Language development in internationally-adopted children acquiring French as a *"second first language"*

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Abstract

The language interruption and shift that internationally-adopted (IA) children experience provides unique data of theoretical and practical importance with regard to issues in second language acquisition, first language loss, and recovery. Investigating the development of IA children makes it possible to examine how early life experiences might affect later development and, in particular, the extent to which the language faculty is flexible and can adapt to a new language after interruption in acquisition of the birth language. The general purpose of the present research program was to study the ability of IA children to acquire their "second first language" and to identify factors that might favor or impede the development of their new language, French in the case of the studies presented in this thesis. In contrast with other studies, except for Cohen, Lojkasek, Zadeh, Pugliese and Kiefer (2008), variables that have been shown to have an impact on language development, namely familial socio-economic status, and sex, were carefully controlled in the present studies. To our knowledge, these are the first studies to examine the acquisition of French in IA children.

Study 1 is a longitudinal study in which the language skills, non-verbal intelligence, socio-emotional adjustment, and general health of Chinese-born children adopted into Canadian French-speaking families were compared to those of matched non-adopted monolingual French-speaking children. The children were assessed a first time at 4 years of age, on average, and again 16 months later. They had been in their adoptive families for 3 and 4 years, on average, respectively. The results of the initial assessment showed that the two groups did not differ with respect to socio-emotional adjustment or non-verbal intelligence. Moreover, the IA children performed in the average range on most language tests when compared to test norms, suggesting resiliency in their language acquisition abilities. However, an important percentage of IA children performed significantly below the norms on the Recalling Sentences subtest of the Clinical Evaluation of Language Fundamentals-Revised. Also, as a group, the IA children

performed significantly lower than their non-adopted peers particularly on expressive language tests (lexical and grammatical).

To better characterize the language abilities of the IA children, spontaneous language samples of a subgroup of the IA children from Study 1 were analyzed in detail in Study 2. Results of Study 2 indicated that the IA children had a remarkable capacity to catch-up to their non-adopted peers with respect to diverse features of language, such as mean length of utterance, lexical diversity, and tense morphology; but, they made significantly more errors with complement clitics. Globally, the results of Study 1 and 2 support the idea that the pattern of strengths and weaknesses that the IA children exhibited is somewhat unique and suggest the possibility of early age-of-acquisition effects in adopted children's acquisition of a second first language. These results also revealed that the initial facility with which IA children acquired French (time taken to produce first words and age of onset of word production in French) were significant predictors of their later language abilities, suggesting that IA children's very early language development plays an critical role in their later language outcomes.

Study 3 was undertaken in order to examine IA children's very early communicative and language development and the nature of adoptive mothers' language input and attention regulation strategies with their adoptive children soon after adoption. The results support the conclusion that adoptive mothers play an active role in promoting and maintaining joint attention with their adopted children and that the interaction strategy they use most, redirecting their child's attentional focus, contrasts with what has been shown to be effective for biological children raised in Western cultures (Baldwin, 1991; Tomasello & Farrar, 1986) but was, nevertheless positively associated with the internationally-adopted children's later lexical development.

Overall, the findings suggest that IA children exhibited accelerated development in diverse domains of their second first language; but, however, there were significant differences in specific aspects of their language development in comparison to matched control children that suggest the possibility of very early age of acquisition effects.

Résumé

L'adoption internationale engendre une expérience linguistique unique dans laquelle les enfants adoptés ont à apprendre une nouvelle langue alors que l'exposition à leur langue première prend fin brusquement. Cette situation particulière offre l'occasion d'obtenir des informations théoriques et pratiques importantes quant à la perte d'une langue première et l'acquisition d'une langue seconde. Étudier le développement des enfants adoptés permet d'examiner comment les premières expériences de vie peuvent affecter le développement ultérieur et plus particulièrement, comment la faculté du langage est flexible et peut s'adapter à l'apprentissage d'une nouvelle langue à la suite de l'interruption d'une langue première. L'objectif principal du présent programme de recherches était d'étudier les capacités des enfants adoptés de Chine à acquérir leur « seconde langue première » et d'identifier les facteurs favorisant ou nuisant au développement de leur nouvelle langue, soit le français dans le cas présent. Contrairement aux autres études effectuées dans ce domaine, à l'exception de Cohen (2008), des variables reconnues comme ayant une influence sur le développement du langage, soit le statut socio-économique et le sexe, ont été contrôlées dans le cadre des présentes études. Par ailleurs, à notre connaissance, il s'agit des premières études portant spécifiquement sur l'acquisition du français chez les enfants adoptés.

La première étude est une étude longitudinale visant à comparer les habiletés langagières, le fonctionnement intellectuel non-verbal, l'ajustement socio-émotionnel et la santé générale d'enfants adoptés de Chine par des familles québécoises francophones à celles d'enfants non-adoptés et unilingues francophones du même niveau socio-économique. Les enfants ont été évalués une première fois vers l'âge de 4 ans et ensuite 16 mois plus tard. Les enfants adoptés vivaient au sein de leur famille adoptive depuis respectivement 3 et 4 ans en moyenne. Les résultats de l'évaluation initiale ont démontré que les deux groupes étaient similaires quant à leur niveau d'ajustement socio-émotionnel et à leur fonctionnement intellectuel non-verbal. De plus, les enfants adoptés ont performé

dans la moyenne des normes dans la majorité des tests de langage, ce qui suggère de la résilience quant à leur capacité d'acquisition du langage. Toutefois, un pourcentage important des enfants adoptés ont performé significativement sous les normes au sous-test *Répétition de phrases* du Clinical Evaluation of Language Fundamentals-Revised (CELF-R). De plus, en tant que groupe, la performance des enfants adoptés était significativement plus faible que celle des enfants non-adoptés notamment aux tests évaluant le langage expressif (vocabulaire et grammaire).

Afin de mieux caractériser le profil langagier des enfants adoptés, des échantillons de langage naturel provenant d'un sous-groupe d'enfants adoptés évalués lors de la première étude ont été analysés en détail dans le cadre de la seconde étude. Les résultats de la deuxième étude ont démontré que les enfants adoptés présentent une capacité remarquable de récupération leur permettant de rattraper leurs pairs non-adoptés dans plusieurs sphères langagières, notamment au plan de la longueur moyenne des énoncés produits, de la diversité lexicale et de la morphologie des verbes. Cependant, les enfants adoptés ont fait significativement plus d'erreurs dans l'utilisation de clitiques. Globalement, les résultats des études 1 et 2 tendent à démontrer que le profil de forces et de faiblesses présenté par les enfants adoptés leur est spécifique et suggèrent la possibilité d'effets reliés à l'âge d'acquisition. Les résultats des études 1 et 2 suggèrent également que la facilité avec laquelle les enfants adoptés acquièrent le français initialement (le temps nécessaire à la production des premiers mots et l'âge de production des premiers mots) peuvent prédire significativement leurs habiletés langagières ultérieures, ce qui suggère que la capacité initiale d'acquisition de la « seconde langue première » joue un rôle important dans le développement langagier futur.

La troisième étude a été entreprise afin d'examiner le développement des habiletés de communication et de langage chez les enfants nouvellement adoptés ainsi que la nature du langage et des stratégies de régulation de l'attention utilisées par les mères adoptives. Les résultats suggèrent que les mères adoptives ont joué un rôle actif dans l'initiation et le maintien des épisodes d'« attention

conjointe » avec leur enfant. Par ailleurs, la stratégie d'interaction qu'elles utilisent le plus fréquemment, rediriger l'attention de leur enfant, était reliée positivement au développement lexical ultérieur des enfants adoptés, ce qui contraste avec les résultats d'études effectuées auprès d'enfants non-adoptés élevés au sein de familles occidentales (Baldwin, 1991; Tomasello & Farrar, 1986).

Globalement, les résultats suggèrent que les enfants adoptés présentent un développement accéléré dans plusieurs sphères relatives à l'apprentissage de leur « seconde langue première »; toutefois, des différences significatives sont présentes au plan de certains aspects spécifiques de leur développement langagier en comparaison avec des enfants non-adoptés du même niveau socio-économique et du même sexe, suggérant la possibilité d'effets reliés à l'âge d'acquisition.

Statement of Original Contributions

In this thesis, I present three manuscripts that make original contributions to understanding the language development of internationally-adopted children. The present studies are the first to examine the language development of IA children acquiring French and they are also the only studies on IA children exposed to their new language for 3 to 4 years, on average, which involved control groups matched for familial SES (education of mothers and fathers and familial income) and sex. Only one other study implemented such controls (Cohen et al., 2008) but involved younger IA children who had been exposed to their adoptive language (English) for only up to 24 months. These controls were applied in order to control for factors that have be shown to correlate with language development in typically-developing non-adopted children. The implementation of these controls revealed a more complex and precise portrait of IA children's language development than has been found to date, with some strengths especially in the sphere of receptive vocabulary and some lags in the domain of expressive language (lexical and grammatical skills). This study was also the first to find that a large proportion of IA children acquiring French present a significant weakness in their capacity to recall sentences, with an important proportion of the IA children who performed below average when compared to the test's norms as well as when compared to their non-adopted peers. This finding is practically as well as theoretically interesting because capacity to recall sentences has been found to correlate with language impairment and, in fact, is often used as a clinical marker of risk for impairment. While these results do not mean that the IA children in the present study are language impaired they raise the possibility that recalling sentence is sensitive to early age of acquisition effects.

Study 2 provides the first detailed analyses of the morphological development of IA children using spontaneous language samples. This study is the only study to date to examine IA children's acquisition of features of French that have been found to be vulnerable in L2 learners as well as children with

specific language impairment (e.g., Hamann, 2004; Grondin & White, 1996; Paradis & Crago, 2000), namely complement clitics, lexical diversity, and tense morphology. This study was the first to provide evidence that IA children, after 4 years of exposure to French, on average, exhibit similar mean length of utterance, frequency and correct use of tense morphology, and general lexical and verb diversity compared to matched non-adopted peers, suggesting that their language development was greatly accelerated in these domains. At the same time, findings from the present studies suggest that internationally-adopted children lag in their acquisition of complement clitics, a feature of French that is difficult for children learning French, including French as a first or second language and children with specific language impairment. An important theoretical contribution from Studies 1 and 2 is the suggestion of possible early age of acquisition effects (Hyltenstam & Abrahamsson, 2003; Mayberry & Eichen, 1991; Mayberry & Fischer, 1989).

To our knowledge, Study 3 is the first study to investigate the role of maternal input and attention-regulation strategies on IA children's language development. More specifically, Study 3 examined the generalizability of research findings on language input and attention-regulation strategies which have been derived mainly from studies of typically-developing monolingual children in Western cultural settings to IA children whose exposure to the target languages is delayed. Study 3 makes original contributions to the field of second first language acquisition by highlighting the importance of quantity of maternal input in the development of early lexical comprehension of IA children. Furthermore, the "directing" attention-regulation strategy that has been found to correlate negatively with lexical development in typically-developing monolingual children in Western cultural settings, correlated positively with the lexical development of IA children. This suggests that there is not an ideal maternal attention regulation style, but that the style that correlates with lexical development varies according to the type of learner and the context of learning (Akhtar, 2005; Vigil, 2002; Vigil et al., 2006).

To our knowledge, findings of the two longitudinal studies (Study 1 and 3) were the first to show that the rate of language acquisition of IA children might

decrease with time and affect more aspects of language ability with age, suggesting that amount of exposure to the new language alone might not be sufficient to explain the lags found in their profile.

Contributions of Authors

The three studies included in this thesis were written as manuscripts co-authored by myself and Fred Genesee. The questions, rationale, and methodologies for each study were developed by myself in collaboration with Fred Genesee. I recruited the participants, developed the coding schemes, participated in the data collection, conducted the analyses, and drafted and revised the manuscripts. Dr. Genesee assisted in the interpretation of the data and provided editorial comments on the manuscripts and helped fine-tune the final reports of each study. The three studies were submitted for publication. I presented the results of these studies at conferences throughout this process. Erika Hoff, Johanne Paradis and Maggie Bruck gave us input on an earlier version of Study 1. Theres Grüter and Johanne Paradis provided comments on an earlier version of Study 2. Their assistance is mentioned at the beginning of each manuscript. As a member of my thesis committee, Yuriko Oshima-Takane was consulted while designing Study 3. Finally, I supervised students and research assistants over the course of my doctoral studies. Their contribution consisted principally of testing participants and transcribing, coding and entering the data. They are acknowledged personally in each study.

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General Introduction

Language acquisition in childhood has been widely studied, and research in this area has contributed to a better understanding of the capacity as well as of the limitations of the language faculty early in life. A multitude of contexts provide diverse circumstances in which a child acquires language. For example, research has shown that children who learn two languages simultaneously from birth generally exhibit the same milestones and patterns of acquisition as monolingual children (Genesee & Nicoladis, 2006). However, some forms of dual language exposure might be expected to challenge the language faculty -- in particular, the acquisition of an additional language after exposure to a first language (L1). This context creates exceptional circumstances that might generate vulnerabilities in acquisition of a new language (Meacham, 2006; Miller, 1984). Of particular interest in the present thesis are internationally-adopted children (hereafter referred to as IA children). These children experience a unique linguistic experience in which they learn a "second first language" (De Geer, 1992; Glennen, 2002) while the development of the L1 is abruptly stopped. The general goal of this thesis is to foster our understanding of the language, cognitive as well as socio-emotional development of IA children and to determine to what extent the language faculty is resilient to the early risk factors encountered by IA children.

Why studying internationally-adopted children?

There has been increased scientific interest in studying the language acquisition of IA children, as reflected by the large number of studies published in this area in the past decade. Diverse reasons motivate this interest. First, there have been many international adoptions in Canada and the United States in the past 15 years (Ministère de la santé et des services sociaux, 2008; U.S. Department of State, 2005). More precisely, more than 14 000 IA children have been adopted in the province of Quebec, the site of the present study, since 1990 (Ministère de la santé et des services sociaux, 2008). Second, adoptive parents are often concerned about the language development of their newly adopted child. A

survey conducted one year post-adoption indicated that the primary concern of adoptive families is the speech and language development of their adopted children (Clauss & Baxter, 1998). Third, there is a need for research on IA children to provide guidance to health professionals who are involved in the care of IA children (Ouellette & Belleau, 2001). Fourth, the experience that IA children go through constitutes a natural experiment that has the potential to shed light on theoretical questions related to resiliency and early age effects on language acquisition (Hyltenstam & Abrahamsson, 2003). These theories will be presented shortly following a discussion of how best to conceptualize the language acquisition of IA children.

Conceptualization of language acquisition process in internationally-adopted children

The language acquisition of IA children cannot be conceptualized easily in terms of first language acquisition, simultaneous bilingual acquisition, or second language (L2) learning since most IA children are no longer exposed to their L1 once they are adopted. The term *language arrest* has been used to refer to the interrupted exposure to the L1 that IA children experience (Glennen, 2002). As noted earlier, the term "second first language" acquisition has been used to describe IA children's linguistic experience (De Geer, 1992; Glennen, 2002). The latter term portrays the unique linguistic experience of IA children most adequately since these children are often adopted quite young and, thus, have not developed complete mastery of their first language when they begin to learn the adoptive language which often becomes their only language. Furthermore, they frequently lose their L1 shortly after adoption (De Geer, 1992; Nicoladis & Grabois, 2002). Consequently, their language acquisition cannot be conceptualized in term of *bilingualism*. Throughout this thesis, the terms *birth or original language* will be used in reference to the language IA children learned at birth and the term *adoptive* or *new language* will be used in reference to the language spoken in their adoptive families.

Possible language outcomes post-adoption and explanations

The exceptional circumstances in which IA children develop language could result in different outcomes. First, their language development could resemble that of monolingual children suggesting that processes that underpin L1 acquisition are still in progress and that the enriched post-adoption environment that IA children experience might compensate for delayed exposure to their "second first language" and the lack of social and linguistic stimulation they experience pre-adoption as a result of institutionalization. This would indicate a significant degree of robustness and flexibility in their language learning ability and would suggest resiliency in the face of impoverished pre-adoption learning environments. This would also accord with the traditional version of the critical period hypothesis (Lenneberg, 1967; Penfield & Roberts, 1959) which suggests that, before puberty, the acquisition of an L2 is rapid and can result in native-like levels of ultimate attainment, a point that will be explored in more detail later.

An alternative possibility is that the experiences that IA children go through, including a sudden change in language exposure, may impede their ability to master the new language in the short-term and even long-term. Indeed, it has been suggested that the abrupt interruption in exposure to the birth language that they experience creates vulnerabilities in the acquisition of the adoptive language (Miller, 1984; Schiff-Myers, 1992). This could result in two developmental profiles: 1) IA children could experience generalized delays or problems affecting not only language development but also cognitive and socio-emotional development. These generalized effects could be due to their pre-adoption history, including early social, emotional and linguistic deprivation, as well as possible health-related problems, and/or genetic factors; or 2) the cognitive and socio-emotional development of IA children might be normal for their age, but they would experience delays or difficulties specific to acquisition of the adoptive language. Theoretical accounts and empirical data that are relevant to each of these possible outcomes are discussed in the next section.

Theoretical explanations of language outcomes of IA children

Effects of early deprivation and institutionalization. In addition to experiencing a unique linguistic experience, IA children encounter early adverse circumstances pre-adoption. Indeed, a vast majority of IA children live in institutional environments before being adopted, which is in many respects different from a typical rearing environment. Research in this area can further our understanding of the long-term effects of early impoverishment on developmental processes and outcomes and can, in turn, shed light on the capacity of the child to recover from early social and/or physical deprivation (Gunnar, Bruce & Grotevant, 2000). As proposed by the "developmental niche" framework (Super & Harkness, 1997), physical and social settings, along with child-care/child rearing customs and caretakers' psychology (i.e., parenting styles, value systems, parental cultural belief systems and developmental expectations), constitutes one of the subsystems that mediate child development. It might be expected that the physical and social settings in which IA children develop during the first months or years of life challenge their development due to the lack of stimulation, emotional consistency, and care that they experience. Gunnar, Bruce and Grotevant (2000) proposed three possible levels of privation for children raised in institutions. The first level comprises nutrition, hygiene and medical care and is influenced by the political and economic conditions of the country. The second level includes stimulation, support for social, language, cognitive and motor development. The third includes consistent and durable interpersonal relationships and the chance to develop an attachment relationship with a stable caregiver. Children raised in an orphanage are often deprived of consistent and durable interpersonal relationships due to frequent changes in caregivers and low caregiver-child ratios (Gunnar, Bruce & Grotevant, 2000).

According to Johnson and Dole (1999), it is nearly impossible for children to not be negatively affected by their stay in an institution. Studies have shown that institutionalized children exhibit more developmental delays compared to their non-institutionalized peers (Ames, Fisher, & Savoie, 1994; Kaler & Freeman, 1994; Morison, Ames, & Chisholm, 1995) and that the length of time

spent in an orphanage is related to the extent of delay or impairment in cognitive, behavioral, social, and attachment abilities of IA children (e.g., Chisholm, Carter, Ames, & Morison, 1995). For example, Miller and Hendrie (2000) found that IA children from China tended to exhibit more language delays as the length of stay in an institution increased. However, the length of time in an institution is confounded with the age at which children are exposed to their new language. Therefore, it is difficult to separate the respective role of each variable on the language development of IA children. One way of separating these factors is by examining the impact of being raised in an institution as opposed to other types of pre-adoptive placements. In a study by Groze and Ileana (1996), language delays were more common among Romanian children coming from institutions than children coming from other placements (e.g., children adopted directly from families, from maternity hospitals, or from other medical settings).

It is often difficult to evaluate the precise impact of institutionalization on IA children's development due to the lack of information about their functioning before institutionalization, their genetic background, prenatal care, and birth history. Kaler and Freeman (1994) were able to obtain information regarding perinatal characteristics of Romanian children still living in an orphanage and found that Apgar scores and birth weight were not related to the cognitive and adaptive delays that children exhibited when they were between 23 to 50 months of age, suggesting that other factors, including those related to institutionalization, might have a more important impact on development. However, these factors are often difficult to quantify since the extent of deprivation that children suffer during their institutionalization is usually not well documented (Wismer Fries & Pollak, 2004). Furthermore, there can be important variability among institutional settings (Gunnar, Bruce & Grotevant, 2000) with respect to the quality of care and stimulation that they provide. Even in the same orphanage, conditions might be different for different children depending on their caregiver. Moreover, conditions in the same orphanage can be quite different depending on socio-political factors prevailing at the time a child is adopted. For example, conditions in orphanages in Romania have reportedly improved leading to better outcomes (e.g., Glennen &

Master, 2002). As well, orphanages in China have received increased economic support from organizations inside and outside China during the past decade and this has contributed to increased quality of care pre-adoptively (Dalen & Rygvold, 2006).

Early fine-tuning of the language faculty. Theoretical and empirical accounts related to early language development milestones is also relevant to predictions about and our understanding of the language development of IA children. The development of new methodologies and techniques to study language processing in pre-verbal infants has promoted research demonstrating that children start to acquire and process language very early, even before birth. DeCasper & Spence (1986) have found that, shortly after birth, infants prefer to listen to a story read to them by their mothers during their last 6 weeks of pregnancy than to a novel story, suggesting that even in the womb, infants possess the ability to perceive and retain information about speech. Jusczyk (1997) has suggested that it is likely that these effects are mediated by infants' retention of information about the general rhythmic properties of the language they heard while in the womb. Research has also shown that, at birth, infants can discriminate most phonetic units employed in all natural language (e.g., Streeter, 1976; Werker & Tees, 2002). This ensures that infants are equipped from birth to discriminate most phonetic contrasts in any language. Developmental research has demonstrated further that, during the first year of life, infant speech processing shifts from being language independent (general) to language-specific. More specifically, during the second half of the first year of life, infants' ability to discriminate phonetic units that are non-native declines as their ability to discriminate native contrasts continues (Werker & Tees, 2002). For example, while Japanese-learning infants between 6-8 months of age can discriminate the English contrast [r]-[l], at 10-12 months of age, they no longer can (Kuhl et al., 2006). Similarly, adult speakers of Japanese have great difficulty making this discrimination (Goto, 1971).

Infants' early abilities to discriminate phonetic units have been found to be related to their later language development. Kuhl, Conboy, Padden, Nelson and

Pruitt (2005) found that 7-month old English-speaking children's ability to discriminate native phonetic contrasts was positively correlated with their performance on the following sub-scales of the MacArthur-Bates Communication Development Inventory: word production at 18 months, sentence complexity at 24 months, and mean length of the longest three utterances at 24 months. In contrast, their ability to discriminate contrasts that are phonemic in Mandarin Chinese, a language that they were never exposed to, was negatively correlated with their later language development. Taken together, these results suggest that the level of maturity of infants fine-tuning to their native language during the first months of life is related to their later language development.

Based on the findings presented above and other research on early language acquisition, Kuhl (1994) proposed the *Native Language Magnet (NLM) Theory* and its revised version, the *Native Language Magnet Theory, expanded* (NLM-e; see Kuhl et al., (2008) for a complete explanation and rationale behind the theory) which argue that early phonetic learning modifies perceptual abilities and affects later language learning as a result of an underlying native language neural commitment (NLNC; Khul, 2004). The NLNC hypothesis proposes that early language exposure creates neural networks that encode acoustic properties of native-language speech. It argues further that statistical and prosodic regularities of the native-language that are encoded before 10 months of age are used later to acquire computationally more complex skills in that language, such as recognition of the typical stress pattern of words (e.g., Jusczyk, Houston, & Newsome, 1999; Kuhl, Williams, Lacerda, Stevens, & Lindblom, 1992). According to the NLNC hypothesis, acquisition of specific features of the native language in this fashion limits future learning of foreign/second languages that do not conform to the patterns learned during this early stage of development (Kuhl, 2004). The NLNC hypothesis is in line with bootstrapping approaches to understanding language acquisition (Morgan & Demuth, 1996). According to prosodic and phonological bootstrapping theories, phonological and prosodic signals in the input language help infants identify higher order linguistic structures, such as sentential phrases or clauses, using acoustic information and

patterns in early input (Gerken, 2001). For example, Jusczyk et al. (1992) have argued that infants' sensitivity to acoustic markers associated with major grammatical units, such as phrases and clauses, plays a role in their later morpho-syntactic development. In a related vein, Hernandez and Li (2007) present evidence concerning the neural and computational mechanisms that could account for age of acquisition effects in L1 and L2 language acquisition as well as in non-linguistic domains. They conclude that sensorimotor integration and learning play crucial roles in age of acquisition effects and they argue that their view is consistent with that of Kuhl and others (e.g., Elman, 2005) who hypothesize that early learning results in dedicated neural circuitry that influences later language development.

In short, there is ample empirical evidence that infants process speech input very early on and, as they develop, their speech perceptual capacities became more selective and more tuned to the phonetic patterns of their native language. A number of current theories of infant speech production and language learning suggest that the language development of young IA children (those adopted around 1 year of age) might differ from that of monolingual children because of lack of exposure to the adoptive language during the first year of life and abrupt interruption in exposure to the birth language. These effects in IA children, if true, might be explained in terms of theories like those of Kuhl and others, as reviewed above. Most children adopted from China by Quebec families are around one year of age at the time of adoption. Thus, they are interesting cases for testing the potential effects of early fine-tuning to a native language, and the interruption of that process, on "second first language" acquisition.

