inventories (MCDI; Fenson, et al., 1992). The MCDI consists of two forms. A parent of each participant completed the *Words and Gestures* form for infants and transitioned to complete the *Words and Sentences* form for toddlers when the child produced 30 or more words. The *Words and Sentences* form assessed the participants' morphological and syntactical development. The measures of syntax and grammatical development studied were sentence complexity and mean length of longest utterances. Productions of the following morphemes in the MCDI were also studied: regular plural '-s', possessives ''s', progressive '-ing', and past tense '-ed'. A parent of each participant completed the MCDI approximately every 3 months until the child's scores exceeded the 50th percentile for 30-month-olds (e.g., 600 words produced). Participants did not complete the same number of surveys as they joined and completed (or discontinued) the study at different times. Each participant completed from 1 to 10 surveys (M = 6 surveys) over the duration of the study. The scores for each returned MCDI were calculated in accordance with the instructions in the manual. Only data from the *Words and Sentences* form were used in the current study. Only raw data are reported in this study because participants were often above the age range of the MCDI normative data. A more complete report of participant characteristics and methods can be found in Pollock (2005).

When the surveys were returned, the data were extracted and coded for further analysis. All data were collected as part of the original study by Pollock (2005). Participants' chronological age and number of months post-adoption was calculated at the time of each survey. Expressive vocabulary was reported by parents' selection of words on the MCDI checklist that their child produced (out of a possible 680 listed words). The MCDI also asks parents to list the three longest utterances that they have heard their child say recently. The

mean length of the three longest utterances (ML3) was calculated by counting the number of morphemes in each of these utterances and dividing this by 3. The acquisition of four bound morphemes (the regular plural '-s,' possessive ''s,' progressive '-ing,' and past tense '-ed') was examined by providing a description and example of each morpheme and asking "Has your child begun to do this?" Each morpheme that was not reportedly used was coded as a '0' and each morpheme that was reportedly used "sometimes" or "often" was coded as a '1.' The number of morphemes acquired was summed to obtain the ratio of the number of morphemes acquired out of a possible four. The measure of sentence complexity was calculated based on parent report of the total number of complex sentences produced, when provided with a choice of two sentences of differing complexity (e.g., "I sing song" and "I sing song for you") and asked which one was most like what their child says, for a maximum score of 37.

RESULTS / DISCUSSION

Expressive vocabulary and ML3 have already been previously reported for this sample (Pollock, 2005, 2011). This report focuses on the data from the sentence complexity and grammatical morpheme measures, as well as the relationship between these measures and vocabulary and ML3. A descriptive approach to the presentation of results has been chosen due to the diverse nature of the number of participants in each subgroup. Data are presented by number of months post adoption (also representing length of exposure to English) and by chronological age (allowing a comparison to the normative sample). The inclusion of these two ways of presentation will allow for better understanding of acquisition of grammar from the onset of exposure to the new language while also considering the chronological age of the

participants. Chronological age may be an important factor as older children may have more advanced cognitive skills and could also have had more exposure to and therefore more advanced development in their birth language prior to adoption (Pollock, 2005).

Sentence Complexity

Figure 1a compares the mean sentence complexity scores for each subgroup at three-month intervals starting at nine months post adoption. All of the subgroups show substantial gains in producing more complex sentences with progression over time. In subgroups which consisted of participants that were adopted between 7-18 months of age, the use of complex sentences developed slowly in the first year post-adoption. However, at 15 months post-adoption, production of complex sentence forms increased relatively quickly. Although the 18-24 month subgroup produced a similar amount of complex sentences as the 7-12 month and 12-18 month subgroups at nine months post-adoption, the 18-24 month subgroup started to experience significant growth in production of complex sentences earlier than children who were adopted at younger ages. Children who were adopted at 24 months and older started producing a higher number of complex sentences shortly after adoption. The developmental trajectory for sentence complexity in this group was not as steep when compared to subgroups containing children who were adopted at younger ages as they started producing more complex sentences at an earlier time. It is important to note that the trends for the 18-24 month and 24+ month subgroups contain more fluctuations than the other two subgroups. This is most likely due to the fact that there were fewer participants in these subgroups and thus the trends were more vulnerable to personal variations.

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The mean sentence complexity scores for each subgroup are also depicted in figure 1b where the production of complex sentences is shown in relation to the approximate chronological age (± 3 months) of the participants. Normed percentile ranks from the MCDI normative sample were also included in the figure for comparison. The developmental trends for sentence complexity in children adopted from China closely resemble the trends that were observed in non-adopted children who were in the normative sample, though at a later age. It appears that the sentence complexity means for children in the 7-12 month subgroup fell between the 25th and 50th percentile from the MCDI norms. Data from another subgroup, children adopted at 12-18 months, was observed to fall between the 10th and 25th percentile from the MCDI norms. Though it appears that children who were adopted at an older age began producing more complex sentences at an earlier time, when looking at development in terms of chronological age, sentence complexity development in these children appeared to lag behind when compared to their non-adopted peers.