Critical Period Hypothesis and early age effects. Penfield and Roberts (1959) suggested that the biological and neurological state of infants' and young children's brains are advantageous for L2 learning. More specifically, they proposed that children have greater neurological plasticity than adults and that, before approximately 9 to 12 years of age, children can learn two or three languages as easily as one (p.235). Beyond approximately 10 years of age, they argued, learning an L2 tends to be mediated via the L1 (i.e., the learners use the

learned symbols of their L1 to acquire the L2). Somewhat later, Lenneberg (1967) developed Penfield and Roberts' hypothesis further and proposed that the critical period hypothesis (CPH) extends from 2 years of age to puberty. Before 2, language acquisition is not possible because of neuro-maturational limitations and, after puberty, language acquisition is hindered by the loss of neural plasticity. Lenneberg based his hypothesis on data from unilateral brain damage in children and from hemispherectomies in adults that demonstrated that the child's brain is less lateralized than the adult brain and that transfer of function from one hemisphere to the other is possible between the ages of 2 and 13, approximately.

The CPH is generally accepted for L1 acquisition (Marinova-Todd, 2003), but is highly debated by L2 researchers. L2 learning and its outcomes have been shown to be very complex phenomena which are affected not only by age of acquisition of the L2 but also by, among other things, the availability of the L2, the quality of input, and motivational factors. The CPH has engendered a persistent research interest for more than three decades. Age of acquisition and critical period issues were included in a list of the 100 most important scientific questions to be addressed in the coming decades in the 125th anniversary issue of Science (Kennedy & Norman, 2005).

Hyltenstam and Abrahamsson (2003) have suggested that the critical period might be an illusion perpetrated by studies of L2 attainment that have underanalysed their data. In one study, they carefully examined the native-likeness of adult L2 learners of Swedish whose first intensive exposure to Swedish occurred at different ages: from 4 to 5 years; 8 to 10 years; 12 to 15 years; or 19 to 23 years of age. The subjects' language competence was examined using a number of highly complex language tasks (e.g., cloze test, retelling of written and oral texts, reading aloud of a phonologically controlled text, grammaticality judgment, repetition of language in white noise, and written composition) and was compared to that of a group of adult native speakers of Swedish. In brief, they found that native speakers were significantly better than the L2 learners, even those who had begun to learn Swedish between 4 and 5 years of age. There was no significant difference on most tasks between the L2

sub-groups according to their age of first exposure to Swedish. Hyltenstamm and Abrahamsson argued that their results indicated that even very early age of onset does not automatically result in nativelike proficiency in L2 learners. The authors called for additional research on very young L2 learners in order to investigate these issues further.

Early age of acquisition effects have also been found with deaf children who begin acquiring sign language as an L1 or L2 at different ages (Mayberry, 1993; 2007). Research by Mayberry has shown that age of acquisition effects are evident even during the early childhood period and that they affect L1 acquisition more than L2 acquisition. IA children, although their adoptive language cannot be categorized unequivocally as an L2 or an L1, represent an interesting population for examining very early age of acquisition effects.

Studies on language development of IA children

Research of IA children has been carried out on children who are adopted from different countries. The country of origin of IA children is an important variable to consider when interpreting research findings since this factor has the potential to influence developmental outcomes (e.g., Dalen & Rygvold, 2006). Indeed, the reasons for adoption, the conditions of institutionalization, the selection criteria of children available for adoption determined by the country of origin, the adoption procedures, and the health status of IA children can be quite different from one country to another. China provides unique circumstances because of the social policies that allow families to have only one child. This one-child policy, which began in 1981, has resulted in an increase in the number of children available for adoption from China (Johnson, Banghan, & Liyao, 1998). Indeed, Johnson, Banghan, and Liyao (1998) found that the main reason for which Chinese families abandoned a child was China's strict birth planning policies rather than health concerns, as is the case in other countries.

Thus, it is possible that children adopted from China are uniquely advantaged when compared with children from other countries where parents may give up children for adoption owing to socio-economic, medical, or psycho-social difficulties; the latter conditions may predispose the adopted child to

developmental problems later. For example, serious health conditions such as Fetal Alcohol Syndrome reported in children adopted from Eastern European countries (e.g., Rutter & the English-Romanian Adoption Study Team, 1998) are not as prevalent in children adopted from China (Roberts, Krakow & Pollock, 2003). McGuinness, McGuinness and Dyer (2000) found that 41% of the birth mothers of the IA children from Eastern Europe they studied (N = 105) had a history of alcohol abuse. Differences in school success have been reported in a study in Quebec, the site of the present study, on children who were adopted from diverse countries, including Eastern Europe, China, Africa and Haiti (Tessier et al., 2005). Only 2.5% of Chinese adopted children failed a year in primary school compared to more than 40% of children adopted from Russia. Other research conducted in Quebec found that Chinese adoptees had significantly higher scores on the cognitive scale of the Bayley upon arrival and on the WISC-IV at 7 years of age compared to children adopted from Russia (Lapointe, Gagnon-Oosterwal, Cossette, Pomerleau & Malcuit, 2006). Moreover, children adopted from China performed better in school when compared to children adopted from Russia and other Asian countries (Lapointe et al., 2006). Therefore, the findings concerning IA children adopted from China are separated from those involving children adopted from other countries in the following sections.

Language outcomes of adopted children from countries other than China. Clark and Hanisee (1982) found that, on average, 40 month-old children adopted from Korea and Southeast Asia performed in the superior range when compared to norms on the Peabody Picture Vocabulary Test, a test of receptive vocabulary. These children had been in their adoptive American families, on average, for 33 months (range = 23-57 months). In an earlier study, DiVirgilio (1956) found that the 24 Korean children adopted by American families involved in her study all learned English rapidly. However, no description was given about the way language learning was assessed. Dalen (2001) examined 11- to 16-year-old children adopted from Korea and Columbia (n = 193) who were between 2 months to 81 months of age (M = 16.28). As a group, these children had lower language skills when compared to a non-adopted group of children from Norway

(n = 193). Dalen examined two kinds of language abilities: day-to-day language skills and school-language (i.e., use of language at a higher cognitive level). The adopted children's school-language abilities were particularly low and were correlated with their school performance. The author warned parents and teachers about the possibility that their children's proficiency in the use of daily language might hide deeper language difficulties.

Glennen and Masters (2002) conducted a longitudinal study of the language development of 130 children adopted from Eastern Europe. The adopted children appeared to follow the same language developmental pattern as non-adopted children. After their arrival in the United States, children adopted at various ages (0 to 30 months) rapidly began to speak English and their expressive vocabulary improved quickly. However, they were delayed in comparison to the norms of English- speaking children and this delay increased with the age of the child at the time of adoption. Children adopted between 0 to 12 months of age reached age level for receptive and expressive language by 30-36 months of age; children adopted between 13 to 24 months of age continued to exhibit a few months delay in their receptive and expressive language at 37-40 months of age; and children adopted between 25 to 30 months of age continued to demonstrate delays in their English receptive and expressive abilities at 40 months of age. The frequency of speech and language services required by these children was positively correlated with their age at adoption. Thirty-four children (47%) adopted before 12 months of age underwent speech-language pathology assessments, and treatment was recommended for 22 of these 34 children (31% of the total number of children in this category). Seventeen children (58%) adopted between 13 and 18 months underwent speech-language pathology assessments, treatment was recommended for 41% of them. For the children adopted between 19 to 24 months of age, 11 of 15 (73%) underwent clinical assessment and 7 (46%) were recommended for treatment.

Glennen (2007) has recently conducted a study using direct assessments of children adopted from Eastern Europe rather than relying on parental reports, as has been the case in many studies of IA children. Her study involved 27 children

between 11 to 23 months of age who were followed during their first years post adoption. At the last assessment, the children were, on average, 31 months of age and they had been exposed to English for 15 months, on average (range = 12-21 months). Twenty-two percent of the children were considered to be developing language slower than their peers; that is, they scored below the 16th percentile on two or more assessment instruments. Croft et al. (2007) found that 82% of 6 year-old children adopted before 6 months of age from Romanian institutions scored in the average range on a task that assessed information content of narratives (i.e., retelling a story with the help of pictures). On a task assessing understanding of grammatical contrasts, 88% of the children adopted before 6 months of age scored in the average range. Only 3% of the children performed below average on a test of receptive vocabulary. In contrast, the percentage of children adopted between 6 to 42 months who scored within the average range on these measures was significantly smaller, varying from 56% to 76%.

Similarly, Morison, Ames and Chisholm (1995) found that Romanian children adopted at or before 4 months of age were not considered to have a language delay 25 months post-adoption, according to parental reports. In contrast, children adopted after 8 months of age exhibited significant language delays. However, they had only spent 11 months in their adoptive homes, considerably less than the children adopted at a younger age (i.e., at or before 4 month-old). Tirella, Chan and Miller (2006) found that 52% of the 8- to 12-year-old children (N = 81) from Eastern Europe they studied had a language disorder according to parental report. McGuinness et al. (2000) studied children adopted from the former Soviet Union (N = 105) who had been in their adoptive home for at least 2 years. They found that 55% of the children (n = 58) received speech/language therapy.

Language outcomes of adopted children from China. In Quebec, China is by far the country from which IA children are adopted the most (Secrétariat à l'adoption internationale, 2008). Studies examining the early language acquisition of IA children from China suggest that they generally acquire their adoptive language relatively rapidly (Krakow & Roberts, 2003; Pollock, 2005). More

specifically, Krakow and Roberts (2003) found that 80% of their sample of 15 adoptees from China (24-31 months of age with less than 2 years of exposure to English) scored above the 25th percentile on the Language Development Survey (LDS; Achenbach & Rescorla, 2000). Using the same questionnaire completed by adoptive mothers, Tan and Yang (2005) found similar results among a larger group of 186 children adopted from China. As a group, IA children had caught-up with native English-speaking children after 16 months of exposure to English (between 24 to 29 months of age) on scores reflecting vocabulary size and phrase length. After an average of 21 months of exposure to English (30 to 35 months of age), the adoptees performed above the normative sample according to their mothers' answers on the LDS. Pollock (2005) followed 141 children adopted from China beginning at 1 month after adoption for 19 months using a standardized parent report instrument, the MacArthur Communicative Development Inventories (MCDI). Subgroups were created according to their age at adoption. The children adopted between 7 to 12 months of age (55% of the sample) scored, on average, around the 25th percentile for number of words produced and mean length of their three longest utterances, when assessed at a number of time points between 9 months to 30 months of age. However, children adopted after their first year of life scored, on average, below the 25th percentile on these measures. After this age, the children's performance could not be compared to the norms which end at 30 months.

While research reviewed on Chinese adoptees to this point has relied on parental reports, other studies have involved direct assessments. Longitudinal studies of newly-adopted children from China have been conducted to examine their rate and patterns of language development. The language acquisition of adopted children from China appears to progress rapidly and to follow the same developmental patterns as monolingual children matched for vocabulary size (Geren, Snedeker, & Ax, 2005; Snedeker, Geren, & Shafto, 2007). In a case study of a child adopted from China at 17 months, Nicoladis and Grabois (2002) also reported rapid loss of Chinese as well as rapid acquisition of English.

Roberts, Pollock, Krakow, Price, et al. (2005) found that 94.5% of the children in their sample of 55 3- to 6- year old children adopted from China scored in the average or above average range on a battery of standardized language tests including the Clinical Evaluation of Language Fundamentals-Preschool (CELF-P), the Expressive One-Word Picture Vocabulary Test-Revised (EOWPVT-R), and the Peabody Picture Vocabulary Test-Third (PPVT-Third Edition). Other studies have found that a considerable proportion of IA children perform in the average range on standardized tests normed on native speakers of the adoptive language (Cohen et al., 2008; Scott, Roberts, & Krakow, 2008).

Although, as a group, IA children from China tend to score in the average on standardized language tests, some studies suggest that there might be a subgroup of approximately 20% who exhibit significant language delays/difficulties or receive speech and language therapy services (Roberts, Pollock, & Krakow, 2005; Tan, Dedrick & Marfo, 2007). Roberts, Pollock and Krakow (2005) assessed the 10 lowest performing IA children from an original cohort of 55 IA children on a number of language tasks after they had had two years of additional exposure to English. These children were 5 years 10 months old and had had 4½ years of exposure to English, on average. The authors hypothesized that this additional language exposure would allow them to catch-up to IA children of the same age, same age at adoption, and with the same length of exposure to English. The cohort of 10 lowest performers was compared to a group of 17 adopted children from the original cohort. The author's hypothesis was not confirmed; despite the additional exposure to English, the average performance of the low performers was significantly below the performance of the comparison group of IA children, suggesting that exposure and age at adoption could not explain why this sub-group continued to exhibit lower language abilities. A high incidence of language delays (43%) was reported in a group of 452 IA children from China, but most of these children (88%) were assessed within 2 months of arrival in the United States (Miller & Hendrie, 2000).

Price (2003) conducted a study of the speech and language development of six children adopted from China between the ages of 9 to 17 months; they were

evaluated every 3 months until they were 3 years of age. The last assessment evaluated speech and language outcomes as well as pre-literacy skills. Price's study focused on individual differences and on the course of language development of each child. The longitudinal data showed that two of the children exhibited rapid vocabulary growth immediately post-adoption, whereas two exhibited slow vocabulary growth during the first year after adoption with a vocabulary spurts around one year post-adoption. The two remaining children exhibited stable growth in vocabulary development over the duration of the study. At 3 years of age, four of the children performed in the average range on standardized measures of expressive and receptive language and vocabulary whereas two (33.3% of the sample) lagged behind on some of these tests. There were many individual differences in rate of language acquisition and in language outcomes at 3 years of age. It is important to note that the pre-adoption experiences of these children is not representative of other IA children in that these children were raised in orphanages. In fact, 4 of the 6 children were in foster care for a certain period of time before adoption. As Price indicates, institutionalization is a risk factor for adopted children. Thus, the fact that most of the sample was in foster care before adoption might have resulted in better outcomes than would be found with a more representative sample.

In the aggregate, findings from research on IA children from China have found that their language outcomes are often good. These results suggest that, generally speaking, young IA children from China generally exhibit robust and resilient abilities to overcome the effects of the language shift they have experienced and any deprivation they might have experienced pre-adoptively. However, a subgroup appears to lag behind in their language development. Potential factors that might explain this discrepancy are presented in the section "Variables Related to Language Outcomes".

School achievement

Yet other research has looked at older adopted children during the school years and their academic achievement. However, only a few of these studies has involved children from China. Dalen and Rygvold (2006) found no significant

differences between a group of 7 to 13 year-old adopted children from China (*n* = 77; age at adoption ranged from 2 months to 52 months) and a group of Norwegian-born children (*n*= 77) of the same age with respect to educational achievement, language skills, behavioral problems, and school and social behavior. However, there was much greater variability in the results of the adopted group than the control group. Most of this variability was due to variation in the adopted children's academic language skills and their levels of hyperactive behavior. Lapointe and collaborators (2006) found that the majority of adopted children from China in their study performed above average academically. Other studies, in contrast, suggest a higher incidence of academic or language-related difficulty among school-age IA children. For example, despite the fact that, as a group, IA children scored in the average range on a variety of oral and written language tests, Scott et al. (2008) found that more than half of the 7;6-year old IA children from China in their sample were receiving supplementary academic or special education services.

Le Mare, Audet and Kurytnik (2007) found similar results with respect to services received for academic problems among a group of children adopted from Romania. They followed three groups of children for several years: in the first group, children spent at least 8 months in a Romanian orphanage (*n* = 36); in the second group, children were given up for adoption and most (*n* = 25) were adopted directly from hospitals or from their biological parents very early in life; a few (*n* = 4) were adopted from orphanages; and the third group consisted of non-adopted children in Canada (*n* = 42). At 10.5 years of age, the adopted children in the first and second groups had received significantly more services for academic problems (55% and 30%, respectively) compared to children in the non-adopted group (15%). For children adopted early in infancy (Group 2), the impact of early deprivation (particularly with respect to behavioral and academic problems) tended to appear later in development with the additional pressure and challenges of school. In a related vein, McGuinness et al. (2000) found that 57.3% of their sample of 6- to 9-year old children adopted from the former Soviet Union had attended special classes that provided speech/language therapy in addition to

participation in regular class. Tirella, Chan and Miller, (2006) found that 36% of the 8- to 12-year old adopted children from Eastern Europe ($N = 81$) they studied had learning disabilities and 38% had attentional problems, as reported on a parent questionnaire. Moreover, 61% of the children were receiving special education services as part of an individualized education plan; this was a significantly higher participation rate when compared to that of the general population, namely 12% (U.S. Department of Education, 2001). However, most of the children in this study were adopted quite late; 84% of their sample was 3 years of age or older at the time of adoption (average: 54 months; range 1 year to 8 years).

Glennen and Bright (2005) monitored the progress of children adopted from Eastern Europe from the time they were 2 to 3 years of age until they were 6 to 9 years old; all the children had been adopted before 30 months of age. Based on parent and teacher responses to a survey, 17.4% of these children were receiving accommodations in the classroom or were in special education programs; 27.3% had received speech-language pathology services in the previous year; 11.4% were currently diagnosed with a speech-language delay or disorder; and 11.4% had a learning disability. Dalen (2001) found that the academic performance of a group of children adopted from Columbia and Korea (n = 193) was lower than that of Norwegian-born children ($n = 193$). Adopted girls' school performance was significantly better than that of adopted boys, and children from Korea had significantly better school performance than children adopted from Columbia. Finally, Van IJzendoorn, Juffer and Klein Poelhuis (2005) carried out a meta-analysis of 62 studies involving 17 767 adopted children from diverse countries, except China. They found that adopted children had higher IQs and better school performance than children who remained in institutions or in their birth families. The IQ of the adopted children was not different from that of non-adopted peers or siblings. In contrast, their language skills and school performance were lower compared to that of non-adopted peers or siblings, and IA children exhibited more learning problems. As the authors pointed out, these results suggest that adoption has a positive impact on the cognitive development of children. However, it also

appears that many IA children often exhibit delays in their language and school performance.

In brief, the results of studies examining school achievement in adopted children from countries other than China suggest that while many IA children do well in school, a relatively large proportion experience academic difficulties. Results from the small set of studies involving children from China tend to be more positive. However, one study suggests that even these children receive more supplementary academic or special education services compared to their non-adopted peers (Scott et al., 2008) and another suggests that, although they are not significantly different from their peers as a group, there is more variability in their language abilities (Dalen & Rygvold, 2006).

Cognitive outcomes

Rutter, O'Connor, and the English and Romanian Adoptees (ERA; 2004) study team compared the cognitive abilities of Romanian adoptees ($N = 144$) who had been raised in very impoverished institutions to those of a sample of 52 children born in the UK who had been placed in adoptive families before 6 months of age. They found that none of the Romanian children adopted before 6 months of age exhibited cognitive deficits; in fact, all of them performed in the average range or higher on the general cognitive index of the McCarthy Scales of Children's Abilities when compared to test norms. In contrast, cognitive deficits were observed in Romanian children who stayed in an institution more than 6 months before adoption. Deficits were found in children who suffered severe subnutrition as well as those who did not, suggesting that factors other than malnutrition, such as restricted human interactions and limited early experiences, might be related to cognitive deficits. However, the most serious deficits were found in children who stayed the longest in institutions and who suffered from severe subnutrition. These results suggest that being raised in an institution has a negative effect on intellectual development (measured at 6 years of age) only if it involves severe deprivation, which was most probably not the case for the children in the present studies. Indeed, IA children from China have been found to perform in the average range on measures of intellectual functioning (Lapointe et al., 2006; Scott et al.,

2008), even in comparison to non-adopted children of similar familial socio-economic status (Cohen et al., 2008).

Behavior and socio-emotional functioning

Tan and Marfo (2006) as well as Dedrick, Tan and Marfo (2008) examined the behavioral and emotional functioning of large samples of IA children from China using the Child Behavior Checklist for Ages 6-18 (CBCL/6-18). They found that IA children scored higher on the behavioral and emotional functioning scales of the CBCL in comparison to Achenbach and Rescorla's U.S. normative data. The age of the children varied widely; children in Tan and Marfo's (2006) study were between 1.5 and 11 years of age and those in Dedrick et al.'s (2008) study were between 6 and 15.7 years of age. Similarly, Rojewski, Shapiro and Shapiro (2000) found that adoptive parents' ratings of their children's behavior on the Behavior Assessment Scale for Children (BASC) were, on average, in the normal range ($N = 45$; Chinese adoptees). The scales of the BASC assess hyperactivity, aggression, conduct problems, anxiety, depression, somatization, atypicality, withdrawal, and attention problems. Although as a group these children scored in the typical range, some IA children in the sample exhibited at-risk behavior (below the clinical significance level) in the following domains: hyperactivity, aggression, conduct-related behavior, and attention problems. The younger children were rated significantly more negatively on the withdrawal scale compared to their older peers. The older children received significantly higher ratings on the aggression and hyperactive scales. Dalen and Rygvold (2006) found that 7- to 13- year old children adopted from China ($n = 77$) were not more at risk for exhibiting hyperactive behavior than a group of Norwegian children ($n = 77$) matched for age. Their sample included mostly girls (97.4%).

Many studies have been conducted to investigate the socio-emotional and behavioral outcomes of children raised in orphanages in Eastern Europe. Only a few of these will be presented here. Glennen and Bright (2005) found that the most common diagnosis of the 46 school-age children adopted from Eastern Europe they studied was attention deficit disorder/attention deficit hyperactivity

disorder. However, this diagnosis was principally given to boys. Rutter et al. (2004) found that disinhibited attachment was significantly more frequent in children from very impoverished Romanian institutions (22.4%; *n* = 144) compared to children born in the UK raised in non-impoverished settings and adopted before 6 months of age (3.8%; *n* = 52). Furthermore, the proportion of Romanian children who exhibited disinhibited attachment increased significantly with time spent in an institution; 8.9% of children adopted at 6 months or before exhibited disinhibited attachment compared to 33.3% of children who were between 24 to 42 months of age at the time of adoption. McGuinness et al. (2000) found that nearly 30% of their sample of children adopted from the former Soviet Union (*N* = 105) received psychotherapy (*n* = 28) in the United States. Moreover, 13.3% of these children received a diagnosis of attention deficit disorder with hyperactivity. Dalen (2001) found that 11- to 16-year-old children adopted from Korea and Columbia (*n* = 193) exhibited significantly more hyperactive behavior compared to Norwegian-born children (*n* = 193). These children were adopted between 2 and 81 months (M = 16.28) of age. They also report that the children's level of hyperactive behavior had a negative impact on their school performances.

Taken together, these results indicate that young IA children from China generally exhibit considerable resilience in overcoming the effects of early deprivation they might have experienced pre-adoptively. However, there appears to be more variation in their language abilities than in other developmental spheres. Altogether, these findings suggest that outcomes of children adopted from China are usually quite positive and tend to be more positive in comparison to children adopted from Eastern Europe.

Variables related to language outcomes

Most studies on the language development of IA children have investigated the relationship between age at adoption and language outcomes. Several studies have included mainly preschool-age children, but studies that have examined school-age children suggest that age at adoption correlates negatively with language performance (Cohen et al., 2008; Roberts, Pollock, Krakow, Price et al., 2005; Scott et al., 2008; Tan & Yang, 2005). Yet other studies have found no

relationship between age at adoption and language outcomes (Clark & Hanisee, 1982; Dalen & Rygvold, 2006; Glennen, 2007; Glennen & Bright, 2005). Krakow, Tao and Roberts (2005) found that IA children who were older at the time of adoption acquired the new language more rapidly than children adopted at a younger age. However, the older adoptees were well behind the children adopted at a younger age when assessed later, at 2½ years of age.

Altogether, studies have produced mixed results regarding the effect of age at adoption on language outcomes. Age at adoption is often confounded with length of time spent in an orphanage, making it difficult to disentangle the effects of age at adoption from the effects of length of time spent in an institution, an environment that is not optimal for normal development. Indeed, the younger the children are when they are adopted, the less time they spend in an orphanage. Glennen (2007) examined both variables independently and found that the differences between the children with slow and normal language development could not be attributed to length of time spent in the adoptive home or to age of adoption.

Another factor that has been found to be a strong predictor of language outcomes in IA children is some, even minimal, ability, such as attempts to reproduce speech sounds, in the birth language at the time of arrival in the adoptive family (Croft et al., 2007). This result was found with 6- to 11-year-old Romanian children adopted by UK families. To our knowledge, this type of relationship has not been investigated in other studies. In a related vein, Glennen (2007) found that IA children from Eastern Europe who were delayed in pre-linguistic abilities and receptive vocabulary at 18 months were highly prone to slow language development at 2½ years of age. These findings suggest that early communicative and receptive language abilities might be a good indicator of later language outcomes for children adopted from Eastern Europe. The relationship between age at adoption and the behavior of adopted children has also been investigated. Rojewski, Shapiro and Shapiro (2000) found that parental assessment of behavior in children adopted from China was similar regardless of the age at adoption.

Methodological issues

It is important to discuss the methodological limitations of previous studies in order to interpret adequately their findings as well as to put the present study into context. The first methodological issue concerns the techniques that have been used to assess language development. A considerable number of studies examining the language development of IA children have used parental reports to determine language proficiency (e.g., Dalen, 2001; Krakow & Roberts, 2003; Tan & Yang, 2005). One advantage of this methodology is that it permits researchers to collect data from large samples because parent questionnaires can be sent via mail and, thus, families from a larger geographical area can participate. Even though significant correlations have been found between parental reports and direct measures of language development (e.g., Patterson, 2000), parental reports might be biased by parent's understanding of the questions or demands of the questionnaire and/or they may have opinions or feelings that could bias their responses. This might be especially true for adoptive parents who might be concerned that their children might be at risk for delays and, therefore, might overestimate or underestimate their actual language development. For example, Glennen and Master (2002) devised the Language Development Scale, based on the Rossetti Infant-Toddler Language Scale (Rossetti, 1990), to collect data on 130 children from Eastern Europe. Their survey was more elaborated than most other surveys used with IA children and included specific questions concerning vocabulary development, sentence production, and developmental milestones (e.g., parents had to write 10 examples of their child's longest utterances). While the authors indicate that the majority of parental report measures have been shown to be reliable and highly correlated with conventional assessment tools (Berglund, Eriksson & Johansson, 2001; Klee et al., 1998), they also acknowledge that reliability of parent's ability to complete the survey they used was not assessed independently. In fact, some questions in the survey could not be analyzed because parents indicated that they had difficulty understanding them. According to Glennen and Master (2002), "direct assessment is necessary for a more comprehensive view of the children". Parental reports might be even less reliable

or valid as their children's language becomes more complex and sophisticated. We also believe that direct and objective assessments of IA children's language skills are required in order to get a more valid and complete portrait of their language development.

Some studies reported frequency of use of services such as speech and language therapy or remedial services as indicators of IA children's language outcomes. Although such information is very important and informative, it might be biased by other variables, such as parents' ability to access services, threshold to seek clinical services, or recognition or denial of problems by parents, teachers or doctors. For example, Le Mare et al. (2007) reported that the percentage of adoptive families who were unable to access services that they considered necessary for their children was elevated. Such artifacts could reduce the number of families receiving services and lead to an underestimation of children's actual difficulties or delays. In addition, Le Mare and collaborators also found that adoptive parents had a lower threshold for referring their children for services compared to non-adoptive parents. Another methodological limitation in some previous studies is the absence of assessments of IA children's cognitive or intellectual abilities. Assessment of cognitive abilities is important in order to determine if any lags in language development reflect generalized delays or are specific to language.

The use of test norms to determine the language skills of IA children entails certain limitations. Although comparing the performance of IA children to test norms can be informative and pertinent for clinical purposes, it does not take into account important variables that might bias or confound test results. First, test norms do not usually take into account the sex of children. Since girls have sometimes been found to be slightly advantaged compared to boys in their language development (e.g., Le Normand, Parisse, & Cohen, 2008) and the majority of children adopted from China are girls, using norms might overestimate their performance. Second, most norms do not take into account the socio-economic status (SES) of the families in which children are raised. This is particularly important in the case of adopted children because adoptive families

have been shown to have higher SES than the general population (McGuinness et al., 2000; Tan & Yang, 2005; Tessier et al., 2005). SES has a significant impact on the quality of language input children are exposed to as well as their language development (Hart & Risley, 1995; Hoff, 2006). Children in high SES families are exposed to more words and a greater variety of words on a weekly basis (215 000 words) than children from lower SES families (62 000 words; Hart & Risley). Hart and Risley, for example, found that the recorded vocabulary size of 3 year-old children was larger for high-SES families (over 1000) compared to lower SES families (525 words). In a recent study of children acquiring French as a first language, Le Normand et al. (2008) found that children from high SES families produced utterances that were lexically and morpho-syntactically more complex than those of children from low SES families. The children from higher SES families examined by Le Normand et al. performed significantly better than children from lower SES families on many of the measures they used, including MLU, word token, word types and grammatical tokens.

SES has also been found to be related to the academic and intellectual outcomes of IA children (Dumaret & Stewart, 1985; Dyume, 1988), suggesting that the development of IA children post-adoption cannot be understood solely in terms of genetic factors or pre-adoption deprivation, and that environmental factors post adoption may also play an important role. Research has been conducted on the impact of SES of adoptive families on IA children's IQ and school achievement. Dumaret & Stewart (1985) found that children of low SES birth mothers placed in advantaged adoptive environments had higher IQs and less school failure than children remaining with their low SES birth mothers or raised in institutions or foster homes. Children adopted by higher SES families have been shown to repeat significantly fewer grades than children adopted in lower SES families (Dyume, 1988). Thus, it appears that the environment in which adopted children are raised post-adoptively can influence their intellectual skills and school success.

Overview of the present studies

To our knowledge, the present studies are the first to examine the acquisition of French by IA children. Aside from a recent study conducted by Cohen and her colleagues (2008), they are also the only studies on IA children that included control groups matched for familial SES (education of mothers and fathers and familial income) and sex. These controls were implemented in order to control for factors that have been shown to be correlated with language development in non-adopted children, as already noted. The current studies also used direct measures and fine-grained analyses of IA children's language abilities and early communication skills and, in comparison to most other studies in the field, investigated diverse spheres of IA children's development, including vocabulary, expressive and receptive language, non-verbal intellectual abilities, and socio-emotional development. Analyses of these results were carried out in comparison to those from matched control groups and in relation to each other (Study 1). Study 2 is the first detailed investigation of the morphological development of IA children using spontaneous language samples. Study 3 is the first study we know of to examine the role of maternal input and attention-regulation strategies on IA children's language development prospectively. Examining the relationships between language input and outcomes is important to better understand the factors that favor early language development in IA children and also to test the generalizability of research findings on language input and attention-regulation strategies which have been derived primarily from studies on non-adopted, monolingual children in Western cultural settings.

More specifically, the goal of Study 1 was to better understand the profile of strengths and weaknesses of IA children acquiring French as a "second first language". This was accomplished by examining their levels of proficiency in diverse domains: vocabulary (expressive and receptive), general language (expressive and receptive), cognitive abilities, and socio-emotional functioning. The performance of a group of IA children from China (n = 24) was assessed longitudinally and compared to that of non-adopted control children (n = 25) matched for socio-economic status, sex, and age. An initial assessment was

carried out when the children were, on average, 50 months of age, and revealed that the two groups did not differ with respect to socio-emotional adjustment, non-verbal cognitive abilities, receptive vocabulary, or receptive language. However, the IA children's expressive language skills were significantly lower than those of the non-adopted control children. When the IA children were reassessed 16 months later, on average, their receptive language skills had now became significantly weaker so that they scored significantly lower than the control children on measures of both receptive and expressive language skills at the follow-up assessment. Consistent with most studies on the acquisition of English by IA children that have compared their performance to test norms, the IA children in Study 1 performed in the average range on most language tests according to test norms, except for their performance on the Recalling Sentences subtest of the CELF-R which was below norm. Of particular interest, we found that the age at which the IA children produced their first words in French predicted later language abilities, providing a potentially useful diagnostic indicator for identifying individual differences in IA children's later language development. The implications of these results are discussed in terms of possible early age-of-acquisition effects on the medium-term language outcomes of IA children acquiring French.

The goal of Study 2 was to conduct a detailed analysis of the expressive language abilities of 4 year-old IA children after they had spent, on average, 3 years in their adoptive families. Spontaneous language samples of a sub-group of the IA children who had participated in Study 1 were analyzed focusing on complement clitics, lexical diversity, and tense morphology, all aspects of French that have been found to be vulnerable in L2 learners as well as children with specific language impairment (Grondin & White, 1996; Hamann, 2004; Paradis & Crago, 2000). The IA children's results were compared to a sub-group of the original CTL group. The IA and CTL children in Study 2 had similar levels of socio-emotional adjustment and non-verbal intelligence. The IA children were similar to the control children in most domains of language, including MLU, frequency and correct use of tense morphology, general lexical diversity, and

lexical-verb diversity. However, the IA children made significantly more errors using complement clitics compared to the non-adopted children. Taken together, these results indicate that these IA children who were acquiring French demonstrated accelerated development and remarkable catch-up in their expressive language skills, but, nevertheless, lagged in their acquisition of complement clitics, a domain of French that is particularly difficult for children learning French as an L2 and in children with specific language impairment. Interestingly, age at adoption and length of exposure correlated significantly with their lexical development (i.e., with lexical diversity and lexical-verb diversity measures) but not with their grammatical development (MLU and percentage incorrect use of complement clitic errors), suggesting that factors other than amount of exposure to French post-adoption were related to their lag in the acquisition of complement clitics.

In Study 3, the language use and patterns of communication between newly adopted children from China and their adoptive mothers were examined in order to better understand the nature of these interactions and their influence on the children's later language development. While research has examined IA children's language outcomes, to date, there has been little research on communication between IA children from China and their adoptive parents. This study involved 10 mother-child pairs with 15 month-old children adopted from China living in French-speaking families and 11 mother-child pairs with French-speaking children living with their biological families. Joint attention (JA), defined as a shared experience about an object or event with another person, along with the specific attention-regulation styles used by adoptive mothers (e.g., following or redirecting their child's attentional focus), were examined at Time 1 when the children were, on average, 15 months of age. The children's vocabulary development was also assessed at Time 1 and a second time, when the children were 20 months of age, using the MacArthur Communicative Development Inventory. The results indicated that the adoptive mothers played an active role in encouraging and maintaining joint attention with their children and that they used more redirecting attention regulation strategies with their children than the control mothers.

Moreover, while the redirecting style has been found to correlate negatively with lexical development in typically-developing children raised in Western families (e.g., Tomasello & Farrar, 1986), use of this style by the adoptive mothers in Study 3, nevertheless, correlated significantly and positively with their adoptive children's later lexical development. These results indicate that the following style is not related to lexical development in the same way in all family contexts. These findings corroborate those of other researchers who have similarly questioned the universality and necessity of the following style of attention regulation (Akhtar, 2005).

Globally, the results from all three studies indicate that IA children from China are resilient and demonstrate a remarkable capacity to catch-up to their non-adopted peers post-adoption in diverse developmental domains despite relatively impoverished pre-adoption language and socio-emotional experiences. Comparisons of these IA children's language skills to test norms are in line with what others have found (e.g., Roberts, Pollock, Krakow, Price, et al., 2005; Scott et al., 2008) and suggest that the language outcomes of IA children learning French are generally similar to those of IA children learning English. However, a more complex picture emerged in Study 1 and 2 which controlled for important confounding factors that have not been controlled for in other studies (except Cohen et al., 2008) and involved more fine-grained analyses of the IA children's language skills than has been conducted previously. More specifically, the results of Study 1 and 2 indicated that the IA children lagged in some domains of language development in comparison to matched control children, principally expressive vocabulary and grammar-related skills, contrary to the findings of studies that are based only on test norms or non-matched control group comparisons. In a related vein, we also found that the IA children scored lower than the matched non-adopted control children on the Recalling Sentences subtest of the CELF-R and below average in comparison to test norms. These findings are of particular interest because the Recalling Sentences task has been found to be highly sensitive to age of acquisition for L1 and L2 learners (Mayberry & Eichen, 1991; Mayberry & Fischer, 1989), suggesting the possibility that IA children

experience very early age-of-acquisition effects on their acquisition of their "second first language". However, long term studies are necessary to determine if these lags persist.

Finally, Study 3 contributes to our understanding of interactional factors that might have an impact on the early lexical development of IA children. Interestingly, maternal interaction strategies that have been found to be significantly correlated with the lexical development of typically-developing children raised by their birth parents in mainstream Western cultures may not be the most effective strategies for IA children. Our results indicate that adoptive mothers adapt their interactional style and language use to their IA children's special language needs and interact with them in ways that foster joint attention and lexical development.

Study 1

Language Development in Internationally-Adopted Children: A Special Case of Early Second Language Learning[1]

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This work has been submitted for publication and the revision is currently under review at *Child Development*

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Abstract

We examined the French language development of children adopted (*n* = 24) from China in comparison to that of control children matched for socio-economic status, sex, and age. The children were assessed initially at 50 months of age, on average, and again 16 months later. The initial assessment revealed that the two groups did not differ with respect to socio-emotional adjustment or general cognitive abilities. However, the adopted children's expressive language skills were significantly lower than those of the non-adopted control children at initial and follow-up assessments. The receptive language skills were also significantly weaker for the adopted children at the second assessment. The results are discussed in terms of possible early age-of-acquisition effects that might affect adopted children's ability to acquire a second first language.

Introduction

In the last decade, there has been substantial interest in the language development of internationally-adopted (IA) children. Several reasons explain this rising interest. First, there has been a significant number of international adoptions in North America during the past 15 years (Ministère de la santé et des services sociaux, 2005; U.S. Department of State, 2005). Second, there are clinical concerns as to whether IA children are at risk for language difficulties. Third, the language learning experience of IA children is an interesting natural experiment in early second language acquisition – they discontinue exposure to and acquisition of the birth language as they begin to acquire a new language or a "second first language" (De Geer, 1992; Glennen, 2002). On the one hand, IA children are often considered to be at risk for language delay and difficulty (Albers, Johnson, Hostetter, Iverson, & Miller, 1997; Glennen, 2002; Groze & Ileana, 1996); there are several reasons for these concerns: 1) most IA children spend a significant period of time in an orphanage, a complex, high-risk environment for young children (Zeanah, Smyke, & Dumitrescu, 2002) due in part to the lack of general stimulation and impoverished language experiences; 2) IA children experience an abrupt termination in exposure to the birth language as exposure to the new language begins; and 3) exposure to the adoptive language is delayed usually until one year, or more, after birth. Research by Abrahamsson and Hyltenstam (in press) suggests that even pre-school age children who are immersed in a second language as a result of immigration are unlikely to achieve native-like abilities in a second language in comparison to native speakers (see Hyltenstam & Abrahamsson, 2003; for a review of related evidence). What is particularly important about Abrahamsson and Hyltenstam (in press) results is that the gap between their subjects' competence in their second language (Swedish) and that of native learners was evident despite the fact that all of the second language learners had been judged subjectively by native speakers of Swedish to have native-like competence in oral Swedish. Abrahamsson and Hyltenstam (in press) argued that other studies of early second language learners have tended to find native-like levels of second language competence because they used tests that were not

sufficiently difficult to reveal differences at the upper end of the language competence continuum. In contrast, they tested their second language learners (and native speakers) on a variety of complex language tasks (such listening to language in noise) that were able to differentiate levels of proficiency even among native speakers. We return to the issue of assessment methods later.

On the other hand, there are reasons to believe that IA children can quickly acquire a level of proficiency in a second language that is comparable to children acquiring the same language from birth: 1) based on the classical critical period hypothesis (Lenneberg, 1967; Penfield & Roberts, 1959), IA children are well within the critical period for language acquisition so they should acquire the new language rapidly and to native-like levels, other things being equal; 2) IA children usually only receive input in their adoptive second language in contrast to typical second language learning children who continue to acquire their birth language and, as a result, divide their learning time between two languages; and 3) post-adoption, most IA children receive significant amounts of enriched stimulation in their new language because their adoptive parents usually enjoy a higher level of socio-economic status than parents in general (Tan & Yang, 2005; Tessier et al., 2005).

Language outcomes of IA children

Research on the language learning outcomes of IA children in the short and medium term differ depending on their country of origin (Dalen & Rygvold, 2006; Lapointe, Gagnon-Oosterwal, Cossette, Pomerleau, & Malcuit, 2006; Tessier et al., 2005). Since the present study involves children from China, we focus on research findings on the outcomes of these children. In the aggregate, findings from research on IA children from China indicate that the early acquisition of their adoptive language progresses relatively rapidly (Krakow & Roberts, 2003; Nicoladis & Grabois, 2002; Pollock, 2005) and appears to follow the same developmental pattern as that demonstrated by monolingual children (Geren, Snedeker, & Ax, 2005; Snedeker, Geren, & Shafto, 2007). Krakow and Roberts (2003) found that 80% of their sample of 15 adoptees from China (24-31 months

of age with less than 2 years of exposure to English) was above the 25th percentile on the Language Development Survey (LDS; Achenbach & Rescorla, 2000). Tan and Yang (2005) also reported good language outcomes for children adopted from China (*N* = 186); as a group, they had caught-up with native English-speaking children after 16 months of exposure to English (between 24 to 29 months of age). After an average of 21 months of exposure to English (30 to 35 months of age), the adoptees performed above average on measures of vocabulary size and phrase length obtained from the LDS. Furthermore, even after a relatively short period of exposure to the new language, a sizeable proportion of IA children from China have been found to score within the normal range on standardized tests normed on native speakers of the adoptive language (Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer, 2008; Roberts, Pollock, Krakow, Price, et al, 2005; Scott, Roberts, & Krakow, 2008). However, despite the fact that as a group IA from China appear to attain average levels of performance on standardized language tests, some studies suggest that there might be a subgroup of approximately 20% who presents significant language delays/difficulties or receives speech/language therapy services (Roberts, Pollock, & Krakow, 2005; Tan, Dedrick, & Marfo, 2007). Furthermore, Miller and Hendrie (2000) report a high incidence of language delays (43%) among a group of 452 adoptees from China, but most of the adopted children were tested within 2 months after arriving in the United States.

Most research on IA children has focused on the pre-school years, although a number of studies have examined the language outcomes of school-age children (Dalen & Rygvold, 2006; Lapointe et al., 2006; Scott et al., 2008). Some of these studies report that, on average, IA children tend to score in the normal range on a variety of oral and written language tests. At the same time, however, there is some indication of a higher incidence of academic or language-related difficulty among school-age IA children. For example, Scott et al. (2008) report that more than 50% of the 7;6-year old IA children from China they assessed were receiving supplementary academic or special education services. Dalen and Rygvold (2006) report that there was greater variability in language and academic outcomes among 7 to 13 year-old IA school children (age at adoption ranged from 2 months to 52

months) than among a comparison group of non-adopted children of the same age. In contrast, Lapointe et al. (2006) found that the majority of 7-year old adopted children from China in their study performed above average academically compared to their classmates.

The association between language outcomes and age at adoption has been studied in order to shed light on the factors that might have an impact on IA children's language proficiency. In some studies, age at adoption has been found to be associated with language outcomes so that the younger IA children are at adoption, the better their performance at the time of assessment (Miller & Hendrie, 2000; Roberts, Pollock, Krakow, Price, et al., 2005). However, other studies have not found a link between age at adoption and language skills (e.g., Dalen & Rygvold, 2006). Furthermore, Krakow, Tao and Roberts (2005) found that IA children who were older at the time of adoption initially made faster progress in acquiring the new language in comparison to younger children. Interestingly, Croft et al. (2007) found that the existence of residual language abilities at the time of arrival in UK was a strong predictor of the language outcomes of 6- to 11- year old children adopted from Romania.

Cognitive and Socio-emotional Outcomes

IA children from China have been found to perform in the average range on measures of cognitive functioning (Lapointe et al., 2006; Scott et al., 2008), even when compared to control children matched for familial SES (Cohen et al., 2008), and to score satisfactorily on measures of socio-emotional adjustment (Dedrick, Tan, & Marfo, 2008; Tan & Marfo, 2006). In fact, Tan and Marfo (2006), as well as Dedrick et al. (2008), found that IA children from China tended to obtain better behavioral and emotional functioning scores according to parent ratings on the CBCL/6-18 in comparison to the Achenbach and Rescorla's US normative data. The children ($N = 695$) in Tan and Marfo's (2006) study were between 1.5 and 11 years while those ($N = 516$) in Dedrick et al.'s (2008) study were between 6 to 15.7 years of age. Taken together, these results indicate that young IA children from China generally exhibit robust and resilient abilities to overcome the effects of deprivation they might have experienced pre-adoptively.

However, there seems to be more variation in their language abilities than in other developmental spheres.

Socio-economic status

IA children are usually raised in adoptive homes with higher than average socioeconomic status (SES) (Tan & Yang, 2005; Tessier et al., 2005). SES has been found to have significant effects on children's language learning environment and on their language development (Hart & Risley, 1995; Hoff, 2006). Hart and Risley (1995), for example, found that children from families with relatively high SES were exposed to a greater diversity of words compared to children from lower SES families; they also heard more words on a weekly basis (215,000 words) than children from mid-SES (125,000 words) and low-SES families (62,000 words). Hart and Risley (1995) also reported that the vocabulary of 3-year old children was over 1000 words for those from high-SES families, but only 525 words for those from low-SES families. In a related vein, Arriaga, Fenson, Cronan, and Pethick (1998) found that 80% of children with parents earning a relatively low income scored below the 50th percentile on the MacArthur Communicative Development Inventory. Pan, Rowe, Spier and Tamis-Lemonda (2004) found that children of mothers who had less than a high school education performed significantly lower on the Peabody Picture Vocabulary Test (3rd Edition) compared to children of mothers with more education. LeNormand, Parisse and Cohen (2008) found that children from high SES families produced lexically and morpho-syntactically more complex utterances than children from low SES families. With the exception of a study by Cohen et al. (2008), to be discussed shortly, SES factors have not usually been controlled for in studies of IA children's language development.

The present study

Since a great deal of research on IA children to date has been motivated by clinical issues concerning their ability to catch up to native speakers of the language, norm-referenced tests or questionnaires have been the preferred method of assessment in most, but not all, studies. While assessments of IA children's language development using test norms are informative and important, they cannot elucidate the full extent of IA children's second language learning capacity and, in

particular, their ability to benefit from the enriched language learning environment that they experience post-adoptively, if the norming group is not representative of the families into which IA children are adopted. Thus, notwithstanding results showing that, on average, IA children from China generally score within the normal range on standardized measures and, in some cases, in comparison to non-adopted children, questions remain concerning the upper limits of IA children's post-adoption language competence. Therefore, each IA child in the present study was matched to a non-adopted control child of similar SES (based on mother's and father's levels of education and on family income). The control children were also matched for sex and age (within a 3 month interval). We felt it was important to include a gender match because the vast majority of children adopted from China, and all of the IA children included in the present study, are girls (e.g., Lachance & Fortin, 2002). Although the magnitude of differences in language development between boys and girls has been found to be rather small, girls nevertheless tend to develop faster than boys (e.g., Bornstein & Haynes, 1998; Van IJzendoorn, Juffer, & Klein Poelhuis, 2005). Since standardized language tests usually do not provide breakdowns by gender, use of standardized test results makes it difficult, once again, to reveal the full extent of IA children's language learning capacities post-adoption. We only accepted participants who had a minimal exposure (25% of the time maximum) to a language other than French.

In a recently published study, Cohen et al. (2008) compared the language outcomes of a group of IA children, adopted between 8 to 21 months of age (n = 70), to those of a group of non-adopted children (n = 43) who were matched for SES. The IA children were assessed at 4 to 6 weeks post-adoption and then 6, 12 and 24 months later. The expressive language skills of the IA children, assessed with the Expressive scale of the Pre-school Language Scale 3, were in the average range in comparison to test norms, but were lower compared to the scores of the control children at each follow-up assessment. In contrast, their receptive language skills, assessed with the Receptive scale of the Pre-school Language Scale 3, were comparable to those of the control children at each follow-up assessment. Cohen et al.'s results suggest that choice of comparison group can reveal different patterns

of results. Interestingly, the IA children exhibited cognitive and motor functioning similar to the control children at the 24-month follow-up assessment, so only their expressive language skills were significantly weaker.

The present study complements Cohen et al.'s (2008) study and, at the same time, provides a replication, in that our IA children were older at the time of their initial (4;2 year) and follow-up (5;6 years) assessments; the last assessment in Cohen et al.'s study took place when the children were approximately 3 years of age. At the time of our follow-up assessment, the IA children had had 4 years and 4 months exposure to their adoptive language, on average. While this allows considerable time for full language development, it leaves open the possibility that an even later assessment would reveal yet different results, a point we return to in the Discussion. Our study is also complementary to Cohen et al.'s in that our assessment battery included measures of the IA children's receptive and expressive vocabulary as well as their general language abilities. Moreover, we included measures of non-verbal cognitive abilities and socio-emotional adjustment in order to assess the IA children's overall level of development and to pinpoint and better understand the nature of any differences between the two groups, if differences emerged.

Failure to find significant differences on language outcome measures between IA and control children in the present study would accord with the traditional version of the critical period hypothesis and would corroborate most existing studies of IA children from China that have not included SES-matched controls (except Cohen et al., 2008). In contrast, evidence of significant differences between the IA and control children on the language measures, once SES differences are eliminated, would be consistent with emerging theories of and evidence for very early age-effects on second language learning (e.g., Abrahamsson & Hyltenstam, in press) if, at the same time, there were no differences between the IA and control groups on measures of general cognitive and socio-emotional development. Indeed, in line with studies mentioned above that found that IA children are generally functioning in the normal range or above the normal range on measures of socio-emotional development and general

cognitive abilities, we did not expect to find differences between the two groups in the present study on measures of nonverbal intelligence and socio-emotional development. To date, most studies have involved children adopted into English-speaking countries, with the exception of some studies taking place in Scandinavian countries. As noted by Geren et al. (2005), results obtained with children adopted from China learning English may not generalize to other linguistic environments. This is the only study, to our knowledge, to investigate the acquisition of French by IA children.