The sentence complexity of children adopted internationally has not been extensively documented in the literature. However, a study by Geren, Snedeker, and Ax (2005) found that as the vocabulary size of children adopted from China increased, the number of words used in a sentence increased, and the complexity of the sentence increased. In this study, the CDI-2 was used to measure sentence complexity, which is similar to the MCDI sentence complexity portion as it is a 37 item questionnaire based on parent report. Contrary to the results from the current study, Geren, Snedeker, and Ax (2005) found that age at adoption was not indicative of the sentence complexity score of children adopted internationally. The determining factor for sentence complexity was the participants' vocabulary size. Differences may be due to the small

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sample size of 14 and the later adoption age between 2 years, 7 months and 5 years, 1 month when compared to the current study.

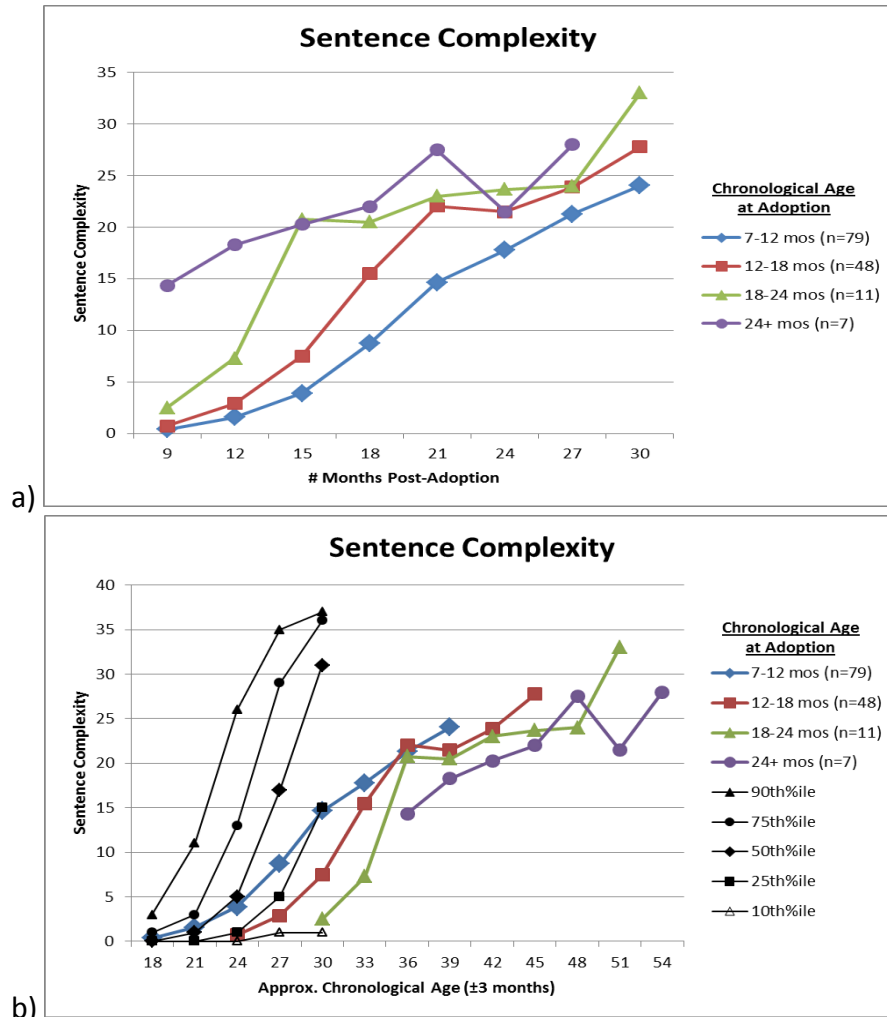


Figure 1. Mean sentence complexity score by a) number of months post adoption and b) approximate chronological age (± 3 months) compared with percentile rank norms from the MCDI. Total possible score for sentence complexity = 37. MCDI, MacArthur Communicative Development Inventories.