Method

Participants

Initial assessment

Twenty-four girls[2] adopted from China (hereafter referred to as internationally-adopted (IA) children) who were between 41.5 and 56 months of age (M = 50.1, SD = 5.0) participated in the study for this initial assessment. They were adopted by monolingual French-speaking families when they were between 7 and 24 months (M = 13.5, SD = 4.7) of age and were tested between 19 and 46.5 months (M = 36.1, SD= 8.4) after adoption. The control (CTL) group was composed of 25 girls between 41.0 and 57.0 years of age (M = 50.4, SD = 4.8) at time 1. These children were recruited from daycares in the Montreal area as well as through ads in a local newspaper. The following exclusionary criteria were used when selecting the CTL children: 1) no psychiatric or neurological problems; 2) no previous history of intellectual deficiency or language problems; 3) no premature birth; 4) no major health problems, past or present; 5) no serious motor or behavior problems; and 6) no or minimal exposure (25% of the time maximum) to a language other than French. ANOVA indicated that there was no difference between groups in terms of age, $F(1, 47) = .28$, $p = .87$. Chi-square tests indicated that there were no significance differences between the IA and the CTL groups in

[2] This is consistent with the very high proportion of girls among children adopted from China in the province of Quebec. In 2000, 99.2% of children adopted from China in Quebec were girls (Lachance & Fortin, 2002).

terms of educational level of the mothers ($x^2 = 1.2$, $p = 0.55$) or the fathers ($x^2 = 0.57$, $p = 0.76$) or for family income ($x^2 = 2.0$, $p = .37$). ANOVA indicated that there was a difference between groups in term of mothers' age, $F(1, 25) = 15.12$, $p = .001$ and fathers' age, $F(1, 24) = 7.96$, $p = .009$; adoptive parents were significantly older. Demographic information of the participants is presented in Table 1. ANOVA, with group (IA and CTL) as the independent variable, indicated that the CTL children spent significantly longer in daycare prior to the initial assessment than did the IA children, $F(1, 45) = 13.794$, $p = .001$. Time spent in daycares varied from 0 to 38 months ($M = 16.2$, $SD = 12.3$) for the IA children and from 0 to 51 months ($M = 30.1$, $SD = 13.2$) for the CTL children.

Follow-up

The same twenty-four IA children participated in a follow-up assessment which took place, on average, 15.6 months (range: 12 to 18) after the initial assessment. The IA children's ages varied from 56.5 to 72.0 months ($M = 65.8$, $SD = 5.31$) and this assessment took place between 34 and 64 months ($M = 51.7$, $SD = 8.6$) after adoption. The CTL group was composed of 23 children who ranged in age from 54.0 to 74.0 ($M = 65.5$, $SD = 6.7$) years of age matched to the IA children with respect to sex, age (within a 3 month interval), and socio-economic status (i.e. level of education of the mother and father and family income). Five children from the original group participated in the follow-up assessment and the remaining 18 children were newly recruited. The decision to include mostly new CTL children was based on the fact that we wanted to include CTL children who had spent less time in daycare in order to better match the amount of time spent in daycare by the IA children. Therefore, in contrast to the results from the initial assessment, there was no significant difference in total number of months spent in daycare between the groups in the follow-up assessment, $F(1, 44) = .328$, $p = .57$. The time spent in daycares varied from 0 months to 60 months ($M = 29.7$, $SD = 16.4$) for the IA group ($n = 24$) and from 0 to 56 months ($M = 32.5$, $SD = 17.7$) for the CTL group ($n = 22$). ANOVA indicated that there was no significant difference between groups in terms of age, $F(1, 45) = .014$, $p = .91$. Chi-square tests indicated that there were no significance differences between the IA and the CTL groups in

terms of number of years of education of the mothers ($x^2 = 0.90$, $p = 0.76$) or the fathers ($x^2 = 1.02$, $p = 0.60$) or family income ($x^2 = 1.21$, $p = 0.55$). A one-way analysis of variance indicated that there was a difference between groups in term of mothers' age, $F(1, 24) = 13.00$, $p = .001$, and fathers' age, $F(1, 23) = 5.05$, $p = .034$. Adoptive parents were significantly older than control parents. Demographic information of the participants in the follow-up assessment is presented in Table 1.

Table 1

Demographic data of the adopted (IA) and control (CTL) groups at the initial assessment and follow-up

	Initial assessment		Follow-up	
	IA ($n = 24$)	CTL ($n = 25$)	IA ($n = 24$)	CTL ($n = 23$)
Age (in months, *M* & *SD*)	50.1 (5.0)	50.4 (4.8)	65.8 (5.31)	65.5 (6.7)
Age at adoption (in months, *M* & *SD*)	13.5 (4.7)	--	13.5 (4.7)	--
Length of exposure to French (in months, *M* & *SD*)	36.1 (8.4)	50.4 (4.8)	51.7 (8.6)	65.5 (6.7)
Mother's age (in years, *M* & *SD*)	43.5_{d} (4.7)	35.7_{e} (5.8)	44.6_{d} (4.8)	37.16_{e} (5.7)
Father's age (in years, *M* & *SD*)	44.03_{e} (5.2)	37.25_{e} (7.0)	45.4_{e} (5.2)	40.15_{f} (6.4)
Mother's education (% & *n*)				
High school	--	4.2_{a} (1)	--	--
College	20.8 (5)	25.0_{a} (6)	20.8 (5)	17.4 (4)
University	79.2 (19)	70.8_{a} (17)	79.2 (19)	82.6 (19)
Father's education (% & *n*)				
High school	9.1_{a} (2)	4.2_{a} (1)	9.1_{b} (2)	4.5_{b} (1)
College	27.3_{a} (6)	33.3_{a} (8)	27.3_{b} (6)	18.2_{b} (4)
University	63.6_{a} (14)	62.5_{a} (15)	63.6_{b} (13)	77.3_{b} (17)
Total family income per year (% & *n*)				
30 000-49 999	4.5_{b} (1)	14.3_{c} (3)	0_{c} (0)	9.1_{b} (2)
50 000-69 999	13.6_{b} (3)	14.3_{c} (3)	14.3_{c} (3)	9.1_{b} (2)
70 000-89 999	4.5_{b} (1)	14.3_{c} (3)	14.3_{c} (3)	18.2_{b} (4)
90 000- 99 999	36.4_{b} (8)	4.8_{c} (1)	19.0_{c} (4)	13.6_{b} (3)
100 000 and more	40.9_{b} (9)	52.4 (11)	52.4_{c} (11)	50.0_{b} (11)

Note. [a] $n = 24$ [b] $n = 22$ [c] $n = 21$ [d] $n = 14$ [e] $n = 13$ [f] $n = 12$. IA = Internationally adopted children; CTL = Control children.

Tests

Initial assessment

Semi-Structured Interview - Developmental Questionnaire. A questionnaire was administered to each parent by the first author, a licensed psychologist, or a trained research assistant. The questionnaire included questions about the child's development, past and current health problems, and medical condition before and after adoption for the IA children. The questionnaire also included questions about each parent's education and occupation, combined family income, and the composition of the family.

Language Environment Questionnaire. Parents were asked to estimate the amount of French, English, or any other language the child had been exposed to. Estimates of input considered exposure in and outside the family and in a variety of situations (e.g., TV, radio).

The Preschool Language Scale-Third Edition (PLS-III; Zimmerman, Steiner, & Pond, 1992). A French adaptation of the PLS-III, developed by the Speech and Language Pathology Department of the Montreal Children's Hospital, was used to assess the children's receptive and expressive language skills. Because it was an adaptation of the English version, its psychometric properties may differ from those of the English version. The PLS-III is composed of two subscales, one that assesses auditory comprehension and the other expressive skills. Children were asked to do diverse tasks, such as answering questions, giving definitions, explaining the use of different objects, and naming pictures. The PLS was administered according to standard administration procedures described in the manual, as were the other language tests. To calculate standard scores, the procedure described in the manual was used (i.e., one point was given for each task if a certain number of items were performed successfully). Raw scores were computed by giving 1 or 0 points to each individual item of the test, allowing more variability in the scores.

Expressive One-Word Picture Vocabulary Test-Third Edition (EOWPVT; Brownell, 2000). A French adaptation of the EOWPVT, developed by the Speech and Language Pathology Department of the Montreal Children's Hospital, was

used to assess expressive vocabulary skills. Again, psychometric properties may differ from those of the English version. Each child was asked to name objects, actions, and concepts that were depicted graphically.

Échelle de vocabulaire en images Peabody (EVIP; Dunn, Thériault-Whalen, & Dunn, 1993). The EVIP assesses receptive vocabulary skills in French. Children were shown four pictures on a page and are asked to point to the picture that corresponds to a word spoken by the examiner. This test was normed on native French-speaking children living in Canada.

Leiter International Performance Scale-Revised (Roid & Miller, 1997). The Brief IQ Screener of the Leiter-R was used to assess nonverbal intellectual ability. This test avoids verbal instructions and responses and was designed to decrease the influence of cultural and language biases on intellectual functioning. The internal consistency coefficients for the four subtests of the Brief IQ Screener for ages 3 to 5 vary from .66 to .91. It has a reliability coefficient of .88. Results on the Brief IQ Screener differentiate different criterion groups such as typical, severely cognitively-delayed, and talented children (Roid & Miller, 1997). The correlation between the Leiter-R Brief IQ and the Wechsler Intelligence Scale for Children (WISC-III) Full Scale IQ is .85. The same correlation (i.e., .85) is obtained with the WISC-III Performance IQ. The Leiter-R Brief IQ has been use in research involving clinical population (Glenn & Cunningham, 2005) and typically developing children (Chiles, 2007). Four subtests from the Visualization and Reasoning battery compose the Brief IQ Screener: 1) Figure Ground (FG) assesses visual scanning skills and effective search strategies: the child has to look for an object among a group of objects; 2) Figure Completion (FC) assesses the capacity to identify a "whole object" from a complex visual array: the child has to identify embedded figures within complex stimuli; 3) Sequential Order (SO) assesses the capacity to generate rules and to understand relationships between pictures or figures: the child has to organize stimuli in sequential order (i.e., by arranging triangles according to size); and 4) Repeated Patterns (RP) measures deductive reasoning skills and the capacity to generate rules in order to produce a sequence: the child has to complete a patterned sequence of symbols (i.e., one blue square,

one yellow square, one blue square, and one yellow square). The Leiter-R was administered according to the administration procedures described in the manual.

Vineland SEEC: Vineland Social-Emotional Early Childhood Scales (Sparrow, Balla, & Cicchetti, 1998). The Vineland SEEC is a measure of social-emotional adjustment. It contains three scales: 1) Interpersonal Relationships, 2) Play & Leisure Time, and 3) Coping Skills. Administration was adapted for the present study. Parents were given response choices instead of responding freely to ensure that scoring was standardized and objective; we also found that parents had difficulty responding to open-ended questions. The scoring system was as follows: 2 points was given if the behavior was observed often; 1 point if the behavior was observed sometimes, with partial success, if the parent did not have the opportunity to observe it, or if the parent did not know; and 0 was assigned if the behavior was never observed.

Follow-up

During the follow-up assessment, three of the measures from the initial assessment were re-administered: the Expressive One-Word Picture Vocabulary Test-Third Edition (EOWPVT), the Échelle de vocabulaire en images Peabody (EVIP) and the developmental questionnaire. The French version of the Clinical Evaluation of Language Fundamentals-Revised (CELF-R; Semel, Wiig, Secord, & Sabers, 1987) was added as a new measure of receptive and expressive language skills. The CELF-R provides a comprehensive assessment for the identification and diagnosis of language deficits. In the present study, the Receptive Language Index raw score was used as a measure of receptive language abilities. It includes three subtests: Linguistic Concepts, Sentence Structure, and Oral Directions. The Linguistic Concepts subtest assesses the ability to understand oral directions containing linguistic concepts such as “et” (and), “si” (if), and “soit…ou” (either…or). The Sentence Structure subtest assesses mastery of structural rules at the sentence level. The child is presented a page with four pictures and has to choose the one that corresponds to a sentence produced by the examiner (e.g., *Le garcon est suivi par le chien* (*the boy is followed by the dog*)). The Oral Directions subtest assesses the ability to interpret, recall, and execute oral directions. For

example, the child receives the following instruction: “Touche le dernier petit carré blanc” (touch the last little white square) when presented with a sequence of squares of different sizes and colors. As well, two subtests of the Expressive Language Index were administered to each child: Formulated Sentences and Recalling Sentences. Formulated Sentences assesses the ability to formulate compound and complex sentences. The child is given a target word or phrases (e.g., *parce que* (*because*)) and has to formulate a sentence with a picture as a reference. The Recalling Sentences subtest assesses the child’s ability to recall and repeat sentences of increasing length and syntactic complexity presented by the examiner.

Procedure

Initial assessment

Recruitment of the IA children was done in collaboration with an adoption agency in Montreal: Société Formons une Famille Inc. For the children in the CTL group, daycare directors were contacted and letters describing the research project were then sent to the parents of the appropriate children. Some parents also contacted us after they had seen an ad in a local newspaper.

Before testing began, the objectives and the procedure of the study were explained to the child and parent by the investigator and questions from the child or parent were answered by the test administrators. Parents were then asked to read and sign the consent form. The testing was conducted by the first author, a licensed psychologist, or one of two trained assistants, all of whom were native speakers of Quebec French. The parents were allowed to stay in the room during testing, but were instructed not to give help to their child. In total, four sessions were required to complete the testing and each session lasted approximately one hour and a half, with breaks when needed. The Language Environment Questionnaire was administered as a semi-structured interview during the first session. The order of administration of the remaining tests was counterbalanced in order to avoid any possible bias due to order of administration. A free play session with the child and caregiver, lasting 30 minutes, was filmed during the last session, but is not analyzed in this paper.

Follow-up

All the parents of the adopted children who had participated in the initial assessment were contacted by telephone and were asked if they would participate in a follow-up study. The acceptance rate was 100%. The children comprising the CTL group at follow-up were recruited using the same procedure as for the initial assessment. The children were tested in a laboratory at McGill or in their homes. After the parents signed the consent form, the Language Environment Questionnaire and the Developmental Questionnaire were completed or updated for the participants who had taken part in the initial assessment. The child was then given the language tests. The order of administration was counterbalanced. A 30-minute free-play session with the caregiver was filmed during the last session. In total, two sessions of approximately 1 hour each were necessary to complete the follow-up assessment.

Results

General Health

Information regarding current and past general health and development was collected through a semi-structured interview during the initial assessment. In response to a question included in this interview, 75% of the IA parents answered that they considered their child's general health as excellent, 16.7% answered very good, and 8.3% good. For the CTL parents, 77.3% judged their child's general health as excellent and 22.7% judged it as very good. The appendix A summarizes detailed results concerning the current and past health and developmental problems for each group, as reported by their parents at the time of the initial assessment. The results show that IA and CTL children are comparable concerning their current general health and development, with 9 instances of problems reported for the IA and 10 instances of problems for the CTL children. However, with regards to their past medical and developmental history, the IA children had a higher incidence of problems compared to the CTL children. Globally, the IA's parents reported 32 instances of health and developmental problems, nearly twice the number reported by CTL's parents, 17. That the current health status of the IA

children was comparable to that of the CTL children at the time of the initial assessment suggests that they recovered well from any initial health problems.

Test Results

One-way analyses of variance were carried out to compare the results of the IA and CTL children on the Vineland SEEC and the Leiter; a significance level of .05 was used. A sample size of 25 children per group is sufficient to detect a large effect (.8 SD between means) with alpha = .05 and beta = .2 (power = .8; Cohen, 1988).

Vineland SEEC: Vineland Social-Emotional Early Childhood Scales

There was no significant difference between the IA and CTL children on the total raw scores of the Vineland SEEC: IA (M = 157.58, range = 123-194, SD = 17.90); CTL (M = 163.95, range = 136-197, SD = 15.47); $F(1, 43) = 1.61$, $p = .212$. Thus, according to parental reports, the socio-emotional adjustment of IA children was comparable to that of the CTL children.

Leiter-R: Brief IQ

ANOVA of the raw scores on the Leiter-R (Brief IQ) revealed that that there was no significant difference between the IA (M = 48.90, range = 32-63, SD = 7.33) and CLT groups (M = 51.30, range = 36-70, SD = 9.89); $F(1, 42) = .822$, $p = .370$ (see Table 2). Similarly, there was no significant difference between the IA (M = 115.76, range= 93-137, SD = 12.71) and CLT groups (M = 120.22, range = 89-143, SD = 16.62); $F(1, 42) = .983$, $p = .327$) on the standardized scores of the Leiter-R (see Table 5).

Language Tests

Raw language tests scores. The IA children's performance on the language measures was compared to that of the CTL children using one-way analyses of variance (see Table 2 for a summary of average raw scores and statistical results). Separate analyses were carried out on the initial and follow-up test results. At initial testing, the IA children's performance was significantly lower on the expressive subscale of the PLS-III and on the EOWPVT compared to that of the CTL children. There were no significant differences between the groups with respect to their performance on the receptive subscale of the PLS-III or the EVIP.

At follow-up, the IA children performed significantly lower than the CTL on the expressive language subtests of the CELF-R (Recalling Sentences and Formulated Sentences), on the Receptive Language Index of the CELF-R, and on the EOWPVT. There was no significant difference between the groups on the EVIP. In order to examine the performance of the IA children more closely, we calculated, for the tests and subtests in which there was a significant difference between groups, the percentage of IA children who scored lower than the average of the CTL children, calibrated in standard deviations (see Table 3). Between 35 and 47% of the IA children scored at least 1.25 standard deviations below the mean of the CTL group on the language tests measuring general expressive language skills and expressive vocabulary at initial and follow-up testing. Regarding receptive language abilities, approximately 26% of the IA children scored at least 1.25 standard deviations below the mean of the CTL group on the Receptive Scale of the CELF-R at follow-up. To better understand the language scores of the IA group, we also calculated correlations between the language tests at follow-up (see Table 4). In order to determine if expressive and receptive vocabulary accounted for the difference between the groups on the Recalling Sentences subtest because they all inter-correlated strongly, we conducted an analysis of covariance (ANCOVA) of the Sentence Repetition scores in which we removed the influence of expressive and receptive vocabulary. The effect of group alone was significant even after controlling for the effects of expressive vocabulary (performance on the EOWPVT) and the effects of receptive vocabulary (performance on the EVIP), $F(1, 42) = 12.84$, $p = .001$). These results indicate that the difference between the IA and CTL children on the Recalling Sentences subtest cannot be attributed only to differences in vocabulary skills.

Table 2

Results of tests at initial assessment and follow-up (raw scores)

MEASURES	IA *M* (*SD*)	CTL *M* (*SD*)	df	F
EOWPVT				
- *Initial study*	40.09 (9.38)$_c$	46.83 (8,41)$_b$	(1,45)	6.76*
- *Follow-up*	54.52 (10.91)$_c$	62.52 (9.62)$_c$	(1,44)	6.95*
EVIP				
- *Initial study*	51.30 (15.63)$_c$	56.08 (16,44)$_b$	(1,45)	1.04
- *Follow-up*	74.48 (17.35)$_c$	79.96 (14.64)$_c$	(1,44)	1.34
PLS-III (*Initial study*)				
Expression Scale	75.57 (12.72)$_c$	86.64 (11.21)$_a$	(1,46)	10.28**
Comprehension Scale	115.46 (9.97)$_b$	120.80 (8.68)$_a$	(1,47)	4.02
Leiter-R: Brief IQ (*Initial study*)	48.90 (7.33)$_d$	51.30 (9.89)$_c$	(1,42)	.82
Vineland SEEC (*Initial study*)	157.58 (17.90)$_b$	163.95 (15.47)$_d$	(1,43)	1.61
CELF-R (*Follow-up*)				
Formulated Sentences Subtest	11.48 (7.68)$_c$	17.00 (8.64)$_e$	(1,41)	4.26*
Recalling Sentences Subtest	28.35 (12.69)$_c$	43.30 (13.90)$_c$	(1,44)	14.52**
Receptive Language Scale	41.52 (8.47)$_c$	47.83 (10.33)$_c$	(1,44)	5.12*

Note. [a] $n = 25$. [b] $n = 24$. [c] $n = 23$. [d] $n = 21$. [e] $n = 20$.
*$p < .05$. **$p < .01$.
IA = Internationally adopted children; CTL = Control children; EOWPVT = Expressive One-Word Picture Vocabulary Test-Third Edition; EVIP = Échelle de vocabulaire en images Peabody; PLS-III = The Preschool Language Scale-Third Edition; Leiter-R = Leiter International Performance Scale-Revised; Vineland SEEC: Vineland Social-Emotional Early Childhood Scales; CELF-R = Clinical Evaluation of Language Fundamentals Revised.

Table 3

Percentage of adopted children above and below the mean of control children on language tests

SD	Expression Scale (PLS-III)	EOWPVT	EOWPVT	Recalling Sentences (CELF-R)	Formulated Sentences (CELF-R)	Receptive Language Scale (CELF-R)
	Time 1	Time 1	Time 2	Time 2	Time 2	Time 2
-2	30.4	13.04	30.4	17.4	0	4.3
-1.25	13.0	21.7	17.4	17.4	39.1	21.7
-1	0	4.3	0	0	3.3	8.7
0	56.5	56.5	52.2	65.2	52.2	65.2
+1	0	4.3	0	0	3.3	0
+1.25	0	0	0	0	0	0
+2	0	0	0	0	0	0

Note. PLS-III = The Preschool Language Scale-Third Edition; EOWPVT = Expressive One-Word Picture Vocabulary Test-Third Edition; CELF-R = Clinical Evaluation of Language Fundamentals Revised.

Table 4

Correlations between age at adoption, length of exposure to French and outcome variables for adopted children at follow-up (except for Leiter-R obtained at initial study)

VARIABLES	1.	2.	3.	4.	5.	6.	7.	8.
1. Age at adoption	__	-.78**	-.43*	-.44*	-.32	-.40*	-.20	.23
2. Exposure to French		__	.36*	.48*	.32	.23	.11	-.34
3. EVIP			__	.55**	.73**	.77**	.18	.20
4. EOWPVT				__	.65**	.60**	-.15	-.03
5. Receptive Language Scale (CELF-R)					__	.80**	.22	.06
6. Recalling Sentences (CELF-R)						__	.28	.10
7. Formulated Sentences (CELF-R)							__	-.03
8. Leiter-R (*initial study*)								__

*$p < .05$. **$p < .01$.

Standardized language test scores. Although statistical analyses were not conducted on the standardized language test results because the standardized scores provided for the tests are not based on the French version that we used, group average standardized scores are presented here for descriptive purposes because they are often used for clinical purposes; they are summarized in Table 5. The results show that the performance of the CTL group was in the average range on all language measures at initial and follow-up testing, except for the EVIP where they scored in the above average range at both testing times. The IA group scored in the average range on all the language measures, except for three tasks at follow-up: they scored above average on the EVIP and they performed below average on the Recalling Sentences and the Formulated Sentences subtests of the CELF-R. The discrepancy between the IA and CTL groups is particularly important for the Recalling Sentences subtest for which the CTL children obtained a mean standard score in the average range (i.e., 9.61) compared to IA children who obtained a mean standard score of 6.26, falling below average.

In order to better understand the language test results, correlations between scores on the language tests and diverse variables were carried out and are presented in the next section.

Table 5

Standardized Test Score Results at Initial Assessment and Follow-up

MEASURES	IA *M* (*SD*)	CTL *M* (*SD*)
EOWPVT		
- *Initial study*	94.52 (10.69)$_c$	103.71 (10.44)$_b$
- *Follow-up*	96.87 (11.03)$_c$	106.35 (12.29)$_c$
EVIP		
- *Initial study*	111.48 (15.52)$_c$	117.08 (17.64)$_b$
- *Follow-up*	119.22 (17.32)$_c$	124.91 (13.79)$_c$
Leiter-R: Brief IQ (*Initial study*)	115.76 (12.71)$_e$	120.22 (16.62)$_c$
PLS		
- Expression Scale	100.78 (18.79)$_c$	112 (17.11)$_a$
- Comprehension Scale	106.25 (16.57)$_b$	110.72 (17.19)$_a$
CELF-R		
- Formulated Sentences subtest	6.91 (1.62)$_c$	7.80 (2.53)$_f$
- Recalling Sentences subtest	6.26 (2.44)$_c$	9.61 (3.41)$_c$
- Receptive Language scale	102.43 (12.15)$_c$	112.39 (17.37)$_c$

Note. [a] $n = 25$. [b] $n = 24$. [c] $n = 23$. [d] $n = 22$. [e] $n = 21$. [f] $n = 20$.
IA = Internationally adopted children; CTL = Control children; EOWPVT = Expressive One-Word Picture Vocabulary Test-Third Edition; EVIP = Échelle de vocabulaire en images Peabody; PLS-III = The Preschool Language Scale-Third Edition; CELF-R = Clinical Evaluation of Language Fundamentals Revised.
For the Receptive Language Scale of the CELF-R, the Expression and Comprehension scale of the PLS-III, and for the EVIP, standard scores were assigned a mean of 100 and a standard deviation of 15. For the EOWPVT, standard scores were assigned a mean of 100 and a standard deviation of 10. For the subtests of the CELF-R (Recalling Sentences and Formulated Sentences), standard scores were assigned a mean of 10 and a standard deviation of 3.

Relationship between cognitive ability and language performance at initial testing

Pearson correlation coefficients were calculated between the Brief IQ scores and the standardized scores on the language tests for IA children and CTL children. Since the Leiter-R was only administered at initial testing, only test scores at initial testing were analysed. Significant correlations were obtained between scores on the Brief IQ and scores on all the language tests for the CTL children, ranging from .44 to .71, whereas none of the correlations were significant for the IA children, ranging from -.10 to .20. Specifically, the following correlations were obtained between the Brief IQ and the following language tests for the CTL children: EOWPVT ($r = 0.44$; $p = 0.018$); EVIP ($r = 0.59$; $p = 0.002$); Expression scale of the PLS-III ($r = 0.71$; $p < 0.001$); and Comprehension scale of the PLS-III ($r = 0.47$; $p = 0.011$). For the IA group, the correlations between the Brief IQ and the language tests are presented in Table 4. The correlations between the language tests in which differences between groups were found were negative or very low, varying from -.03 to .10. Therefore, nonverbal intelligence did not appear to contribute to the differences in language abilities found between the groups.

Relationship between language performance at initial testing and at follow-up

Pearson correlation coefficients were calculated on the raw scores of the EOWPVT and the EVIP at initial and follow-up testing in order to verify the reliability of the children's performance on these tests over this time period and, thus, the utility of the initial results in predicting the children's subsequent abilities. Correlations were carried out on only these two tests because they were the only tests administered at both times. The correlations were significant for both the EOWPVT ($n = 22$; $r = 0.68$; $p < 0.001$) and the EVIP ($n = 22$; $r = 0.49$; $p = 0.010$).

Relationship between past health and developmental problems and language test results

To investigate if the IA children who performed relatively poorly on the language tests at follow-up had more health and developmental problems in the past, two groups of IA children were created on the basis of their scores on the

follow-up language tests. One IA language group comprised "poor language performers": they had scores on at least two language tests that were 1.25 standard deviations below the average of the CTL group. The remaining children comprised the "good language performer" group. ANOVA indicated that there was no significant difference between the poor and the good language performers in terms of the number of instances of health and developmental problems reported by their parents at initial assessment, $F(1, 21) = .032$, $p = .86$. The parents of the poor and good language performers reported, on average, 1.13 and 1.20 health and developmental problems, respectively. Thus, it does not appear that the IA children's language development was influenced significantly by their general health.

Relationship between exposure to French, age at adoption, and language test results

In order to further examine potential factors that might have influenced the language outcomes of the IA children, we correlated number of months of exposure to French and age at adoption with their language test scores at follow-up testing (see Table 4). There was a significant correlation between age at adoption and length of exposure to French ($n = 24$; $r = -0.78$; $p < 0.001$) indicating that these variables are confounded. Therefore, with the current set of data, it was not possible to identify the unique role of each variable. Correlations were significant between the vocabulary measures (EVIP and EOWPVT) and age at adoption/length of exposure to French, varying from .36 to .48. The correlations between age at adoption/exposure to French and grammatical measures were not significant (Receptive Language Scale, Formulated Sentences subtest and Recalling Sentences subtest of the CELF-R), except for a significant correlation between age at adoption and scores on the Recalling Sentences subtest of the CELF-R ($n = 23$; $r = -0.40$; $p = 0.03$). Nonverbal IQ scores were not correlated significantly with age at adoption/exposure to French and any of the language measures.

Relationship between performance on the language tests and early language development

During the initial assessment, as part of the semi-structured interview, parents were asked at what age their IA children produced their first word(s) in French. The mean length of exposure before uttering their first words in French was 2.9 months, although parental responses revealed considerable variance among the children, ranging from a few days to 12 months. In order to examine a possible link between production of first words in French and later language performance (at follow-up), correlations were calculated between age at first words (measured in months) and scores on the language tests at follow-up. There was a significant negative correlation between age at first words in French and performance on the: EOWPVT ($n = 22$; $r = -0.67$; $p < 0.001$); Receptive Scale of the CELF-R ($n = 22$; $r = -0.46$; $p = 0.016$); EVIP ($n = 22$; $r = -0.50$; $p = 0.010$); Recalling Sentences subtest ($n = 22$; $r = -0.45$; $p = 0.017$). The correlation with the Formulated Sentences subtest ($n = 22$; $r = -0.10$; $p = 0.328$) was non significant. Thus, there is some suggestion that IA children who produced their first words in French earlier did better on all the language measures at follow-up, except for the Formulated Sentences subtest.

We conducted stepwise regressions, in which the dependent variables were the language test scores found to be significantly lower for the IA children compare to the CTL at follow-up, and the independent variables were age at follow-up, age at first word in French, age at adoption and length of exposure to French. Age of first words predicted significantly the performance on the EOWPVT ($R^2 = .45$; beta weight of -.67; $p = .001$), the Recalling Sentences subtest ($R^2 = .21$; beta weight of -.45; $p = .035$) and the Receptive Language Scale of the CELF-R ($R^2 = .17$; beta weight of -.46; $p = .032$). Age at follow-up, age at adoption and number of months of exposure to French did not enter any of these regressions. The Formulated Sentences subtest score was not predicted by any of the variables.

Discussion

The purpose of the present study was to examine the limits of IA children's second language learning abilities by comparing their performance on a number of language tests in their adoptive language to the performance of control children matched on factors that favor language development (i.e., SES and "being female") and are disproportionately represented among IA children and their families; these factor have not usually been controlled in previous research except that of Cohen et al. (2008). The IA and CTL children were initially assessed at about 4 years of age when they had been exposed to their new language for 2 to 4 years. The general cognitive, socio-emotional and health status of the IA children, along with their language skills, were assessed and compared to that of the CTL children. Inclusion of the non-language measures allowed us to determine the extent to which any differences that might be found between the IA and CTL children were general or specific to language. Results indicate that the IA children scored significantly lower on tests of expressive vocabulary and general expressive language skills than the CTL children, but there were no significant differences between the two groups with respect to receptive language skills; nor were there significant differences on measures of nonverbal intellectual ability and socio-emotional adjustment. These results are consistent with Glennen's (2007) study who found that the expressive language abilities of children adopted from Eastern Europe were less developed than their receptive language skills when they were tested at 31.26 months of age, after 12 to 21 months of exposure to English.

Since the IA children were relatively young when tested the first time, it is possible that they had had insufficient exposure to French to catch up to their non-adopted peers and that, with more exposure to French, they would close the gap. Therefore, the IA children were assessed a second time, some 16 months later, after they had been exposed to French for 4 years 4 months, on average. Since our IA sample had spent significantly less time in daycare compared to the CTL children who participated in the first assessment, we decided to recruit CTL children for the follow-up assessment who had spent the same amount of time in daycare as the IA children. This allowed us to better match the post-adoptive

language learning environment of the IA children to that of the CTL group since some research has found that daycare attendance is positively linked to language development (e.g., Peisner-Feinberg et al., 2001). The results of the second assessment indicated that not only did the IA children continue to exhibit lags in expressive skills in comparison to the matched CTL children, they also exhibited significantly weaker receptive language skills (i.e., Receptive Language Scale of the CELF-R); more precisely, their performance on subtests of the CELF-R (Linguistic Concepts, Sentence Structure, and Oral Directions) that assess the ability to interpret oral directions and to understand sentence-level syntactic structures were now also significantly lower than that of the CTL children. Thus, extended exposure to French was not sufficient to overcome the IA children's initial lags in expressive abilities in comparison to the control children and, to the contrary, their initial lags had expanded to include receptive language skills as well. Our results suggest that there might be a subgroup of children for whom acquiring the new language is more difficult. This finding is consistent with those of Roberts, Pollock and Krakow (2005) who found that with 2 additional years of exposure to English (after a total of 4½ years of exposure and an average age of 5 years 10 months), the 10 lowest performers on language tasks from the original cohort of 55 IA children still performed significantly lower than a group of matched IA children from the initial cohort. Our results are also consistent with those of Scott et al. (2008) who found that 50% of IA children from China they assessed were receiving supplementary academic or special education services; the children in their study (7;6-years old), were older than our subjects.

The IA children's results on the EOWPVT provide additional evidence that exposure alone cannot explain the differences between the IA and CTL children. This test was administered at both the initial and follow-up assessments making it possible to ascertain if the IA children's initial difference in comparison to the CTL children on this test was reduced after additional exposure to French. Although the average standardized test scores of the IA children were similar at initial and follow-up assessments, in fact, there were more than twice as many IA children with lags when compared to the CTL children at the follow-up compared

to the initial assessment. More specifically, at the initial assessment, approximately 13% of the IA children scored 2 standard deviations below the mean of the CTL children compared to 30% at the follow-up assessment.

The IA children's scores on the tests of receptive and expressive vocabulary at the initial assessment were significantly correlated with their scores at follow-up, suggesting that early indicators of development in the new language are good predictors of IA children's later language development. In a related vein, we also found that there was a significant negative correlation between the age at which IA children produced their first words in French and their subsequent language outcomes. Thus, IA children who produced their first words in French earlier performed better on almost all of the language measures at follow-up compared to children who were older when they produced their first words in French. Caution is called for when interpreting these results because they are based on parental reports and might be tainted by the perception of the parents about their children's current language abilities. It is not clear at this time whether delay in producing first words reflects individual differences in second language learning ability, pre-adoption language learning experiences, a language reserve that survived the effects of institutionalisation (Croft et al., 2007), or other pre-adoptive variables; but, from a clinical point of view, it appears that children who produce their first words relatively young are likely to make better progress later, at least within the next three to five years post-adoption, than IA children who are older when they produce their first words in the new language.

The present results are consistent with studies that have compared the language skills of IA children to test norms insofar as the children in the present study performed in the typical range on almost every test. Thus, our results, along with those of other researchers, suggest that abandon of the birth language and the pre-adoption experiences of IA children from China are not significant impediments to their acquisition of their second first language. However, our results differ from most other studies insofar as they indicate that the IA children's language lagged behind the CTL group. Our findings are similar to those of the only other study we know of that included a control group matched for SES

(Cohen et al., 2008). Cohen et al. (2008) used the same measures that we used at the initial assessment to assess expressive and receptive language skills; namely, the Expressive and Receptive scales of the PLS-3. Like us, they found that IA children acquiring English performed significantly lower on the Expressive scale compared to controls matched for SES at each follow-up assessment (6, 12 and 24 months post-adoption). Also similar to our results, they too found that the IA children scored in the average range when compared to the test norms. The receptive language skills of the IA children were comparable to those of the controls at each follow-up assessment.

The discrepancy between our and Cohen's et al. (2008) results, on the one hand, and other studies, on the other hand, could be due to the use of CTL groups that were matched to the IA children on factors that have been found to be influential in language development and that are differentially distributed among IA and non-adopted children and families. As a group, the adoptive parents had more education and higher incomes compared to the general population, as has been found in other studies (e.g., Tan & Yang, 2005). Since research has shown that SES has a significant positive correlation with quality of language input as well as later language development in non-adopted children (e.g., Hoff, 2006), the use of an SES-matched control group minimized a source of positive influence on the results of the IA children in this study and, thereby, served to equate the IA group with the CTL on this factor. As well, only were included in our control and adopted samples. Tests norms do not always consider gender and this could be an additional source of influence in other studies since research has shown that girls tend to develop slightly faster than boys in diverse developmental domains (e.g., Van IJzendoorn et al. 2005).

A number of pieces of evidence suggest that the differences demonstrated by the IA children in the present study are specific to language and not global in nature. First, there were no major differences in overall health status between the IA and CTL children at the follow-up assessment. The initially relatively poor state of health of the IA children at first assessment appears to have been resolved by follow-up, indicating that their initial health problems responded well to their

new environments. As well, our results failed to reveal that general health and developmental problems that the IA children experienced early on were linked to poorer language outcomes later. This finding corroborates results from Glennen and Masters (2002) who found that medical risk factors were not predictive of language development outcomes. Second, the level of socio-emotional adjustment of the groups was similar. Third, there was no difference between the IA and the CTL children in terms of nonverbal intellectual abilities. This finding is consistent with Rutter et al.'s (2004) results suggesting that being raised in an institution only has a negative effect on intellectual development (measured at 6 years of age) if it involves severe deprivation which was not the case for the children in our study.

The language-specific nature of the differences that are reported here are similar to those found in a meta-analysis of 62 studies of adopted and non-adopted children's IQ and school performance carried out by Van IJzendoorn et al. (2005) who found that IA children did not differ from non-adopted peers in terms of IQ, but their language skills as well as their school performance lagged. Yet a further indication that our results are language specific derives from the lack of correlation between the IA children's language skills and their intellectual abilities. In contrast, the language abilities of the CTL children correlated positively and significantly with their intellectual abilities as is usually found in typically-developing children (e.g., Cathers-Schiffman & Thompson, 2007).

Taken together, our results indicate that the IA children continued to differ from the CTL children at the follow-up assessment, that they showed differences in more areas at follow-up than initially, and that more IA children showed differences on certain tests at follow-up than initially in comparison to the CTL children. These findings suggest that factors besides length of exposure are called for to explain the differences between the IA and CTL children's language performance. The question is: what are these other factors? One possibility is the age difference between the IA and CTL parents - the IA parents were significantly older than the CTL parents. It is difficult to control this variable since parents who adopt are usually older because they often try to have biological children before considering adoption, and after the decision to adopt is made, there are often

substantial delays. However, research on the link between parental age and language environment or outcomes are very sparse. Magill-Evans and Harrison (2001) found that parental age predicted cognitive and motor development but did not predict expressive or receptive language. Brasel (2008) found a significant negative relationship between parental age (20 to more than 50 years), and parental involvement (i.e., providing support to assist in learning). Since information about familial antecedents of the IA children is not available, it might be argued that genetic factors could play a role in explaining some of the differences obtained in the current study. However, due to equivalence in terms of nonverbal intelligence between the groups, it seems unlikely that the discrepancies obtained with regard to language skills are due to genetic factors. Indeed, nonverbal intelligence has a strong heritable component (Hoekstra, Bartels, & Boomsma, 2007).

As we speculated in the Introduction, it is also possible that the differences in the IA children's language performance in comparison to the matched control group reflect early age-of-acquisition effects. As noted previously, Hyltenstam and Abrahamsson (2003) present evidence and arguments that it might be difficult, if not impossible, for second language learners to attain native-like levels of competence even when second language learning begins early during the preschool years. The present results are similarly supported by findings from studies that have reported early age effects in language acquisition among deaf children with delayed exposure to sign language (e.g., Mayberry, 1993). It is interesting to note that there was a significant difference between the IA and CTL children on the Recalling Sentences subtest of the CELF-R -- on average, the IA children were about 1.5 times lower than the CTL children on this test at follow-up. Furthermore, when compared to test norms, the average score of the IA group was significantly below norm whereas the average score for the CTL was within the average range. Despite the fact that there was a significant correlation between the children's vocabulary and Recalling Sentences subtest's scores, the IA children's relatively poor performance on the Recalling Sentences subtest cannot be accounted for entirely by differences in vocabulary because the difference between the IA and CTL groups on the Recalling Sentences subtest remained significant even after

statistically controlling for the expressive and receptive vocabulary scores. This suggests that this task is tapping other skills; probably memory for spoken language as the test developers claim and grammatical skills as suggested by studies involving sentence repetition tasks (e.g., Devesovi & Caselli, 2007). Additionally, the IA children's performance on the Receptive Language Scale of the CELF-R suggests receptive morphosyntax lags in comparison to the matched CTL children. These lags probably contributed to the IA's difficulties on the Recalling Sentences subtest since the scores on this subtest were highly correlated with the scores on the Receptive Language Scale. Furthermore, the IA's performance on the Formulated Sentence subtest suggests expressive morphosyntax lags in comparison to the CTL children. Although the performance of both the CTL and IA children was in the low end of the average range on this latter subtest, suggesting that this test is difficult for French-speaking children, the IA children had significantly more difficulty compared to the CTL group on this test which requires children to formulate grammatical sentences using prompts.

The results on the Recalling Sentences subtest are of additional interest because it has been found that sentence repetition tasks are highly sensitive to age of acquisition among both first and second language learners (Mayberry & Eichen, 1991; Mayberry & Fischer, 1989). Performance on such tests has also been identified as a clinical marker of specific language impairment (e.g., Conti-Ramsden, Botting, & Faragher, 2001; Stokes, Wong, Fletcher, & Leonard, 2006). We are not suggesting that the IA children are language impaired in the clinical sense, but rather that they appear to have difficulty with aspects of French that show age-sensitivity and are particularly difficult for children with SLI. In other words, IA children's acquisition of French is vulnerable in the same way as some researchers have suggested is the case for other learners of French.

Clearly, the current evidence is insufficient to conclude confidently that the present results reflect early age-of-acquisition effects. It would be necessary to examine the long term language outcomes of IA children in comparison to matched controls to determine the ultimate limits of IA children's second language learning abilities. In fact, we are currently planning a third assessment of the IA

children's language skills now that they have attended school for 2 to 3 years. While extended and enriched language experiences in school might serve to boost these children's language abilities, it is also possible that the increased language demands of schooling will be associated with continued and even larger differences. In our third assessment, we will also examine more specific aspects of language development to pinpoint the precise areas of strengths and weaknesses. We are also engaged in studies that seek to understand the social processes and input factors that might influence the development of language skills in recently-adopted IA children.

Limitations of this study include a small sample size. Studies involving more participants are needed in order to strengthen our findings. Furthermore, the use of French adaptations of English tests limited the psychometric properties of the measures. However, at the time of conceptualization of this study, these tests were the best option available. The use of a control group diminished any possible bias due to the fact that some of the tests were adapted from English. In closing, it is important to emphasize that the IA children in the present study performed well within the normal range of typically-developing children their age (i.e., when their language performance was compared with norms), except on two subtests administered at follow-up (i.e., the Recalling Sentences and Formulated Sentences subtests of the CELF-R). These findings support other studies that most IA children from China are functioning linguistically, and otherwise, in the normal range compared to typically-developing children of the same age. Thus, from a clinical point of view the results are not alarming. They provide useful information to professionals in helping them to know what to expect from IA children and what areas of language may be more challenging to acquire. From a theoretical perspective, the present results suggest the intriguing possibility that early age effects on second language acquisition may be influencing these children's second first language development.

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Connecting Text – Study 1 to Study 2

The purpose of the previous longitudinal study was to examine the French language acquisition of children adopted from China around 13 months of age in comparison to that of non-adopted children matched for socio-economic status, sex, and age and, as well, in comparison to test norms. The children were assessed initially at 4 years of age, on average, and again 16 months later; they had been in their adoptive homes for 3 and 4 years, on average, respectively. The results of the initial assessment revealed that the two groups did not differ with respect to socio-emotional adjustment or general cognitive abilities. As well, the internationally adopted (IA) children performed in the average range on most language tests when compared to test norms, suggesting resiliency in their language acquisition abilities. However, differences were found between the IA and control (CTL) children especially in the domain of expressive language. In order to better understand the differences between the IA and CTL children and to validate the findings of Study 1, in-depth analyses of the expressive language abilities of some of the IA children was undertaken in Study 2.

Spontaneous language samples of a sub-group of the 4-year-old IA children who had participated in Study 1 were analyzed with a focus on complement clitics, lexical diversity, and tense morphology. We chose these specific features of French because they have been found to be vulnerable in second language learners as well as in children with specific language impairment (Grondin & White, 1996; Hamann, 2004; Paradis & Crago, 2000; Thordardottir & Namazi, 2007). Thus, we expected that, if the delayed exposure to French and consequently reduced amount of exposure to French that the IA children had experienced had impacted their language development, it would be apparent in these areas. As well, examining these features of French goes beyond the generalized analyses that have tended to characterize investigations of IA children's language development. At the same time, it made it possible to substantiate evidence from Study 1 that there are indeed some areas of weakness in the language acquisition of IA children in comparison to a matched control

group. General features of the IA children's expressive abilities were also examined, including mean length of utterance (MLU) and number of utterances produced. The IA children's skills were compared to a sub-group of the original CTL group from Study 1. The IA and CTL children in Study 2 had similar levels of socio-emotional adjustment and non-verbal intelligence. Study 2 complements Study 1 by examining language abilities using natural language samples based on interactions with a caregiver instead of test performance, and highlights strengths and weaknesses in the French of the IA children whose initial exposure to French was delayed in comparison to children learning French from birth. Moreover, to better understand the role of age at adoption, length of exposure to French, and age of production of first word(s), the relationships between these variables and language abilities were examined. This is the only study that we know of that has examined directly the acquisition of specific grammatical features by IA children from China who are learning French.

Study 2

Acquisition of Complement Clitics and Tense Morphology in Internationally-Adopted Children Acquiring French[3]

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Abstract

The goal of the present study was to assess the language development of children adopted from China focusing on complement clitics, lexical diversity, and verb morphology, features of French that are relatively late to emerge in native speakers of French and difficult to acquire by monolingual learners of French with specific language impairment and by second language learners of French. Spontaneous language samples of 12 Chinese-born adopted children from 3;6 to 4;8 years of age living in French-speaking families were analyzed and compared to those of a group of non-adopted monolingual French-speaking children of the same age, sex, and socio-economic status. The adopted and control children had similar levels of socio-emotional adjustment and non-verbal intellectual abilities. Although the adopted children exhibited accelerated language development in general (for example, with respect to mean length of utterance, tense morphology, and general lexical and verb diversity), they made significantly more errors when using complement clitics, and in particular object clitics, compared to the non-adopted children. These findings suggest that internationally-adopted children may lag in their acquisition of complement clitics, a feature of French that is difficult for children learning French as second language and for children with specific language impairment, when compared to control children of the same socio-economic status, age and sex.

Introduction

Language acquisition has been studied in diverse populations of learners: first language (L1), second language (L2), bilingual, and in children with typical and impaired capacities for language learning. Studies of language acquisition in different contexts and by different kinds of learners have made significant contributions to our understanding of the capacity of the language faculty as well as its limitations. For example, studying late first and second language learners has shed light on issues related to the critical period for language learning (e.g., Mayberry, Lock, & Kazmi, 2002) and research on simultaneous bilingual children has extended knowledge about the capacity of children to acquire two languages simultaneously in comparison to monolingual acquisition (Genesee & Nicoladis, 2006).

Internationally-adopted children (hereafter referred to as IA children) represent a special population of language learners since they face a unique linguistic experience in which they begin to learn a second language while acquisition of the L1 is abruptly and usually completely stopped. For this reason, the language acquisition of IA children cannot be conceptualized easily in terms of simultaneous bilingual acquisition or second language acquisition because IA children are no longer exposed to their first language in their adoptive families (Glennen & Master, 2002). De Geer (1992) used the term "second first language" to portray the unique linguistic experience of IA children. Interruption of first language acquisition often occurs in the case of children adopted from China when the child's language processing is becoming fine tuned to the first language (see Werker & Tees, 2002), creating a natural experiment in which it is possible to examine the acquisition of an additional language when the neuro-cognitive substrates for language learning are disrupted. It is an empirical, as well as theoretical, question whether the pattern and processes of language development in young IA children more closely resemble those of monolingual children or second language learners, or if they present as a distinct profile.

On the one hand, it might be expected that the language development of IA children who are exposed to an additional language around 12 months of age would resemble that of monolingual children because the processes that underpin first language acquisition are still available, and acquisition of the new language falls well within what is thought to be the critical period for language learning (e.g., Birdsong, 1999). On the other hand, it has been suggested that the sudden change in L1 exposure that IA children experience may create vulnerability for subsequent language learning and perhaps even an inability to develop complete mastery of the new language (e.g., Schiff-Myers, 1992) because the neuro-cognitive substrates of language learning are disrupted with cessation of exposure to the L1. Newborn infants have perceptual capacities that allow them to discriminate phonetic units of any natural language (e.g., Werker & Tees, 2002). However, this ability declines markedly toward the end of the first year of life when infants become unable to discriminate contrasts that are not phonemic in the input language but continue to discriminate contrasts that are phonemic in the ambient language (Werker & Tees, 2002). Researchers have also found that the phonetic discrimination abilities of 7 month-old children are positively correlated with their later lexical and syntactic development and negatively with their ability to discriminate non-native phonetic contrasts (Kuhl, Conboy, Padden, Nelson, & Pruitt, 2005). Thus, IA children might be at a disadvantage learning a new language because exposure to the primary language that drives fine-tuning of the neuro-cognitive substrates of language learning is discontinued abruptly around 12 months of age.

Despite these concerns, research to date on the language development of adopted children from China has generally reported good outcomes with a low rate of language problems or delays and, in some cases, performance on standardized language tests that is above average (Geren, Snedeker, & Ax, 2005; Pollock, Price, & Fulmer, 2003; Roberts, Krakow, & Pollock, 2003; Tan & Yang, 2005). In contrast, Miller and Hendrie (2000) found an elevated rate of language delays (43%) among a group of 452 adoptees from China. However, most of their IA children were tested only a few months after arriving in the United States.

Most studies have used performance on standardized tests or parent questionnaires to assess the language skills of IA children (Dalen, 2001; Krakow & Roberts, 2003; Krakow, Tao, & Roberts, 2005; Tan & Yang, 2005; Tirella, Chan, & Miller, 2006). Studies that have used direct measures of language proficiency have generally found that the language acquisition of IA children from China appears to progress rapidly and to follow the same general developmental patterns as monolingual infants matched for vocabulary size (Geren et al., 2005; Snedeker, Geren, & Shafto, 2007). However, these studies examined language acquisition relatively early following adoption (3 to 18 months post-adoption). Furthermore, to date, studies with IA children have only involved general measures of language development such as the Communicative Development Inventory (CDI-2), MLU, and vocabulary size and type. In the present study, we investigated more fine-grained features of the language of IA children in addition to using general measures of language development. Moreover, IA children had been in their adoptive families nearly three years, on average.