Grammatical Morphemes

Aside from examination of the complexity of sentences, the acquisition of the grammatical morphemes plural ‘-s’, possessive ‘-’s’, progressive ‘-ing’, and past tense ‘-ed’ were also studied. The MCDI asked parents to report whether their child had begun to use these

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grammatical morphemes in their speech, either “sometimes” or “often.” Figure 2 shows the number of grammatical morphemes that had been acquired, with a maximum possible score of 4. Figure 2a shows the mean number of grammatical morphemes acquired in relation to the number of months post-adoption. Children who were adopted at older ages not only acquired grammatical morphemes more quickly than those who were adopted at younger ages, they also appeared to have acquired all four grammatical morphemes studied by 15 months post adoption. For children who were adopted between 7-12 months of age, grammatical morpheme acquisition increased substantially approximately one year post-adoption. When compared to the 7-12 month subgroup, the 12-18 month subgroup acquired grammatical morphemes earlier at 9 months post adoption. The trends for the two subgroups of children who were adopted at older ages (18-24 months and 24+ months) fluctuate and are not relatively smooth like the trends shown for the two subgroups where participants were adopted at younger ages. Again, this was due to the low number of participants in the 18-24 month and 24+ month subgroups.

Figure 2b shows the same data (mean number of grammatical morphemes acquired) by approximate chronological age (± 3 months). Here, it is seen that although children who were adopted at older ages acquired grammatical morphemes more quickly than those who were adopted at younger ages, they seemed to lag behind in their grammatical morpheme development as children who were adopted at younger ages were shown to have acquired more morphemes at a given chronological age. It is also evident from this figure (figure 2b) that all groups seem to have acquired all four grammatical morphemes at approximately 45 months of age.

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Similar trends were identified in a study by Glennen and Masters (2002) that looked at the grammatical morpheme acquisition of children adopted from Eastern Europe. According to Glennen and Masters (2002), children adopted before the age of 12 months were using a combination of any two of the four morphemes studied by 28-30 months old. Similar results were attained in this study, whereby the children adopted from China were using any two of the four morphemes by 26-27 months of age. The developmental trend of children adopted at an older age lagging further behind their typically developing non-adopted peers was evident in both studies. Expressive use of two of the four bound grammatical morphemes appeared at 34-36 months in children adopted from Eastern Europe between 13 and 24 months of age. Children adopted from China at 12-18 months acquired two grammatical morphemes on average at 27-30 months and children adopted from China at 18-24 months acquired two grammatical morphemes on average at 30-33 months. Both subgroups containing children adopted from China, based on chronological age at adoption, developed two of the four grammatical morphemes faster than same aged peers adopted from Eastern Europe. In addition, expressive use of two of the four bound grammatical morphemes appeared at 37-40 months for children adopted from Eastern Europe at the age of 25-30 months. The same pattern was found for children adopted from China at 24 months and over as these children acquired two of the four grammatical morphemes by 36-39 months of age. For all subgroups that were compared by chronological age at adoption in the study by Glennen and Masters (2002), the average child did not use all four grammatical morphemes studied by 37-40 months, which was the highest age reported in the study. In this study, the average child acquired all four grammatical morphemes by approximately 41 months of age and higher. The children who

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acquired all four grammatical morphemes were the children adopted at an older age. Similar patterns in terms of grammatical acquisition were found for children adopted from China and children adopted from Eastern Europe.

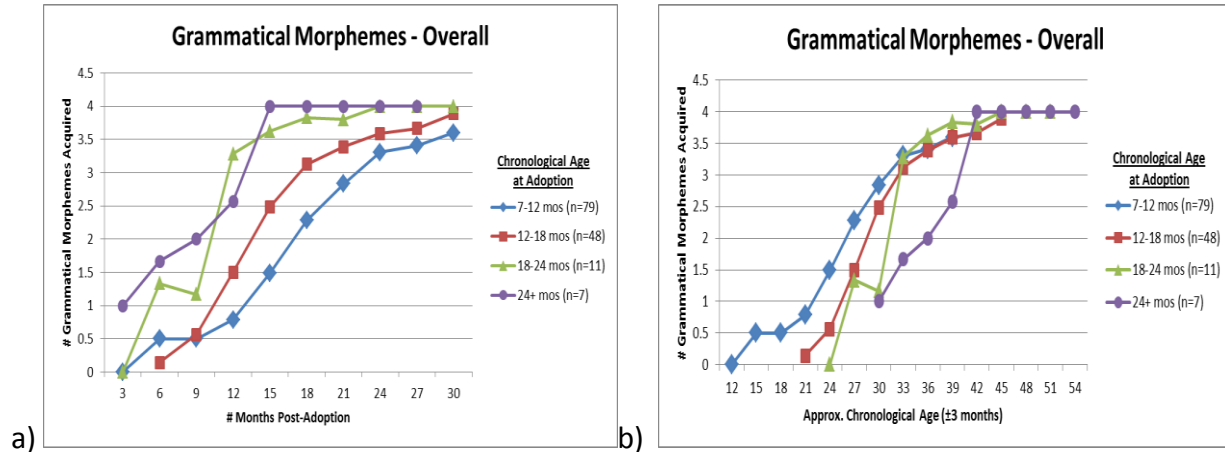


Figure 2. Mean number of grammatical morphemes acquired by a) number of months post-adoption and b) approximate chronological age (± 3 months). Total possible number of grammatical morphemes acquired = 4; plural '-s', possessive '-s', progressive '-ing', and past tense '-ed'.