The children examined in the present study were part of a longitudinal study that included 24 children adopted from China and 25 non-adopted, monolingual French control children who were matched for SES, age, and sex (Gauthier & Genesee, 2009). The children were assessed initially at 50 months of age, on average, and again 16 months later. The children had been exposed to French at the first assessment for 36 months (range = 19 to 46.5 months) and for 52 months at the second session (range = 34 to 64 months), on average. The initial assessment revealed that the two groups were similar with respect to non-verbal intellectual abilities and socio-emotional adjustment. However, the IA children performed significantly lower than the controls on standardized tests of expressive vocabulary and general expressive language skills at initial and follow-up assessments.

We attribute the differences we found in our sample of IA children to the fact that we made direct comparisons between the IA children and a comparison group of non-adopted children matched for age, sex, and socio-economic status

(SES). SES has not been controlled for in studies of IA children's language development, with the exception of Cohen, Lojkasek, Zadeh, Pugliese and Kiefer (2008). SES has been shown to have an important impact on language development in children (Le Normand, Parisse, & Cohen, 2008). In a summary of research on SES and language, Hoff (2006) reports significant effects of SES on the language environment in which children develop as well as on their language development. In the case of IA children, SES is an important variable to consider since adoptive families generally have a higher SES than the general population (e.g., Tan & Yang, 2005). Thus, in order to control for the learning environment in which children acquire language, it is crucial to control for SES. The use of test norms might overestimate IA children's abilities because the norming group is not representative of the families into which IA children are adopted. Cohen and her colleagues, like our study, found that IA children scored significantly lower than control children on the expressive subscale of the Preschool Language Scale-3 (PLS-3; Zimmerman, Steiner, & Pond, 1992).

In order to better characterize the nature of the language differences between the IA and non-adopted control (CTL) children in our earlier study and, in particular, to better understand the specific aspects of French that IA children might have difficulty acquiring, in the present study we undertook a detailed analysis of specific aspects of the expressive language abilities of a sub-group of the IA children who participated in the longitudinal study. These analyses also permitted us to examine the reliability of the results we obtained from standardized language tests. The analyses were carried out on spontaneous language samples from 12 of 24 of the IA and 12 of the 25 CTL children. We concentrated our analyses on features of French that are acquired relatively late in typically-developing monolingual children and are difficult to acquire by L2 learners of French as well as monolingual learners of French with specific language impairment; namely complement clitics, lexical diversity, and tense morphology (e.g., Grüter, 2005; Jakubowicz & Nash, 2001; Paradis & Crago, 2000; Paradis, Crago, & Genesee, 2003; Parisse & Maillart, 2004). To the best of

our knowledge, this is the first study to examine in detail the language abilities of IA children raised in French-speaking families.

Complement clitics in French

We examined the IA children's use of complement clitics, with a focus on direct object clitics (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. masc. *le,* 3rd pers. sing. fem. *la,* 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *les*). Direct object clitics in French serve the same referential role as object pronouns in English, which are used when the object is salient in the discourse, either as a result of previous mention or due to the referent's visual presence (deixis). In English, object pronouns have the same distribution as full lexical objects and occur post-verbally. In contrast, object clitics in French occur in pre-verbal position (see examples 1b and 1c for correct and incorrect placement of the direct object pronoun "*les*" – the plural form of "the", respectively). An exception to pre-verbal placement is affirmative imperatives as in 1d. French clitic pronouns are dependent on a verb and cannot be conjoined with other pronouns (see 1e); they cannot stand alone; and they cannot be modified, dislocated or separated from the verb except by other clitics (Kayne, 1975).

(1) a. *Julie nourrit Bruno et Amanda*.
Julie is feeding Bruno and Amanda.

b. Julie les nourrit.
Julie them feed.
Julie is feeding them.

c. *Julie nourrit les.
Julie is feeding them.

d. Donne-le.
Give it.

e. *Julie le et la nourrit.
Julie him and her feed.
Julie is feeding him and her.

Children with SLI have difficulty acquiring object clitics and frequently omit them (Grüter, 2005; Hamann, 2004; Jakubowicz, Nash, Rigaut, & Gérald, 1998; Paradis, 2004; Paradis, Crago, & Genesee, 2005-2006). Paradis (2004) found that 7-year-old French learning children with SLI were less accurate in choosing the appropriate form of object clitic compared to typically-developing children of 3 or 7 years of age. Their mistakes consisted of errors in person, gender- and number-marking, as well as choice of the wrong clitic paradigm (e.g., using the locative clitic *y* as a replacement for the direct object clitic). Children who have difficulty with object clitics often omit them (Grüter, 2005; Hamann, 2004; Jakubowicz et al., 1998; Paradis, 2004). In fact, omission of object clitics has been proposed as a clinical marker for impairment in children learning French as a first language (Paradis, Crago, & Genesee, 2003). It has also been noted that French-learning children with SLI have more difficulty acquiring object clitics than definite articles (*"le"* – the masculine form of "the", "*la*" – the feminine form of "the", and "*les*" – the plural form of "the") even though they have the same acoustic form, arguing that the difficulty that children with SLI have acquiring clitics cannot be attributed to perceptual processing alone (e.g., Hamann, 2004; Jakubowicz et al., 1998). Paradis (2001) suggested that the difficulties that children with SLI have in the acquisition of object clitics is associated with underlying representation of clitics and not limited processing capacity, a point we return to later.

Although research on SLI has focused on object clitics, it has also been found that all complement clitics, including direct objects (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. masc. *le,* 3rd pers. sing. fem. *la,* 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *les*), indirect objects (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. *lui,* 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *leur*), reflexives (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. se, 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *se*), genitive (*en*/of them), and locative (*y*/there) forms are an area of difficulty for children with SLI. Like object clitics, these other clitic forms appear pre-verbally in French; see examples of these clitic forms in examples 2a, 3a and 3c. Typically-developing children start to use

complement clitics in French relatively late in development, usually around 2½ years of age, and they emerge after subject clitics (e.g., Hamann, Rizzi, & Frauenfelder, 1996). Complement clitics, including object clitics, are acquired late by simultaneous bilinguals (Hulk, 1997; Hulk & Müller, 2000) and are an area of some difficulty for L2 learners of French as well as children with SLI (Hamann, 2003 with SLI; Hamann, 2004 with SLI; Grondin & White, 1996 with *L2 learners*), as evidenced by a low rate of suppliance (Grüter, 2005; Paradis, 2004), high rate of omission (Adiv, 1984), and late emergence (White, 1996), as already noted.

Lexical Diversity

Lexical diversity is an index of a learner's active vocabulary and has been studied extensively in language acquisition and educational research. Breath of lexical knowledge has been shown to be linked with school progress (Walker, Greenwood, Hart, & Carta, 1994) as well as with reading achievement (Harlaar, Hayiou-Thomas, Dale, & Plomin, 2008). It has been found that children with SLI who are acquiring French have restricted lexical diversity when compared to typically-developing children of the same age (Thordardottir & Namazi, 2007). Restricted diversity of lexical forms has also been found in children with SLI learning English (e.g., Rice & Bode, 1993; Watkins, Rice, & Moltz, 1993; however, see Thordardottir & Weismer, 2001, for evidence of no difference) as well as in Cantonese-speaking children with SLI (Klee, Stokes, Wong, Fletcher, & Gavin, 2004). Researchers have reported that L2 children also have a restricted range of lexical verbs and, as a result, use more general all purpose (GAP) verbs than L1 learners (e.g., Harley, 1992, for English L1-French L2 learners; and Golberg, Paradis, & Crago, 2008 for learners from various language background learning English as a L2). GAP verbs, such as "to do", "to go", "to take", are often used by L2 learners of English instead of less frequent verbs that are appropriate in the same contexts.

Tense morphology

Research involving English-speaking children with SLI has found that they have difficulties with tense morphology and, in particular, they often omit

tense-marking inflectional morphemes (Leonard, 1989; van der Lely, 1998). The use of tense marking morphemes has been found to be less accurate than the use of non-tense marking morphemes in children with SLI whereas typically-developing children do not exhibit such a discrepancy, or to a much lesser extent (e.g., Rice, 2003). French-speaking children with SLI also have greater difficulty with inflectional morphology that marks tense compared to typically-developing children learning French as a first language, and they exhibit a significant discrepancy in accuracy between tense marking versus non-tense marking morphemes (Jakubowicz & Nash, 2001; Paradis & Crago, 2001; 2004). Tense-marking difficulties have also been found in typically-developing English-speaking L2 learners of French when compared to monolingual learners of French (Paradis & Crago, 2000). In their study, Paradis and Crago (2000) included three groups of 7-year old participants: French-speaking children with SLI, typically-developing English-speaking L2 learners of French, and monolingual French-speaking children. The SLI and L2 groups were significantly less accurate in their use of past and future tense morphemes in comparison to monolingual children. Thordardottir and Namazi (2007) found that French-speaking children with SLI and MLU-matched monolingual French-speaking children demonstrated significantly less diversity in their use of verb inflectional morphology than typically-developing children matched for age with the SLI children. However, the accuracy of verb inflection was not significantly different between groups.

The present study

This study was designed to examine these features of French language acquisition in IA children because, as noted earlier, they have been found to be delayed or problematic for other learners of French, including L2 learners and monolingual children with SLI. Thus, they may also pose difficulties for IA children whose initial exposure to French is delayed in comparison to children learning French from birth. To this end, we compared the French language development of IA children to that of non-adopted French-monolingual control children matched for age, sex, and SES; we examined (a) complement clitics (all types combined, direct object clitics separately): number of clitics produced,

omission and error rates; (b) lexical diversity: all words, lexical verbs; and (c) tense-related verb morphology: diversity, accuracy. As well, we examined general features of their French (MLU, number of utterances) in order to provide a general profile of their language use. Finally, we included standardized measures of expressive and receptive vocabulary and of social-emotional adjustment and non-verbal intellectual ability in order to compare the two groups to each other and to the larger longitudinal sample from which these sub-groups were drawn.

Method

Participants

The IA group consisted of 12 children with a mean age at time of testing of 48.9 months (range: 42 to 56 months, SD = 4.9). The mean age of the IA children at the time of adoption by French-speaking families in Montreal was 13.5 months (range: 10 to 21 months, SD = 4.7). The IA children had been in their adoptive families for an average of 34 months at the time of testing (range: 20 to 43 months, SD = 7.9). The control (CTL) group consisted of 12 monolingual French-speaking, non-adopted children, with a mean age at time of testing of 49.7 months (range: 42 to 57 months, SD = 4.8). There was no significant difference in age between the two groups, $t(22) = -.375$, $p = .711$ (two-tailed). The IA and CTL groups were matched on parent's education and income according to information collected from the parents during a semi-structured interview. Chi-square tests indicated that there were no significant differences between the groups with respect to number of years of education of the mothers ($N = 24$) ($x^2 = 0.38$, $p = 0.54$) or the fathers ($N = 22$) ($x^2 = 0.11$, $p = 0.95$) or for family income ($N=23$) ($x^2 = 0.68$, $p = .71$). All the IA children in our sample were female, primarily because the majority (98%) of adoptees from China in Quebec are female (Beaulne & Lachance, 2000).

As mentioned earlier, the children were part of another study involving 49 children (24 adopted and 25 non-adopted children) (Gauthier & Genesee, 2009). The children in the present study were chosen according to their expressive language scores on the French versions of the Preschool Language Scale-Third Edition (PLS-III; Zimmerman et al., 1992) and the Expressive One-Word Picture

Vocabulary Test-Third Edition (EOWPVT-III; Brownell, 2000) to be representative of the whole sample of IA and CTL children.

CTL children were excluded from participation in the study if they had: 1) a history of psychiatric or neurological problems, 2) intellectual or language problems, 3) a gestational age at birth of less than 37 weeks, 4) major health problems, past or present, 5) serious motor or behavioral problems, or 6) significant exposure to another language than French (more than 25% of the time). Participants in both groups were monolingual French-speaking children and none of the IA children were exposed to Chinese post-adoption. Recruitment of the IA children was done in collaboration with an adoption agency in Montreal. The CTL children were recruited from daycare centers in Montreal and through ads in a local newspaper. Demographic information of participants is presented in Table 1.

Table 1
Demographic data for the adopted and control groups

Background Variables	Adopted group (n = 12)	Control group (n = 12)
Age (in months, *M* & *SD*)	48.9 (4.9)	49.7 (4.8)
Age at adoption (in months, *M* & *SD*)	13.5 (4.7)	--
Length of exposure to French (in months, *M* & *SD*)	34 (7.9)	49.7 (4.8)
Mother's education (%; Highest degree completed):		
High school	0	0
College	16.7	16.7
University	83.3	83.3
Father's education (%; Highest degree completed):		
High school	10.0[a]	8.3
College	30.0[a]	25
University	60.0[a]	66.7
Family income per year (%; Canadian dollars)		
30 000-59 999	16.7	8.3
60 000-89 999	8.3	16.7
90 000 and more	75	75

[a] n= 10; parents refused to answer this question.

Procedure

The objectives and the procedure of the study were explained to each child-parent pair by the first author or by a trained research assistant and their questions were answered before testing began. Parents were then asked to read and sign the consent form. Naturalistic language samples were recorded from the children during a free play session with the primary caregiver. Of the 12 IA children, 9 were filmed with their mothers and 3 with their fathers. Of the 12 CTL, 10 were filmed playing with their mothers and 2 with their fathers. The sessions lasted approximately 30 minutes and were filmed either in a university lab at McGill University or in the families' homes. A standard set of play materials, including a small portable kitchen set, toy utensils, and a box of pretend food items, was used with every child. Parents were instructed to play with their child as they would normally at home. The play session was part of a larger assessment including four sessions that lasted approximately one hour and a half each, with breaks when needed. The filmed play session, analyzed in this paper, occurred during the last session. During the other sessions, the child completed a non-verbal intellectual test, the Leiter International Performance Scale-Revised (Leiter-R; Roid & Miller, 1997), and a number of language tests in French: the Expressive One-Word Picture Vocabulary Test-Third Edition (EOWPVT-III; Brownell, 2000), the Échelle de vocabulaire en images Peabody (EVIP; Dunn, Theriault-Whalen, & Dunn, 1993) and the Preschool Language Scale-Third Edition (PLS-III; Zimmerman et al., 1992). However, the results of the latter test were not analyzed in the present study. Socio-emotional functioning was assessed using the Vineland Social-Emotional Early Childhood Scales (Vineland SEEC; Sparrow, Balla, & Cicchetti, 1998) which took the form of a structured interview with the parents. A background questionnaire containing questions about the child's development, medical condition before and after adoption, as well as parental education, occupation, and income was completed during an interview with the caregiver(s) during the first session. Parents also completed a questionnaire concerning the child's exposure to language(s) with others (e.g., parents, grand-parents) and in a

variety of situations (e.g., TV, radio). They were also asked to estimate the amount of French, English and any other languages that the child was exposed to.

Transcription and Coding of Language Samples

The recorded language samples were transcribed in accordance with the standard CHAT format (Codes for the Human Analysis of Transcripts; MacWhinney, 2000) of the CHILDES project (Child Language Data Exchange System). Transcription was done from videotapes. Both the child's and the parent's utterances were transcribed and running notes about context and non-verbal gestures were made to facilitate subsequent interpretation and coding of the transcripts. Interjections and onomatopoetic expressions (e.g., ha@i, wouf@o), self-repetitions (e.g., Tu [/] tu manges la pomme ("*You [/] you eat the apple"*)), imitations, singing, and hesitations were excluded. Transcription was carried out using standard conventions of adult French orthography and grammar. Some adaptations were made in accordance with everyday Quebec French usage; for example, expressions such as *pis* ("then") and *tsé ("you know"*), which occur frequently in colloquial Quebec French, were transcribed as they sounded and were not transcribed in standard French form (e.g., "pis" as "*puis"* and "tse" as "*tu sais"*). Pronunciation patterns typical of everyday Quebec French were not considered errors. For example, fait [fɛ] ("did") is often pronounced as "faite" [fɛt]; and was not considered as the feminine form. Hyphenated words or other groups of words that frequently occur together were transcribed as compounds (e.g., est+ce+que "Wh form", là+bas "there", peut+être "maybe") and were treated as single words because they were assumed to be considered one word by the children. The transcription was carried out initially by native or fluent bilingual speakers of Quebec French. Each transcript was subsequently verified completely by two other independent transcribers before being coded. Words or utterances that were unintelligible were excluded from further analyses. Transcriptions of the entire 30-minute sessions were coded using the CLAN program (Computerized Language Analysis; MacWhinney, 2000).

Complement clitics. Complement clitics were coded when used in appropriate discourse contexts; that is, when there was a referent mentioned

earlier in the conversation or there was a visual referent. More precisely, we coded for: direct object (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. masc. *le,* 3rd pers. sing. fem. *la,* 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *les*), indirect object (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. *lui,* 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *leur*), reflexive (1st pers. sing. *me,* 2nd pers. sing. *te,* 3rd pers. sing. se*,* 1st pers. pl. *nous,* 2nd pers. pl. *vous,* 3rd pers. pl. *se*), genitive (*en)*, and locative (*y)* forms. Complement clitics were coded as correct or incorrect. Incorrect usage included misplacements, clitics co-occurring along with an object noun, and wrong forms (e.g., masculine instead of feminine, singular instead of plural, or direct instead of indirect object forms). Complement clitics were coded as omitted if there was no doubt that a clitic was obligatory but not provided. To calculate omission rates, we considered only contexts where a clitic was the most appropriate option in the adult language. The numerator was the number of clitics missing (considering the context) and the denominator was the total number of contexts in which there should have been a clitic (including instances when the clitic was missing, incorrectly used, and correctly used). This gave the percentage of complement clitics that were omitted. The coding of complement clitics was done a second time by a native French speaker and disagreements were resolved by discussion with a third person.

Lexical/verbal diversity. To determine the type-token ratio for all words, we calculated the frequency of different words as a percentage of the total number of words produced by each child. Differently inflected forms of adjectives and nouns were counted as the same type: chat/chatte/chats/chattes and grand/grande/grands/grandes were counted as only one type each. Variations in phonological form of the same words or contracted forms of a word were considered as their full and correct form. For example, "cikron" was considered "citron" ("lemon"). The lexical-verb type-token ratio was obtained by calculating the number of different verbs, without considering inflection, as a percentage of the total number of verbs used. The lexical-verb type-token ratio is an index of the lexical-semantic aspect of verb production since different forms of a verb (i.e., tense, mood, or person forms) were considered as one type.

Tense morphology. In order to investigate tense morphology, errors in the use of inflections marking tense or finiteness were coded. The rate of tense morphemes used correctly was calculated as a percentage of the total number of verbs used correctly and incorrectly. The coding of tense morphology was done a second time by a native French speaker and disagreements were resolved by discussion with a third person.

Standardized Tests

In addition, we examined the children on a number of standardized language and other tests.

Expressive One-Word Picture Vocabulary Test-Third Edition. A French adaptation of the EOWPVT test and scoring manual, developed by the Speech and Language Pathology Department of the Montreal Children's Hospital, was used to assess the children's expressive vocabulary skills. Psychometric properties may differ from those of the English version. Each child was asked to name objects, actions, and concepts that were depicted visually. The EOWPVT was administered and scored according to standard procedures described in the test manual.

Échelle de vocabulaire en images Peabody. The EVIP assesses receptive vocabulary skills in French. Children are shown four pictures on a page and are asked to point to the picture that corresponds to a word spoken by the examiner. This test was normed on native French-speaking Canadian children. The EVIP was administered according to standard administration procedures described in the manual. The basal and ceiling rules of the test were applied.

Leiter International Performance Scale-Revised. The Brief IQ Screener of the Leiter-R was used to measure intellectual ability. This is a nonverbal test that does not require verbal instructions and responses. Four subtests from the Visualization and Reasoning battery compose the Brief IQ Screener: 1) Figure Ground (FG) in which the child has to find, in a picture, an object or part of an object depicted on a card; the test items become more complex as the test progresses. This subtest assesses visual scanning skills and effective search strategies; 2) Figure Completion (FC) in which the child has to mentally organize

fragmented pieces of a object from many parts of the object displayed randomly on a card and find the object within complex visual stimuli. This subtest assesses the capacity to identify a "whole object" from a complex visual array (Roid & Miller, 1997); 3) Sequential Order (SO) measures the capacity to generate rules and to understand relationships between pictures or figures. The child has to organize stimuli in sequential order, for example, by arranging squares according to size; and 4) Repeated Patterns (RP) in which the child has to complete a patterned sequence of symbols; for example, the child is presented with a sequence of one red circle, one yellow square, one red circle, and one yellow square and has to complete the sequence. This task involves deductive reasoning skills and the capacity to generate rules in order to produce a sequence. The Leiter-R was administered according to the standard administration procedures described in the manual.

Vineland SEEC: Vineland Social-Emotional Early Childhood Scales. The Vineland SEEC is a measure of social-emotional adjustment. It contains three scales: 1) Interpersonal Relationships, 2) Play & Leisure Time, and 3) Coping Skills. The administration procedures were adapted for the present study. Parents were given response choices instead of responding freely to guarantee that scoring was standardized and objective. The scoring system was as follows: 2 points if the behavior was observed often; 1 point if the behavior was observed sometimes, with partial success, if the parent did not have the opportunity to observe it, or if the parent did not know; and 0 was assigned if the behavior was never observed.

Results

Separate one-way analyses of variance (ANOVAs) were carried out to compare the performance of the IA and CTL children on the Vineland SEEC, Leiter-R, EVIP, EOWPVT and the naturalistic language results.

Socio-emotional adjustment

An ANOVA was run to examine possible differences between the IA and CTL groups with respect to raw scores on the Vineland SEEC. There was no significant difference between the IA (M= 157.33, range= 127-194, SD = 17.46)

and CTL children (*M*=164.91, range= 142-192, *SD* = 15.00); *F*(1, 21) = 1.24, *p* = .279, suggesting that the socio-emotional adjustment of the IA children was comparable to that of the CTL children.

Intellectual Ability

Results of the ANOVA on the standard scores for the Brief IQ Screener of the Leiter indicated that there was no significant difference between the IA (*M*= 118.27, range: 93-137, *SD* = 15.11) and CTL (*M*= 125.33, range= 97-143, *SD* = 15.51) children; *F*(1, 21) = 1.22, *p* = .282. IQ standard scores on the Leiter-R were assigned a mean of 100 and a standard deviation of 15. The scores of all children in both groups were within the average range or above, suggesting that the groups were equivalent with respect to their general non-verbal cognitive abilities.

Expressive and receptive vocabulary

ANOVAs were conducted to determine whether the groups differed on the raw scores of either the EVIP or the EOWPVT. There was no significant difference between the IA children (M = 46.17, range = 38.52-53.81, SD = 12.03) and the CTL children (M = 57.25, range = 44.97-69.53, SD = 19.34) on the raw score of the EVIP; *F*(1,22) = 2.84, *p* = .11. However, the IA children (M = 37.33, range = 31.63-43.04, SD = 8.98) scored significantly lower than the CTL children (M = 44.92, range = 39.54-50.30, SD = 8.47) on the EOWPVT; *F*(1, 22) = 4.53, *p* = .045. These results replicate those found for the larger sample and suggest that the sub-samples analyzed in this study are representative of the larger samples.

Naturalistic language results

General language measures

Each child's MLU in morphemes was calculated using CLAN. There was no significant difference for MLU between the IA (*M* = 3.90, range = 2.77-4.76, *SD* = .60) and the CTL (*M* = 4.25, range = 3.37-5.35, *SD* = .62) children; *F*(1, 22)= 2.01, *p* = .17. Two of the IA children had MLUs that were 2 standard deviations below the mean of the CTL group -- 2.77 and 2.90. These children were adopted at 10 and 21 months of age and exposed to French for 42 months and 23 months, respectively, suggesting that age at adoption and exposure to French were not the primary reasons for their poor performance. Each transcript

lasted 30 minutes to control for length of play session. Nevertheless, we ran an ANOVA on total number of utterances in each child's transcript. There was no significant difference between the IA (M = 328, range = 216-395, SD = 54.48) and the CTL children (M = 293.6, range = 198-469, SD = 80.24); $F(1, 22) = 1.51$, $p = .23$, indicating that the CTL and IA children were equally talkative.

Lexical diversity

The type-token ratio for all words was the same for the IA (M = .18, range = .16-.21, SD = .019) and CTL children (M = .19, range = .15-.25, SD = .031); $F(1, 22) = 1.20$, $p = .285$. The lexical-verb type-token ratio was not significantly different between the IA (M = .13, range = .09-.18, SD = .02) and CTL group (M = .16, range = .12-.23, SD = .03), $F(1, 22) = 3.78$, $p = .065$.

Complement clitics

There was no significant difference in total number of complement clitics of all types produced (correctly or incorrectly) by the IA children (M = 30.00, range = 18.00-40.00, SD = 6.73) and the CTL children (M = 31.92, range = 9.00-85.00, SD = 18.93), $F(1,22) = .109$, $p = .74$. Examples of correct clitic use are given in (2).

(2) a. Je vais aller **en** acheter à l'épicerie.
"I am going to it buy at the grocery store."
"I am going to buy it at the grocery store."

b. Je **le** met là-dedans.
"I it put in here."
"I put it in here."

c. Je peux pas **les** prendre.
"I cannot them take."
"I cannot take them."