In addition to the number of grammatical morphemes acquired, the use of 4 specific grammatical morphemes was also examined. Parents reported in the MCDI whether their child was using a particular grammatical morpheme. Mean use of grammatical morphemes were plotted by number of months post-adoption (figures 3a to 3d). When grammatical morpheme use was examined by number of months post-adoption, it was evident that the use of past tense '-ed' developed later than other grammatical morphemes in all subgroups, except the 24+ month subgroup. The use of plural '-s' and possessive '-s' developed at the same time and were amongst one of the first grammatical morphemes studied to be acquired. Progressive '-ing' acquisition and use followed shortly after plural '-s' and possessive '-s' acquisition and use. These trends were most evident in the 7-12 month (figure 3a) and 12-18 month (figure 3b)

subgroups as the number of participants in these subgroups was larger and thus the trends were not as susceptible (figures 3c and 3d) to variation.

As previously mentioned, the four grammatical morphemes that were measured in this study can be classified into two categories: nominal morphemes and verbal morphemes. It has been established that a majority of nominal morphemes, in English, are acquired prior to the acquisition of verbal morphemes as they are less difficult to learn (Rescorla and Roberts, 2002). This information is consistent with the data presented as plural '-s' and possessive '-s' are nominal morphemes, and thus have been observed to develop first in all subgroups in the study. Progressive '-ing' and past tense '-ed' are classified as verbal morphemes and thus would be expected to develop later than the two nominal morphemes explored in this study. The acquisition pattern of the four grammatical morphemes in this study was consistent with the expected acquisition of grammatical morphemes in typically developing, English-speaking children.

Aside from the order of acquisition of grammatical morphemes, the acquisition pattern between the different subgroups can also be compared. Subgroups containing children who were adopted at older ages appeared to be acquiring grammatical morphemes at a faster rate than those who were adopted at a younger age. In Pollock (2005), it was found that the children who were adopted at an older age produced more words at a given point in time when compared to children who were adopted at a younger age, and also that the children who were adopted at an older age produced longer utterances shortly after adoption. The combination of these findings suggests that those who were adopted at an older age developed expressive language more quickly after exposure to the new language.

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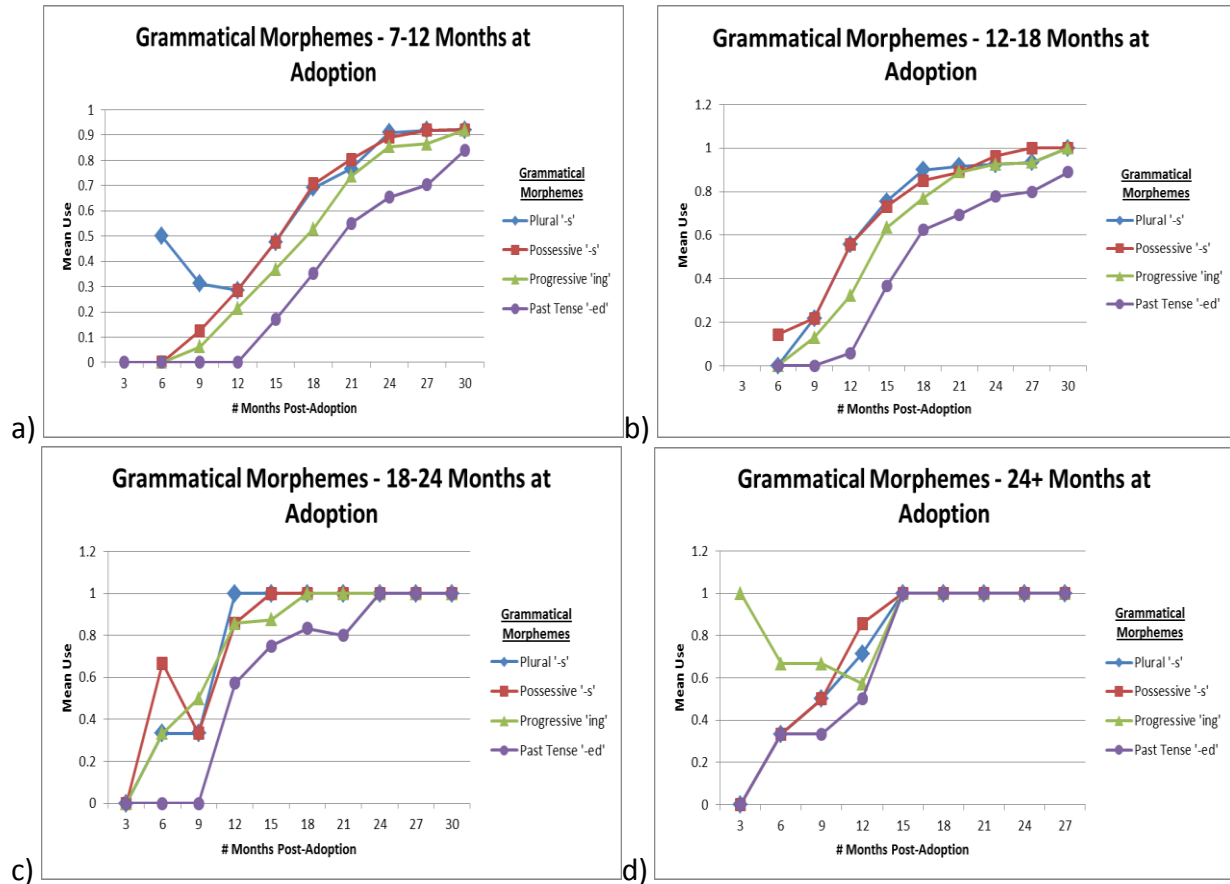


Figure 3. Mean use of grammatical morphemes plural '-s', possessive '-s', progressing '-ing', - and past tense '-ed' by number of months post-adoption for groups that were a) 7-12 months, b) 12-18 months, c) 18-24 months, and d) 24+ months of age at adoption. A score of 1 was used to indicate that there was use of that grammatical morpheme, and a score of 0 was used to indicate that the grammatical morpheme was not being used.

When examining use of grammatical morphemes by approximate chronological age (± 3 months), data were plotted according to percentage of use rather than mean use to accommodate the inclusion of norms from the MCDI for comparison (figures 4a to 4d). A similar pattern of grammatical morpheme acquisition was seen in the participants' data and the normative data from the MCDI. As described above, plural '-s' and possessive '-s' appeared to develop simultaneously with progressive '-ing' following closely behind, and past tense '-ed'

being the latest developing grammatical morpheme in this study. Children who were adopted between the ages of 7-12 months (figure 4a) developed grammatical morphemes only slightly behind their non-adopted peers. It appears that acquisition of possessive '-s' in this subgroup occurs at the same time as the acquisition of progressive '-ing' by non-adopted children. The acquisition of progressive '-ing' in this subgroup also closely approximates the period of time where children in the normative data are acquiring the later developing past tense '-ed' morpheme. As children were adopted at older ages, they acquired grammatical morphemes at a quicker rate, but at the same time, acquisition of grammatical morphemes significantly lagged behind when a comparison to non-adopted children from the normative sample was made.

The similarity of the pattern of acquisition of grammatical morphemes in both children who were adopted from China and the normative data from the MCDI suggest that children who were adopted from China are following the typical pattern of grammatical morpheme development in English. Again, the simpler nominal morphemes are acquired prior to the acquisition of the more complex verbal morphemes. This is consistent with findings from a previous study looking at English grammatical morpheme development in children adopted from Eastern Europe (Glennen et al., 2005). It was found that the order in which grammatical morphemes were acquired was similar to the order found in English-speaking children (Glennen et al., 2005). However, despite the similar acquisition pattern of the four grammatical morphemes, children who were adopted from China lagged behind their non-adopted English-speaking peers in development of these morphemes. Those who were adopted at younger ages lag only a few months behind in their development of grammatical morphemes. It has been observed that as the age at adoption increases, the gap between the time of acquisition of a

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particular grammatical morpheme for children adopted from China and their non-adopted peers increases as well. In other words, although children adopted at older ages acquired grammatical morphemes at a faster rate than those who were adopted at younger ages, they also lagged further behind in grammatical morpheme development when compared to non-adopted, English-speaking children. This trend is also consistent with the findings of Pollock's (2005) study where children who were adopted from China at an older age lagged further behind than their non-adopted peers in terms of number of words acquired and mean length of utterance. Glennen and Masters (2002) had also reported that children who were adopted at older ages from Eastern Europe also lagged further behind their non-adopted peers while also following a similar developmental trend in grammatical morpheme acquisition. As non-adopted children are exposed to English from birth, the lag between these children and children adopted internationally is hypothesized to be due to the difference in length of exposure to the target language studied (Glennen and Masters, 2002). It was found in Glennen and Masters' study (2002) that all participants, regardless of age of adoption, had failed to acquire all four grammatical morphemes studied (plural '-s', possessive '-s', progressive '-ing', and past tense '-ed') by 37-40 months. This information is somewhat consistent with data presented in this study as acquisition of all four grammatical morphemes first happens at 42 months of age in the 24+ month subgroup. The 18-24 month subgroup follows closely behind by acquiring all four grammatical morphemes by 45 months of age. However, these data should be taken with caution as the number of participants in these two subgroups significantly decreased and may be more susceptible to variation from individual participants in the group.