Error rates in complement clitic use (including direct object, indirect object, reflexive, genitive (*en)*, and locative) were calculated as the total number of clitics used incorrectly as a percentage of the total number of clitics used in the 30 minute transcripts. The average percentage of errors was 8.56 for IA children (range = 0 – 22.22, SD = 7.03) and 1.42 for the CTL children (range = 0 – 6.90,

SD = 2.50). Because the percentage of errors was not normally distributed, the percent of errors in complement clitic use was transformed using a square root transformation which reduced the skewness of the data. The square root of the percent of errors in complement clitic use was significantly higher for the IA children (*M* = 2.64, range = .0-4.71, *SD* = 1.32) than for the CTL children (*M* = 0.66, range = .0-2.63, *SD* = 1.04), $F(1, 22) = 16.65$, $p < 0.001$. Concerning individual differences in clitic errors, 11 of the 12 IA children made at least one error when using clitics compared to only four of the 12 CTL children. Of these four CTL children, three made 1 error and one made 2 errors. For the IA children, four made one error, one made 2 errors, and six made between 3 and 6 errors. Table 2 presents the types of complement clitic errors made by the IA and CTL children. Examples of errors made by IA children are presented in (3).

(3) a. *Je s'en va au pique-nique.

"I am going to the picnic."

Type of error: Incorrect choice of clitic

Target form: Je m'en va au pique-nique.

b. *Y touche.

"It touch."

Type of error: Incorrect placement of clitic

Target form: Touche-y.

"Touch it."

Note: The child is asking his caregiver to touch an object.

c. *Après je vais le mettre quelque chose dedans.

"After I am going to it put something inside."

Type of error: Clitics co-occuring with an object noun

Target form: Après je vais le mettre dedans or Après je vais mettre quelque chose dedans.

"After I am going to put it inside or after I am going to put something inside."

d. *On le l'ouvre.

"We it it open."

Type of error: Extra clitic

Target form: On l'ouvre.

"We open it."

Note: In other instances, the same child used the clitic "*le*" correctly with the verb "*ouvrir*" suggesting that the error in (3d) is not due to the fact that the vowel-initial verb "*ouvrir*" was mis-analysed but rather due to difficulty with the clitic per se.

e. *Je vais le servir toi.

"I am going to it serve you."

Type of error: Strong pronoun instead of complement clitic

Target form: Je vais te le servir.

"I am going to serve it to you."

Table 2
Type of complement clitic errors for adopted (IA) and control (CTL) groups

Type of error	IA children (*n* = 12)	CTL children (*n* = 12)
Incorrect choice of clitic		
Direct object	7	0
Indirect object	1	0
Reflexive	3	1
Genitive	0	0
Locative	1	0
Total	12	1
Clitics co-occuring with an object noun		
Direct object	1	0
Indirect object	0	0
Reflexive	0	0
Genitive	2	0
Locative	0	0
Total	3	0
Extra clitic		
Direct object	5	1
Indirect object	0	1
Reflexive	3	1
Genitive	0	1
Locative	2	0
Total	10	4
Incorrect placement of clitic	1 direct object 1 Locative	0
Total	2	0
Strong pronoun instead of complement clitic	1[a]	0
Total	28	5

Note. [a] *toi* was used instead of *te* (indirect object)

We also calculated the percentage errors in the children's use of direct object clitics separately in order to compare the performance of our IA children with that reported in studies of L2 learners and children with SLI (e.g., Grüter, 2005; Paradis, 2004; Paradis et al., 2005-2006). The average percentage of direct object pronoun errors was 6.8% for IA children (range = 0 – 14.29, *SD* = 5.62) and 0.83 for the CTL children (range = 0 – 10.00, *SD* = 2.89). The individual percentage scores were transformed using a square root transformation because the data were not normally distributed. The square root of the percent of direct object clitic errors was significantly higher for the IA children (*M* = 2.10, range = 0-3.78, *SD* = 1.61) than for the CTL children (*M* = .26, range = .0-3.16, *SD* = 0.26), $F(1, 22) = 11.84$, $p = .002$.

We also calculated the percent incorrect use of definite articles (le, la, les), which are homophonous with third person direct object clitic forms (le, la, les) in French and compared accuracy scores on both variables. This comparison was carried out by Paradis et al. (2005-2006) to ascertain to what extent errors in the use of object clitics are due to perceptual processing factors. An ANOVA revealed no significant difference between the IA (*M* = 2.79, range = 0-17.39, *SD* = 5.46) and CTL group (*M* = 1.46, range = 0-5.56, *SD* = 2.25) on incorrect use of articles, $F(1, 22) = .61$, $p = .45$. In contrast, the average percentage incorrect use of third person direct object clitics was 5.07 % for the IA children (range = 0-18.75, *SD* = 6.10) and 1.04% for the CTL children (range = 0-12.50, *SD* = 3.61). These error scores were transformed using a square root transformation because the data were not normally distributed. The square root of the percent of errors was significantly higher for the IA children (*M* = 1.56, range = 0-4.33, *SD* = 1.7) than for the CTL children (*M* = .29, range = .0-3.54, *SD* = 1.02), $F(1, 22) = 4.95$, $p = .037$. These results indicate that the IA children's difficulties using object clitics was not due to general difficulties in processing phonologically weak elements.

There was no statistically significant difference in percentage of complement clitic omissions between the IA (*M* = 1.54, range = 0-5.88, *SD* = 2.40) and CTL children (*M* = 1.24, range = 0-5.26, *SD* = 1.92), F (1, 22) = 0.12,

p = .74. The percentage of direct object clitic omissions (excluding indirect object, reflexives, genitives, and locatives) was also calculated. There was no difference between the IA (M = 1.83, range = 0-14.29, SD = 4.50) and CTL children (M = 2.19, range = 0-10, SD = 4.06), F (1, 22) = 0.41, p = .841. Examples of complement clitic omissions are given in (4) (4a. direct object and 4b. reflexive).

(4) a. * Ça faut tu qu'on mette dans le f(r)igo. (clear referent in the discourse)
"This should we put in the fridge".
Target form : Ça faut tu qu'on <u>le</u> mette dans le f(r)igo.
"This should we put it in the fridge".

b. * Oui ben on chican-ait pour le lavabo.
"Yes we were fighting for the sink".
Target form : Oui ben on <u>se</u> chicanait pour le lavabo.
"Yes we were fighting for the sink".

Tense morphology

A summary of the children's diversity scores with respect to tense morphology is presented in Table 3. ANOVAs were conducted to compare the mean number of each type of verb tense used by the IA and CTL children, six ANOVAs in total; no significant differences were found. ANOVAs were also conducted on the percentage correct use of each verb tense, and again there were no significant differences between the IA and CTL children.

Table 3
Diversity and correct use of verb morphology for the adopted (IA) and control children (CTL)

	IA children (n = 12)			CTL children (n = 12)		
	Correct Use (Number of instances)	Total Use (correct and incorrect)	Percentage of Correct Use[a]	Correct Use (Number of instances)	Total Use (correct and incorrect)	Percentage of Correct Use[a]
Tense type	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Présent	77.0 *(21.9)*	77.5 *(22.0)*	99.4 *(1.0)*	80.8 *(20.8)*	80.9 *(20.9)*	99.9 *(0.3)*
Passé composé	11.3 *(6.8)*	12.3 *(7.0)*	91.5 *(11.0)*	12.3 *(8.0)*	12.9 *(8.0)*	94.8 *(8.1)*
Imparfait	9.2 [b] *(8.8)*	9.4[b] *(9.2)*	99.4[b] *(2.0)*	6.6[b] *(8.7)*	6.9[b] *(8.7)*	96.4[b] *(8.3)*
Plus-que-parfait	3.6[c] *(2.0)*	3.9[c] *(2.3)*	95.4[c] *(8.2)*	1.8[d] *(2.0)*	1.8[d] *(2.0)*	100.0[d] *(0)*
Futur Péri-phrastique	28.7 *(13.2)*	29.4 *(13.8)*	97.3 *(4.8)*	26.0 *(15.5)*	27.0 *(15.9)*	97.2 *(7.9)*
Futur simple	2.3[e] *(1.9)*	2.8[e] (2.9)	92.9[e] *(14.3)*	3.4[f] *(4.7)*	3.8[f] *(5.5)*	91.8[g] *(15.5)*
Total	132.1	135.3	96.0	130.9	133.3	96.7

Note. * $p < .05$. [a] Mean percentage of correct use of tense morphology: the number of correct tense form out of the number of obligatory contexts for these forms. [b]n = 11. [c]n = 7. [d]n= 6. [e]n= 4. [f]n = 8. [g]n= 7. One control children was removed from the analysis because she was an outlier.

Relationship between age at adoption, exposure to French, and language skills

In order to investigate potential factors that might have influenced the language outcomes of the IA children, we correlated age at adoption and length of exposure to French with percentage of complement clitic errors (square root). The correlations calculated between age at adoption and percentage of complement clitic errors (square root) was non-significant (N = 12; r = 0.10; p = 0.38). The correlation between number of months of exposure to French and percentage of complement clitic errors was also non-significant (N = 12; r = -0.01; p = 0.48). Nor did MLU correlate significantly with age at adoption (N = 12; r = -0.16; p = 0.31) or number of months of exposure to French (N = 12; r = 0.25; p = 0.22). In

contrast, correlations between age at adoption and the type-token ratio for all words ($N = 12$; $r = -0.70$; $p = 0.006$) as well as verb type-token ratios ($N = 12$; $r = -0.66$; $p = 0.01$) were significant. Correlations between number of months of exposure to French with type-token ratio for all words ($N = 12$; $r = 0.69$; $p = 0.006$) and with verb type-token ratio ($N = 12$; $r = 0.58$; $p = 0.024$) were also significant. Age at adoption and length of exposure to French were highly correlated ($N = 12$; $r = 0.79$; $p = 0.001$) because the younger children were at adoption, the less exposure they had to French at the time of testing. Therefore, our data did not allow us to identify the differential effects of each variable since they are confounded.

Relationship between language variables measures

Correlations for the IA and CTL children groups combined were calculated between different language variables in order to better understand how they related to each other. The groups were combined because the focus was on examining how the language variables related to each other in general, and not on examining specific patterns of correlations in each group since we did not except them to differ. Combining the groups increased the variance since the number of participants in each group was relatively small. These correlations are presented in Table 4. Correlations were strong between the type-token ratio for all words and the verb type-token ratio, ($N = 24$; $\underline{r} = 0.85$; $p < 0.001$). The correlation between MLU and percentage complement clitic errors was significant ($N = 24$; $\underline{r} = -0.44$; $p = 0.015$). The correlation between the percentage of complement clitic errors and the verb type-token ratio was also significant ($N = 24$; $\underline{r} = -0.48$; $p = 0.008$). The latter correlation indicates that children who had a lower MLU and a lower type-token ratio for verbs tended to make more errors when using complement clitics.

Table 4

Correlations between language variables for adopted (IA) and control (CTL) groups combined

Variable	1.	2.	3.	4.	5.
1. Type-token ratio for all words	__	.85**	-.12	-.30	-.17
2. Verbs type-token ratio		__	-.07	-.48**	-.25
3. MLU			__	-.44*	.15
4. Percent of incorrect complement clitics (Square root)				__	.18
5. Percent of complement clitics omission					__

Note. * $p < .05$. ** $p < .01$.

Relationship between early language development and language outcomes

During the semi-structured interview, the IA parents were asked when their children produced their first word(s) in French. The mean length of exposure prior to uttering their first words was 3.95 months. However, there were substantial individual differences, ranging from a few days to 12 months. In order to investigate a possible link between production of first words in French and later language performance, partial correlations were calculated between time taken to produce first words (measured in months) and the language variables (MLU, percent of incorrect complement clitics, percent of object omissions, verb type-token ratios and type-token ratios for all words) controlling for age at adoption. Months to produce first words in French correlated significantly and negatively with type-token ratio for all words ($n = 11$; $r = -0.58$; $p = 0.04$); correlations with all other variables were non-significant. Thus, even when controlling for age at

adoption, IA children who produced their first words in French relatively soon after adoption had greater lexical diversity around 4 years of age.

Discussion

The goal of the present study was to examine specific aspects of French language acquisition in IA children to complement findings from previous studies that have relied on standardized tests of general language abilities. To our knowledge, this is the first study to investigate the early lexical and morphological development of IA children using in depth analyses of language samples. Furthermore, previous studies of IA children have focused primarily on children acquiring English, and no study has involved children learning French. In the current study, we focused on features of French that have been found to be difficult to acquire by other groups of learners of French; namely, complement clitics, tense morphology, and lexical diversity. There was support for our expectations that IA children would have difficulty with clitics because of their delayed exposure to French. More specifically, the IA children made significantly more errors when using complement clitics than did the CTL children. Error rates were also significantly higher for the IA group when their use of direct object clitics was analysed separately. While studies among L2 learners and monolingual children with SLI have found that the most common error type among these learners is omission, we found no difference between the CTL and IA children with respect to omission rates. Instead of omitting complement clitics, the IA children were prone to make errors in the placement and form choice of the clitics they used. That the IA children were prone to make mistakes in clitic form and placement instead of omitting them suggests that they had acquired underlying syntactic representations of clitics, but were limited in their ability to use them correctly, even after approximately 3 years of exposure to French.

Our findings suggest that delay in the acquisition of complement clitics might be accentuated when French is not acquired from birth, even if acquisition begins as young as 12 months of age. As suggested for L2 learners, it is possible that the difficulties observed in the current study are temporary (Adiv, 1984).

Even if this is the case, these results suggest that the profile of language acquisition of IA children in the short term is uneven since their mastery of complement clitics is delayed in comparison to other spheres of their language development (i.e., tense morphology, overall lexical diversity, lexical-verb diversity and MLU) which were at the same level as non-adopted children. This suggests, in turn, that the developmental pattern of the IA children is distinct from that of L1 learners. They also appear to be distinct from L2 learners of French insofar as their error rates for use of object clitics was lower than that reported by Paradis for L2 learners (Paradis, 2004). More specifically, despite similar MLUs for our IA sample (M = 3.90) and Paradis's L2 learner sample (M = 4.09), the IA children had substantially lower error rates than that of the L2 learners, 6.8% compared to 22.2%.

Contrary to our expectations, the IA children did not differ from the CTL children with respect to overall lexical diversity, lexical-verb diversity, and tense morphology. These findings indicate that the IA children's language profile differs from that of children with SLI and L2 learners who tend to have restricted lexical diversity and difficulty with tense morphology (Jakubowicz & Nash, 2001; Paradis & Crago, 2001; 2004; Thordardottir & Namazi, 2007). The absence of a difference in type-token ratio for all words in the present study is, arguably, discrepant with our result of a significant difference between the IA and CTL children with respect to expressive vocabulary, in favor of the CTL children. This discrepancy is probably due to our use of natural language samples in the present analysis. It might be that the toys used to elicit language from the children (e.g., a play kitchen set, toy utensils and a box of pretend food items) were so familiar and restricted in conceptual scope that they could not reveal the full range of the children's vocabulary knowledge. In other words, our play situation may not have been demanding enough to tap into differences in vocabulary knowledge between the two groups. In contrast, the expressive vocabulary test (EOWPVT) is more demanding because it asks children to name figures/objects/events beyond what they would normally be called upon to identify. In fact, the expressive vocabulary scores of the IA children in the present study were significantly lower than those

of the CTL children, although their receptive vocabulary scores were at the same level. These results are consistent with those for L2 learners insofar as L2 learners tend to have higher receptive vocabulary knowledge compared to expressive vocabulary (Marton, 1977).

The IA and CTL children were equally talkative as indicated by the similarities in their MLUs and the total number of utterances they produced during the 30 minute play sessions. Thus, differences between the IA and CTL children with respect to clitic use cannot be attributed to talkativeness. Likewise, Glennen and Master (2002) found that children from Eastern Europe, at least those who were adopted before 12 months of age, had caught up to English speaker norms with respect to the mean length of the child's three longest utterances, as reported by the parents, by 24 months of age. However, Glennen and Master (2002) also found that children adopted after 12 months of age lagged behind English speaker norms for MLU even at 37 to 40 months of age. In contrast, despite the fact that 7 of 12 of the IA children in the present study were older than 12 months at the time of adoption, their MLUs were similar to those of the CTL children. One notable exception was a child adopted at 21 months whose MLU was two standard deviations below the mean of the controls.

Taken together, these findings suggest that the IA children are behind in their acquisition of the clitic system in French when compared to matched control children, but show remarkable catch-up in other spheres of their language development. Interestingly, age at adoption and length of exposure to French did not have the same effect on the acquisition of complement clitics and lexical diversity. On the one hand, the younger the IA children were at adoption and the longer their exposure to French, the greater their lexical diversity for all words and for verbs at 4 years of age. These results are consistent with other studies that have found that the younger IA children from China are when adopted, the better their general language outcomes (Scott, Roberts, & Krakow, 2008; Tan & Yang, 2005). On the other hand, and in contrast, the correct use of complement clitics was not correlated with length of exposure to French or with age at adoption. Arguably, acquisition of clitics is affected more by the lack of exposure to French

early in life than by length of exposure per se since the three years of exposure to French that the IA children had had at the time of testing is within the time span in which French-L1 children learn to use clitics correctly (Paradis et al., 2005-2006). Moreover, their exposure to French, admittedly delayed and briefer than that of French-L1 children, was sufficient for them to acquire other verb-related features of French, such as tense-morphology, to the same extent as the CTL children. Since exposure to French was correlated with age at adoption in the present sample of IA children, additional research is called for that includes IA children who have had the same amount of exposure to French but are adopted at different ages in order to disentangle these factors. Although the IA children's use of clitics was not correlated with length of exposure to French or age at adoption, it was significantly correlated with MLU and with verb type-token ratio -- the larger the MLU and the greater their verbal diversity, the lower their error rates in clitic use. This, in turn, suggests that the acquisition and correct use of complement clitics reflects general language processing limitations insofar as children with more advanced general language skills have more language processing capacity (e.g., Rice, Redmond, & Hoffman, 2006).

Clitic use also differentiated from lexical diversity with respect to its relationship to production of first words in French. It will be recalled that the time the children took to produce their first words in French was not related to their later ability to use clitics but was correlated significantly with lexical diversity, even when age at adoption was held constant. Approximately 34% of the variance in lexical diversity at age 4 was predictable from variability in the time children took to say their first words in French.

In summary, the present findings indicate that despite delayed exposure to French and, as a result, reduced exposure to French at the time of testing in comparison to native speakers, the IA children's language competence was remarkably similar to that of the control children, with the exception of their accuracy of complement clitics use. The IA's achievement is noteworthy given that the comparison group in the study comprised native French-speaking monolingual children from above average SES families and the linguistic features

examined in this study are complex and/or are relatively delayed in their emergence in native speakers. At the same time, there is evidence that IA children may have difficulty acquiring some complex morpho-syntactic aspects of language – that is, complement clitics. The present results should not be interpreted to indicate the IA children are impaired since their performance in every other respect was comparable to that of the comparison group and their difficulty with clitics differs from that found for children with SLI. Whereas children with SLI tend to omit object pronouns, the IA children tended to make errors of form and placement. Moreover, it should also be noted that the overall error rate for the IA children in their use of clitics is quite low, less than 7%.

With respect to future directions, we plan to use an elicitation procedure devised by Grüter (2005) to examine another group of 4-year old IA children; this procedure will permit us to examine both the production and comprehension of clitics. It will also ensure a large data base for analyzing their use of clitics. We also plan to examine the language skills of the same IA children after they have been in school for two to three years, when they will be around 8 years of age. The goal of this follow-up study is to examine if the IA children continue to perform well linguistically in response to the increased language demands of schooling and/or whether schooling poses challenges that are evidenced in their language performance.

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Connecting Text – Study 2 to Study 3

The two previous studies involved children adopted from China who had been in their adoptive families for a few years (from 2 to 5 years). Internationally-adopted (IA) children were found to be similar to their peers, matched for familial SES, age and sex, with respect to their non-verbal intelligence and their socio-emotional functioning. Furthermore, individual differences in these aspects of development were relatively limited. However, a different and more heterogeneous profile emerged from the results on language. Although the IA children had well developed abilities in diverse language domains, such as receptive vocabulary, mean length of utterance, lexical diversity, and tense morphology, they nevertheless performed significantly lower than their non-adopted peers on tests of expressive language (lexical and grammatical skills), and they made significantly more errors with complement clitics during spontaneous language production. As well, there was considerable individual variation in their language abilities, with some performing at the same level as matched non-adopted children and others performing as much as two standard deviations below the mean of the non-adopted children.

The results of Study 1 and 2 also demonstrated that the initial facility with which IA children acquired their second first language (time taken to produce first words and age of onset of word production in French) were significant predictors of their later language outcomes. These findings suggested that IA children's early development in the new language plays an important role in their later language outcomes. Therefore, the long-term language outcomes of IA children might be understood better by carefully examining their very early development in the new language. Thus, Study 3 focused on early stages of language development in IA children. An additional consideration in the decision to do Study 3 was that adoptive mothers are faced with the unusual challenge of communicating with children whose initial language skills are not commensurate with their age and general cognitive development. In particular, IA children constitute a natural experiment for studying the development of joint attention and

its influence on language development in children who have experienced relatively non-responsive child-rearing and significant socio-cultural and linguistic changes during infancy, the period when joint attention abilities typically develop. IA children might be at-risk for poor joint attention skills for a number of reasons including impoverished language and social stimulation during their stay in an orphanage, frequent changes in caregivers, and low caregiver-child ratios, making it difficult for IA children to develop consistent and lasting interpersonal relationships. Thus, part of the motivation for Study 3 was to examine how adoptive mothers engage their adopted children in dyadic communication and whether their patterns of engagement are the same as those reported for non-adopted children raised in comparable families. Investigating the language use and communication patterns of adoptive mothers within the framework of joint attention also made it possible to examine the attention-regulation strategies used by adoptive mothers and the potential influence of their strategies and language use in general on their children's language development. This, in turn, made it possible to examine the generalizability of previous findings with respect to the prevalence and effectiveness of *following* versus *redirecting* attention-regulation strategies that have been reported mainly in middle class families in Western cultural settings. Therefore, it was decided to conduct a third study with newly-adopted children (15 months of age) to examine: (a) their very early language and communication abilities in their adoptive language, (b) the linguistic input and interaction strategies used by adoptive mothers at an early stage in their children's exposure to their new language, and (c) the relationship between maternal attention-regulation strategies and language input in general and IA children's later lexical development. To our knowledge, Study 3 is the first study on adoptive mothers' interaction styles and language use with their adoptive children and the potential influence of their language behavior on their children's language development.

Study 3

Communication Patterns between Internationally-Adopted Children and their Mothers: Implications for Language Development[4]

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Abstract

This study presents findings on patterns of communication between internationally-adopted children and their mothers in order to better understand the nature of these interactions and their influence on language learning. We examined maternal language use and joint attention behaviors of mothers and their children in 21 mother-child pairs: 10 pairs included children adopted from China living in francophone families, and 11 included francophone children living with their biological families; all were matched for socio-economic status, sex and age. The children were, on average, 15 months of age at initial testing when they were video-taped with their mothers for purposes of describing the mothers' language use and the mothers' and children's joint attention behaviors. Vocabulary development was assessed at 15 and again at 20 months of age using the MacArthur Communicative Development Inventory. The results support the conclusion that adoptive mothers play an active role in promoting and maintaining joint attention and that the redirecting style they used the most and which correlated with their children's later vocabulary development contrasts with the attention-regulation style that correlates with vocabulary development in non-adopted children raised in mainstream North American families.

Introduction

There has been considerable research on the language development of internationally adopted (IA) children from China in recent years (e.g., Krakow & Roberts, 2003; Roberts, Pollock, & Krakow, 2005; Tan & Yang, 2005). Much of this research has sought to examine the extent to which IA children are at risk for difficulties or even impairment in their new language or, conversely, to what extent and when their development of the new language resembles that of children raised with their birth parents. In general, it has been reported that the language outcomes of children adopted from China are usually good, within the normal range, less than 2 years post-adoption (Krakow & Roberts, 2003; Tan & Yang, 2005). At the same time, there appears to be wide individual differences among IA children from China and some studies suggest that there might be a subgroup of approximately 20% who exhibit significant language delays/difficulties (Roberts et al., 2005) or receive speech and language pathology services (Tan, Dedrick, & Marfo, 2007). Miller and Hendrie (2000) reported a high frequency of language delays in a group of 452 adoptees from China shortly after their arrival in the United States (approximately 2 months).

There are relatively little empirical data on the early communication behaviors in IA children from China post-adoption and, of particular importance for the present study, on how adoptive mothers interact with their children and how this might influence their children's later language development. To our knowledge, there is no study that has examined adoptive mother's interactional style and language use. Hwa-Froelich and Matsuoh (2008) assessed the vocabulary, gestural, social, communicative, and symbolic behavior of 4 girls adopted from China when they were between 12 and 36 months of age. They found that, six months post-adoption, three of the children scored in the average range on the communication, social, and symbolic behavior scales of the Communication and Symbolic Behaviors Scales-Developmental Profile when compared to a group of non-adopted English-speaking children as well as when compared to children adopted from Eastern Europe. These results suggest that

children adopted from China can develop prelinguistic communicative abilities in their new language quite rapidly. However, as Hwa-Froelich and Matsuoh note, the sample size was small and some children had siblings while others did not which might have influenced their results. Glennen (2007) conducted a study of he prelinguistic and lexical abilities of children newly adopted from Eastern Europe. Within 2 to 3 months post-adoption, most of these 18-month-old children performed on the low average-mild delay range on the Behavior Sample of the Communication and Symbolic Behavior Scales-Developmental Profile (CSBS–DP; Wetherby & Prizant, 2002) which assesses primarly prelinguistic abilities, including joint attention (JA), skills. They also found that prelinguistic language abilities of these newly adopted children were good predictors of their later language outcomes at 24 months.