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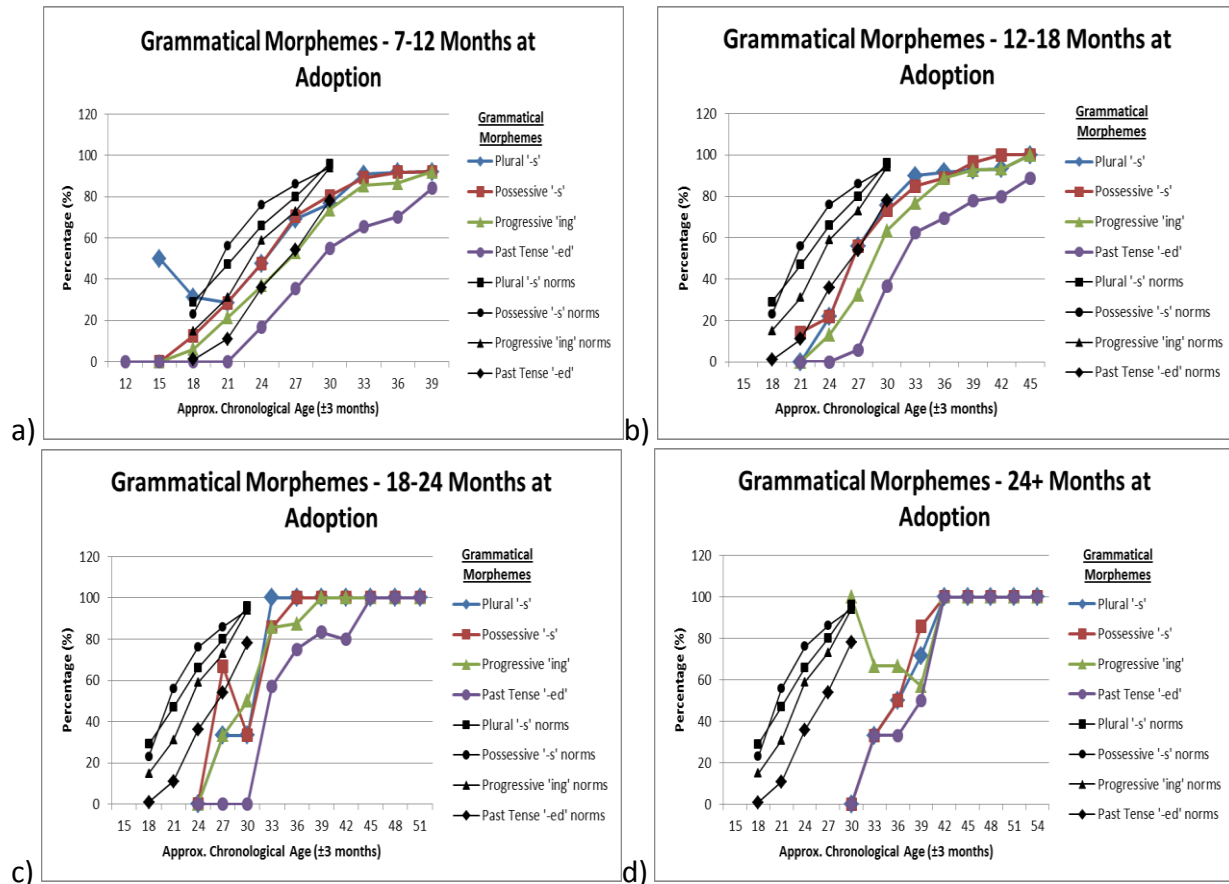


Figure 4. Percentage of use for grammatical morphemes plural '-s', possessive '-s', progressing '-ing', -and past tense '-ed' by approximate chronological age (± 3 months) for groups that were a) 7-12 months, b) 12-18 months, c) 18-24 months, and d) 24+ months of age at adoption. Percentage of use norms from the MCDI were included for comparison. MCDI, MacArthur Communicative Development Inventories.

Relationship between Vocabulary and Grammatical Measures

This study also examined the relationship between the mean number of words in the participants' vocabulary and mean sentence complexity scores (figure 5a). As the number of words in the participants' vocabulary increased, the number of complex sentences produced by the participants also increased. This is consistent with findings from the study by Geren et al., (2005) which also explored the relationship between vocabulary size and sentence complexity scores from the MCDI in internationally adopted preschoolers from China. Results from the

current study and from Geren et al.'s (2005) study, support the idea of lexicon development being a major contributing factor to the development of grammar (Moyle et al., 2007). As more words are acquired, the use of complex sentences is hypothesized to increase as the child is now able to utilize more words to form more complex sentences.

Aside from sentence complexity, this study also compared the relationship between vocabulary size and the number of grammatical morphemes acquired (figure 5b). It was found that as the number of words in the child's vocabulary increased, the number of grammatical morphemes acquired also increased. This measure can be directly related to the comparison between vocabulary and sentence complexity, as complex sentences depend on the use of grammatical morphemes. Thus, a similar trend should be expected between vocabulary and the number of grammatical morphemes acquired. Once again, the notion that the development of a larger lexicon would support the development of grammar (Moyle et al., 2007) also applies here as the word must be acquired in the vocabulary before it can be inflected with grammatical morphemes.

Figure 5c shows the comparison between expressive vocabulary and utterance length. ML3 was calculated by averaging the length of the three longest sentences that the child produced. Through examination of the relationship between vocabulary and ML3, it was found that as the child's vocabulary increased, the mean length of their utterances also increased. This finding is consistent with Geren et al.'s (2005) study where vocabulary size and mean length of utterance were also explored in preschoolers that were internationally adopted from China. The more words a participant has acquired in their vocabulary, the more words they will be able to utilize to form longer and more complex utterances. Thus, it is not surprising that

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vocabulary was found to be positively related to sentence complexity, number of grammatical morphemes acquired, and mean length of utterance as it is critical that the child has acquired enough words to allow him or her to begin building longer and more complex sentences with the correct grammatical morphemes. Again, this is the notion that the development of a strong vocabulary directly influences the development of grammar and sentence complexity (Moyle et al., 2007).

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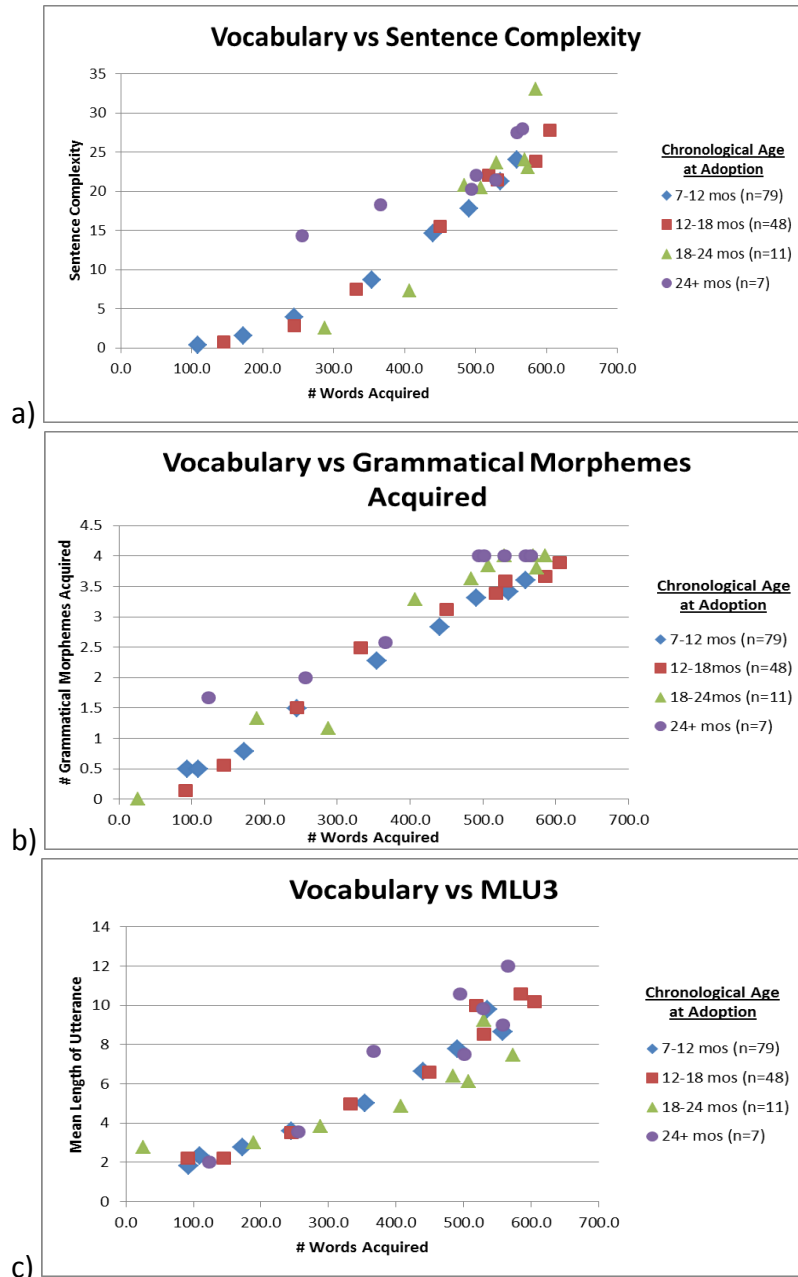


Figure 5. Relationship between dependent variables a) vocabulary and sentence complexity, b) vocabulary and number of grammatical morphemes acquired, and c) vocabulary and mean length of utterance.

Limitations

Even though the results of this study have been shown to be consistent with previous studies, there are limitations that should be highlighted. The first limitation is one that concerns

the sentence complexity measure. As sentence complexity is a measure that was taken directly from parent report, it is possible that participants who were older in age acquired whole sentences or phrases without knowing what the different components of the sentence/phrase were (unanalyzed utterance). Thus, the parents may be interpreting the unanalyzed utterance as a more complex sentence without being aware that the children had acquired the phrase as a whole. This may have an effect on the results of the sentence complexity measure as the score may not be an accurate reflection of the child's true sentence complexity level. The next limitation is that the majority of participants in this study were female. These results are representative of children adopted from China, as the majority of children adopted from China are female. However, these results may not be able to generalize to male infants and toddlers who are adopted from other countries. Next, a major limitation in this study is that subgroups containing children who were adopted at older ages (18-24 months and 24 months and above) did not include a large number of participants. Thus, the developmental trends found in these two groups should be viewed with caution as they may be more vulnerable to personal variation of individual participants. The last limitation is that this study only explored grammatical development in children adopted from China. It is unclear whether these results will be able to generalize to children adopted internationally from other countries and whether these results will be able to generalize to children who were adopted as preschoolers and older. Thus, further research needs to be conducted to determine whether the results from this study can be generalized to children adopted internationally from other countries and children who were adopted at older ages.

CONCLUSIONS / CLINICAL IMPLICATIONS FOR FUTURE RESEARCH

Infants/toddlers who were adopted from China acquired grammatical morphemes and enhanced their syntactic complexity in the same sequential order as their typically developing peers. The older the children were at the age of adoption, the more quickly they acquired grammatical morphemes and increased their syntactic complexity but the further they lagged behind their same aged peers in terms of morphological and syntactic development. The late exposure to their new language resulted in the participants' grammar developing significantly later than that of their same aged peers. The adopted children's native language had no effect in the sequential order in which grammatical morphemes were acquired. The same pattern had been shown for vocabulary development in children adopted internationally (Pollock, 2005). This study has shown that children make remarkable advancements in grammatical development over time.

In a study by Moyle, Weismer, Evans, and Lindstrom (2007), vocabulary and grammatical acquisition were examined in children identified as late talkers and compared to children who were typically developing. These researchers looked at vocabulary and grammar to determine whether these components of language develop separately or together. It was concluded that one mechanism must account for the acquisition of both vocabulary and grammar as these two components of language are strongly correlated. In the early stages of language development, it was found that as the lexicon of children that were typically developing increased, so did their grammar development. However, over time, grammar development began to facilitate vocabulary acquisition. It was found that the delay in vocabulary acquisition of late talkers significantly impacted their grammar development. Late

talkers have weaker grammatical abilities and do not use their grammatical abilities to further vocabulary acquisition.

It should also be mentioned that the use of the lexicon to build grammatical development is a pattern seen predominantly in late talkers. As late talkers are hypothesized to have weaker grammatical knowledge than their peers, they are unable to use grammar to help them deduce the meaning of a particular word (Moyle et al., 2007). The similarity of using the lexicon to aid in grammatical development between children adopted internationally and late talkers has led to the prediction that these two groups may have similar grammatical developmental trajectories. The similarities in grammatical development between children adopted internationally and late talkers should be further explored.

Further research should also focus on children adopted from China at an older age in childhood as this study had a limited sample in the older age subgroups. In addition, further research should examine the grammatical development of preschool and school-aged children adopted from China to identify a range of time where grammatical development can be expected to be at a similar level to typically developing same aged peers. Additional research in terms of grammatical development should be conducted with children adopted internationally from other countries. This will determine whether the same sequential acquisition of grammatical morphemes and syntactic complexity is consistent across all children adopted internationally.

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