To our knowledge, only one study involving IA children from China has specifically and directly examined JA abilities, one of the aims of the present study. JA is defined as a shared experience about an object or event with another person (Paparella & Kasari, 2004). Lejeune (2007) found that IA children's ability to respond to JA initiated by their caregivers when they were between 12 and 34 months was not a significant predictor of vocabulary production, assessed at the same age using the MCDI when age and cognitive ability were controlled for. However, Lejeune assessed JA with an examiner and not the child's caregiver and, thus, we do not know what would have happened between the children and their primary caregivers. Furthermore, JA has been shown to have much less influence on lexical development by the end of the second year (e.g., Morales et al., 2000) and some children in Lejeune's study were around this age or older when they were assessed. Finally, the IA children in LeJeune's study were from different countries, and differences in the effects of pre-adoption childcare might have masked or confounded the effects of JA in these children's language development. In the present study, JA was examined when the children were 15 months of age and IA children were all from the same country, namely China.

We examined JA in adopted children and their mothers in the present study because it has been argued that the emergence of JA in typically-developing

children is a major milestone in early communicative and language development, at least in children raised in mainstream North American families where dyadic interactions between mothers and children are common – a point we return to later (Bruner, 1975; Tomasello & Todd, 1983). The first episodes of JA usually occur around 9 months of age in typically-developing children, as they begin to master abilities that underpin JA, such as "responding to, instigating object-directed gaze, and pointing" (Carpenter, Nagell, & Tomasello, 1998). Episodes of JA become more frequent between 15 and 18 months (Carpenter et al., 1998). JA has been of interest among language researchers because time spent in JA and certain forms of JA have been found to be positively linked to early vocabulary growth (e.g., Tomasello & Farrar, 1986; Tomasello & Todd, 1983). In a large study of 160 children, Watt, Wetherby and Shumway (2006) found that the number of JA episodes at 14 months contributed uniquely to the children's expressive language outcomes at 33 months (i.e., spontaneous utterances, specific vocal/verbal responses to vocabulary, practical reasoning, and high-level concept formation). As well, Rudd, Cain and Saxon (2008) found that vocabulary scores on the MacArthur Communicative Development Inventory (MCDI) of children attending low quality childcare centers increased in response to longer and more frequent episodes of JA with daycare educators following training designed to increase the workers' use of JA and the quality of their JA strategies.

It has also been reported, again in studies conducted in families living in Western cultures, that certain attention regulation strategies during JA appear to be particularly influential in the early language development of typically-developing children. More specifically, it has been found that children learn new words more easily when caregivers use them in reference to objects that the child is already attending to (i.e., following strategy), in comparison to objects that are outside the child's current focus of attention (e.g., Baldwin, 1991; Oshima-Takane & Oram, 2002; Tomasello & Farrar, 1986). For example, Oshima–Takane and Oram (2002) found a significant positive correlation between the use of following attention regulation strategies during episodes of JA at 21 months and their children's receptive vocabulary at 36 months. In contrast, mothers' use of

directive attentional or so-called “redirecting strategies”, the use of verbal or nonverbal cues to redirect children’s attention and behavior, has been found to be associated with relatively slower rates of lexical development (Tomasello & Farrar, 1986).

However, the evidence reviewed to this point has been based on studies of JA and mother’s attention regulation strategies in middle-class families in Western cultural settings, as noted previously. Akhtar (2005) has argued that there may be differences in the prevalence of JA and in the use of specific attention regulation styles in different cultural settings and has questioned whether JA is necessary for early vocabulary learning in all contexts. Indeed, the following attention regulation style that is common and often associated with vocabulary development in typically-developing children in Western families is not so prevalent or influential in other cultural settings. For example, Vigil (2002) found that native-born British mothers tended to follow their children’s attention during dyadic interactions whereas Chinese-speaking immigrant mothers living in Britain tended to redirect their children’s attention at 9 and 12 months of age. She also found that there was no significant difference in vocabulary development between the two groups at 18 months, arguing that both styles were equally effective. In a study of Mexican immigrant and U.S. born families, Vigil, Tyler and Ross (2006) found that Mexican-immigrant children tended to acquire more words in response to attention-directing parental styles than in response to an attention-following style whereas American-born children tended to learn more words than the Mexican-immigrant children in response to attention-following styles. Yet other studies suggest that JA and parental use of specific attention regulation strategies are not related to language outcomes in the same way in children with special needs as in typically-developing children even in families in Western cultural settings. Harris, Kasari and Sigman (1996) found that frequency of JA was negatively correlated with language abilities of children suffering from William Syndrome raised in the United States States. In brief, evidence suggests that the relationship between specific kinds of maternal attention regulation strategies and vocabulary development varies depending on the developmental/health status of

the child and may not be necessary or sufficient to promote vocabulary development in all cultural settings (see Akhtar & Gernsbacher, 2007, for a review of this research).

The present study was carried out on IA children from China living in families where their adoptive parents, like other parents from Western cultural backgrounds, are likely to engage their children in dyadic interactions that entail JA. However, IA children from China might be expected to be at risk for developing JA skills since most IA children are raised in orphanages for several months. Due to frequent changes in caregivers and low caregiver-child ratios, children raised in institution are often deprived of consistent and lasting interpersonal relationships and might not have the chance to develop stable attachment to a caregiver (Gunnar, Bruce, & Grotevant, 2000). Impoverished language input as well as social, cognitive and physical stimulation are also possible areas of privation for children raised in institutions (Gunnar et al., 2000). Although there are undoubtedly important differences among institutions in the quality and nature of the care children receive and the extent of deprivation (Gunnar et al., 2000), studies have established a relationship between the length of time spent in an orphanage and the extent of delay or impairment in cognitive, behavioral, social, and attachment abilities of IA children (e.g., Chisholm, Carter, Ames, & Morison, 1995). All of these factors could be associated with reduced JA abilities among IA children.

In support of this possibility, Flanagan, Coppa, Riggs and Alario (1994) found that teenage mothers' sensitivity to their children's social cues and the contingent quality of their responses during free-play interactions with their infants (aged 9 to 11 months) correlated significantly with the number of JA acts the infants engaged in while interacting with an examiner. As well, Goldsmith and Rogoff (1997) found that 18- to 30-month-old children of mothers with dysphoric symptoms (i.e., feelings of hopelessness) spent significantly less time in JA compared to children of mothers without dysphoric symptomatology. IA children raised in orphanages may not receive the responsive childrearing that is thought to underpin the development of JA abilities and, therefore, may demonstrate less JA

upon adoption than control children raised by their birth parents. In addition, IA children experience significant socio-cultural change and face a unique language learning experience – they learn a "second first language" as exposure to their first language is abruptly stopped (De Geer, 1992). Thus, international adoption constitutes a natural experiment for studying the development of JA and its relationship to language development in infants who experience relatively non-responsive childrearing and significant socio-cultural and linguistic change during infancy, the period when JA abilities typically develop.

Examining JA and language development in internationally-adopted children is of additional interest because adoptive mothers are faced with the unusual challenge of communicating with children whose linguistic skills are not commensurate with their age and general cognitive development. As a result, they might play a more active role in promoting JA and, in turn, language development when interacting with their children than birth mothers with children of the same age. Studies involving children whose language development is slow or delayed, such as children with chronic otitis media (Yont, Snow, & Vernon-Feagans, 2003) and children with developmental disorders (Mahoney, Fors, & Wood, 1990), have found that mothers of these children direct their child's attention significantly more often than mothers of typically-developing children. By inference, following attention regulation strategies that researchers have found to correlate with vocabulary development in typically-developing infants in North America might not be the preferred nor most effective strategy for adoptive mothers of IA children because, as noted, IA children may have poorly developed JA skills making it difficult for them to establish JA with their adoptive mothers and making it difficult for their mothers to establish JA with them. Adoptive mothers might, thus, be prone to use directive attention regulation strategies with their newly adopted children in order to establish JA and, in turn, to accelerate their lexical development. It might also be expected that adoptive mothers' general language use would differ from that of birth mothers in that the former might be expected to talk more, repeat more, and use more gestures, as they might with younger child whose language is less well developed. Indeed, mothers raising

their biological children have been found to adapt their communicative behaviors to their child's level of development (Bakeman & Adamson, 1984).

In summary, the goal of the current study was to examine patterns of communication between IA children from China and their adoptive mothers and the relationships between adoptive mothers' language use and attention regulation styles and their children's later vocabulary development. Three specific questions motivated the study: (1) Are IA children from China delayed in acquiring the ability to engage in JA? (2) Do adoptive mothers interact differently with their children compared to birth mothers and, in particular, are they prone to use more redirecting attention-regulation strategies and to talk more with their children? and (3) Are the interaction strategies of adoptive mothers related to their children's later vocabulary development?

Method

Participants

Two groups of children and mothers participated: 10 children adopted from China and their French-speaking adoptive mothers and 11 monolingual French-speaking, non-adopted children and their French-speaking birth mothers. The IA children were 15.4 months of age on average (range: 14.1 to 17.4; SD = .74) at the time of the first session and 20.0 months of age (range: 17.6 to 21.7; SD = 1.2) at the time of the second session. The average age at adoption of the IA children was 10.2 months (range: 9.0 to 13.3; SD = 1.2), and the average number of months of exposure to French at the first session was 5.4 months (range: 4.0 to 7.6; SD = .96) and 9.8 months (range: 7.1 to 12.1; SD = 1.6) at the second session. All participants were girls since the majority of IA children from China in Quebec are female. All IA children lived in orphanages for the entire period prior to adoption expect for one child who spent 7 months in a foster family before spending 2½ months in an orphanage. Detailed demographic information of the participants is presented in Table 1. The IA children were recruited with the assistance of two adoption agencies in Montreal. The agencies sent letters to French-speaking parents who had recently adopted a child from China. In order to

be included, the child had to be the first child of the family and between 9 and 13 months at the time of adoption; this restriction was important in order to limit variability in the time IA children spent in an orphanage and in their exposure to their new language. Information regarding parental education and income were collected during a semi-structured interview during the first session with the IA parents.

Table 1

Demographic data on the adopted and control groups at initial and follow-up assessments

	IA (N = 10)	CTL (N = 11)
Age (in months, *M* & *SD*)		
15 months assessment	15.4 (.74)	15.6 (.71)
20 months assessment	20.0 (1.2)	20.25 (.67)
Age at adoption (in months, *M* & *SD*)	10.2 (1.1)	--
Length of exposure to French (in months, *M* & *SD*)		
15 months assessment	5.4 (.96)	15.6 (.71)
20 months assessment	9.8 (1.6)	20.25 (.67)
Mother's education (% & N)		
High school	10 (1)	0 (0)
College	50 (5)	36 (4)
University	40 (4)	63.6 (7)
Father's education (% & N)		
High school	0 (0)	9.1 (1)
College	60 (6)	45.5 (5)
University	40 (4)	45.5 (5)
Total family income per year (% & N)		
35 000-64 999	0 (0)	18.2 (2)
65 000-94 999	20 (2)	18.2 (2)
95 000 and more	80 (8)	63.6 (7)

Note. IA = Internationally-adopted children; CTL = Control children.

The control group (CTL) consisted of 11 non-adopted children who were 15.6 months of age on average (range: 15.1 to 17.2; SD = .71) at the time of the first session and 20.3 months of age (range: 19.1 to 21.9; SD = .67) at the second session. The CTL children were recruited through ads in a local newspaper as well as through daycares. The following exclusionary criteria were used to select the CTL children: 1) no siblings; 2) no psychiatric or neurological problems; 3) no premature birth; 4) no major health problems, past or present; 5) no serious motor or behavior problems; and 6) no or minimal exposure (25% of the time maximum) to a language other than French. Information about the exclusionary criteria, the sex, and age of the children as well as level of parental education and family income was collected from the parents during an initial phone call to our laboratory.

The IA and CTL children were matched for age (within a 1.5 month interval), sex, and familial socio-economic status (SES). It was important to control for SES since it has been found that the SES of adoptive parents tends to be higher than that of the general population (e.g., Tan & Yang, 2005) and that SES has a significant influence on the language development of children (e.g., Arriaga, Fenson, Cronan, & Pethick, 1998). For example, Arriaga et al. (1998) found that 80% of children from families with a relatively low income performed below the 50^{th} percentile on the MacArthur Communicative Development Inventory. Only firstborn children were included in the present study since birth order has been found to have an effect on expressive vocabulary, as measured by the MCDI, with first born children scoring significantly higher than later-born children between 17 and 19 months of age (Westerlund & Lagerberg, 2008). Oshima-Takane and Robbins (2003) found that the linguistic environment of first-born children is significantly different for that of second-born.

There was no significant difference in age between the IA and CTL groups at the initial assessment, $t(19) = -.140$, $p = .89$ (two-tailed) or at the follow-up assessment, $t(19) = -.570$, $p = .58$ (two-tailed). Chi-square tests indicated that there were no significant differences between the groups with respect to number of years of education of mothers, X^2 (2, N=21) = 1.89, $p = 0.39$ or fathers, X^2 (2,

N=21) = 1.16, p = 0.56) or for family income X^2 (2, N=21) = 2.02, p = .36). Information about SES can be found in Table 1.

Procedure

Each session took place in the participants' homes to ensure that the children were at ease and to increase the ecological validity of our findings. Carpenter et al. (1998) have suggested that findings from studies on JA and language development conducted in laboratories may not generalize as well as studies conducted in the home. This may be even truer for IA children for whom visiting a laboratory and meeting strangers in an unfamiliar context shortly after adoption might be unsettling. During the initial session, the objectives and procedure of the study were explained to mothers, and questions were answered by the examiner, the first author, a licensed psychologist, or a trained research assistant. Mothers were then asked to read and sign a consent form. This was followed by a semi-structured interview during which mothers completed the *Developmental Questionnaire* with the assistance of the examiner. The questionnaire asked about the child's development, past and current health problems, and medical conditions before and after adoption (for IA children). Questions about each parent's education and occupation, combined family income, and the composition of the family were also included. The mothers also completed the *Language Environment Questionnaire* in which they were asked to estimate the amount of French, English, or any other languages the child had been exposed to. They had to estimate the frequency of language experiences in and outside the family and in a variety of situations (e.g.,TV, radio). After completing these questionnaires, mothers were instructed to interact with their child as they normally would with the toys that they normally played with. They were instructed to stay in a specific delimited area as much as possible during the session in order to ensure that the mother and child could be video-audio-recorded simultaneously. The play session lasted exactly 30 minutes. During the follow-up session, information from the *Developmental Questionnaire* and on the *Language Environment Questionnaire* was updated and mothers were instructed to play with

their child as they normally would. The duration of the interaction was 30 minutes but was not analyzed in the present study.

Vocabulary development was assessed using the French version of the MacArthur Communicative Development Inventory (MCDI). The *Mots et Gestes* form was used at 15 months (*Words and Gestures*; Trudeau, Frank, & Poulin-Dubois, 1997) and the *Mots et Énoncés* form was used at 20 months (*Words and Sentences;* Frank, Poulin-Dubois, & Trudeau, 1997). The MCDI is a parent report measure that is widely used to assess the vocabulary acquisition of young children. Each child's mother was asked to fill out the MCDI the day of the initial visit or the day after and to complete MCDIs every month thereafter. However, only the MCDIs completed at 15 and 20 months were analyzed for the current study. At 15 months, the number of words understood and produced by the child as well as the communicative and symbolic gestures the child had tried or completed were the dependant variables extracted from the MCDI. The Early Gestures score included information about early communicative gestures such as pointing and engaging in games and routines. The Late Gestures score included information about the ability of the child to perform or try to perform certain actions involving objects, to engage in pretend play, and to imitate or to try to imitate the actions of an adult. At 20 months, the number of words produced and the ability to combine words were used as indices of expressive language ability.

Coding Procedure

The videotaped sessions at the initial assessment (at 15 months) and at the follow-up assessment (at 20 months) were transcribed according to the CHAT format developed by the Child Language Data Exchange System (MacWhinney & Snow, 1990). The coders were trained with coded transcripts and videos used in Oshima-Takane and Oram's study (2002) and the Coding Manual created by Oshima-Takane, Oram, Albanese and Browning (1994) was used to develop the coding scheme and to guide our coding of the transcripts. Twenty minutes of the free-play interaction of the initial sessions between the children and their mothers were coded, beginning after the first 5 minutes of each recording. The first 5 minutes were not analyzed in order to give the children and their mothers time to

become comfortable and to ignore the camera and examiner. The last 5 minutes were not analyzed. The videotaped sessions of the follow-up assessment are not analyzed in the current paper. Caregiver utterances were coded for episodes of JA following Tomasello and Todd's (1983) guidelines: 1) JA episodes begin with one person initiating interaction with the other; 2) both individuals visually focus on a single object or activity for at least 3 seconds (they can look away shortly during a long interaction); and 3) to show that the child is aware of the interaction, at some point during the episode, each child must direct some behavior toward the caregiver, particularly looking at her face. The caregivers' utterances inside JA episodes were classified as *following* (i.e., attending to an object or activity that the child is already attending to), *redirecting successfully* (i.e., redirecting with success the child's attention toward an object or action that she was not attending to), or *redirecting unsuccessfully* the child's attentional focus (i.e., trying to redirect the child's attention but failing to do so). The decision to distinguish successful and unsuccessful redirecting strategies was based on Shimpi and Huttenlocher's (2007) findings that successfully redirecting a child's attention to an object being labeled was positively linked to vocabulary development whereas redirecting unsuccessfully was negatively correlated with vocabulary development. Each maternal utterance was classified as being accompanied by gestures (e.g., pointing, tapping, outlining, presenting an object) or not. Twenty percent of the transcripts were recoded entirely by a second coder in order to assess coding reliability. The percentage of agreement was between 90.4% and 98.3%.

Results

General Health

Information regarding past and current general health and development of each child was collected during the semi-structured interview during the first visit and again at the second visit (see Appendix B for a summary). The IA and CTL children were comparable with respect to the frequency of past general health and developmental problems (i.e., problems present before the second assessment),

with 11 instances of problems reported for the IA children and 12 instances for the CTL children. However, the kind of health problems was different, with more CTL children having ear infections or other ear-related problems in comparison to the IA children who had more weight or height problems as well as more emotional problems (e.g., anxiety, attachment difficulties). Concerning their current medical and developmental status at 20 months, the IA children had a slightly higher incidence of problems (4 instances) compared to the CTL children (1 instance). Several IA children (71%; $n = 5$) had overcome their weight and height problems at 20 months, but 20% ($n = 2$) of the IA children continued to be below the 10th percentile with respect to weight and height. One IA child had a mild developmental delay and one had an ear infection or ear-related problem. For the CTL group, one child had feeding difficulties at 20 months.

The mothers of both groups were asked to judge the general health of their child. At 20 months, 80% ($n = 8$) of the IA mothers reported that they considered their child's general health *excellent* and 20% ($n = 2$) answered *very good*. For the CTL mothers, 55% ($n = 6$) judged their child's general health as *excellent*, 36% ($n = 4$) judged it as *very good*, and 9% ($n = 1$) judged it as *good*.

Communication Patterns and Lexical Development

Because most of the coded variables were not normally distributed and the sample sizes were small, the two groups were compared using non-parametric analysis -- Mann-Whitney tests and Spearman correlations which were used to examine, respectively, the presence of a significant difference between groups and the relationships between variables. A p value $< .05$ was considered statistically significant. Table 2 summarizes average raw scores and statistical results for the behaviors that were coded from the transcripts of the play sessions at 15 months.

Table 2

Means and standard deviations of variables computed during the 20-minute interactions between mothers and children at 15 months

VARIABLES	IA *M* (*SD*)	CTL *M* (*SD*)	Mann-Whitney U	*Z* score	P value
Total time spent in JA (seconds)	710.40 (209.65)	816.00 (155.35)	39.00	-1.13	.282
Mean duration of each JA episode	76.89 (45.46)	98.09 (37.42)	38.00	-1.20	.251
JA episodes initiated by child	2.00 (1.56)	2.36 (1.57)	47.50	-.538	.61
Total number of words produced by child (token)	5.20 (8.97)	29.00 (64.70)[a]	30.00	-1.77	.085
Number of different words produced by child (types)	3.20 (5.01)	7.45 (13.94)	35.50	-1.39	.173
Type/token ratio of child	.60 (.40)	.39 (.27)	36.00	-1.35	.197
Number of mother's utterances					
- Inside and outside JA	432.20 (70.64)	307.73 (50.64)	9.00	-3.24	.001**
- Outside JA	137.20 (63.92)	69.91 (37.16)	22.00	-2.33	.020*
- Inside JA	295.00 (62.27)	237.82 (59.56)	28.50	-1.87	.061
Maternal utterances accompanied by gestures (%)	17.76 (12.60)	16.10 (8.42)	53.00	-.141	.918
Total number of words produced by mother (token)	1545.80 (306.53)	1029.09 (230.38)	10.00	-3.17	.001**
Number of different words produced by mother (types)	295.80 (48.87)	251.09 (59.33)	31.50	-1.66	.099
Type/token ratio of mother	0.196 (.038)	0.245 (.028)	14.00	-2.89	.003**
Attention regulation strategies					
- Redirecting successfully					
- % of utterances	83.87 (9.53)	76.16 (24.75)	51.0	-.282	.809
- Number	248.30 (59.36)	178.09 (72.51)	24.0	-2.18	.029*
- Redirecting unsuccessfully					
- % of utterances	.41 (.48)	.49 (.72)	54.5	-.039	.973
- Number	1.10 (1.37)	1.36 (2.01)	54.0	-.078	.973
- Following					
- % of utterances	15.72 (9.50)	23.35 (24.96)	51.5	-.247	.809
- Number	45.60 (27.92)	58.36 (73.56)	52.0	-.211	.863

Note. [a] There was an outlier in the control group who produced 223 tokens but had several repetitions.

*p < .05. **p < .01. IA = Internationally-adopted children; CTL = Control children.

Time in joint attention and child-initiated joint attention episodes

There was no significant difference between the IA and CTL groups with respect to total time spent in JA, calculated in seconds, when the children were 15 months (Mann-Whitney U = 39.0, z = -1.23, p = .282). However, there was considerably more variance in the results of the IA children. Forty per-cent (n = 4) of the IA children spent less than 600 seconds in JA while no CTL child spent so little time in JA; another 40% (n = 4) of IA children spent between 601 and 850 seconds in JA compared to 63.6% (n = 7) of CTL children; and only 20% (n = 2) of the IA children spent more than 850 seconds in JA compared to 36.4% (n = 4) of the CTL children. With a larger sample size, the difference between total time spent in JA might become significant. There was no significant difference between the groups with respect to the mean length of each JA episode (Mann-Whitney U = 38, z = -1.20, p = .251). Again, there was more variation for the IA children with 30% (n = 3) of the IA children spending less than 42 seconds in JA, on average, whereas none of the CTL children had an average length of episode that was so short. Finally, the IA children initiated the same number of JA episodes as the CTL children (Mann-Whitney U = 47.5, z = -.538, p = .605).

Vocabulary development and communicative gestures

Table 3 summarizes the results from the MCDI at 15 and 20 months. There was no significant difference between the groups with respect to number of words understood or number of words produced at 15 months. Moreover, both groups were quite similar with respect to the number of communicative gestures they tried or completed. At 20 months, the IA children produced significantly fewer words compared to the CTL children (Mann-Whitney U = 26.00, z = -2.043, p = .043). Chi-square tests indicated further that there were significantly fewer IA children combining words at 20 months compared to CTL children, X^2 (1, N = 20) = 5.00, p = 0.043). As shown in Table 4, the number of words that the IA children produced at 15 months correlated significantly with vocabulary size at 20 months (r = 0.79; p = 0.003). Furthermore, the number of words understood at 15 months by IA children correlated significantly with the number of words produced at 20 months (r = 0.66; p = 0.020).

Table 3

Results on the MCDI at 15 and 20 months

VARIABLES	IA *M* (*SD*)	CTL *M* (*SD*)	Mann-Whitney U	*Z* score	P value
Words understood (15 months)	157.90 (89.99)	178.73 (55.96)	53.00	-.141	.918
Words produced (15 months)	19.80 (25.41)	22.55 (28.07)	41.50	-.954	.349
Early Gestures (15 months)	14.40 (2.80)	14.64 (1.69)	52.00	-.214	.863
Later Gestures (15 months)	19.50 (6.54)	22.82 (4.33)	38.00	-1.203	.251
Words produced (20 months)	111.50 (147.90)	219.09 (147.88)	26.00	-2.043	.043*
Combining words (20 months; %)	60	100	5.00_a	NA	.043*

Note. [a] Pearson Chi-Square. *p < .05.
IA = Internationally-adopted children; CTL = Control children.

Table 4

Correlations between vocabulary scores, attention regulation strategies, and number of mothers' language use with their IA children

Variable	1.	2.	3.	4.	5.	6.	7.
1. Words understood on MCDI (15 months)	__	.49	.66*	.79**	.42	.46	-.22
2. Words produced on MCDI (15 months)		__	.79**	.36	.51	.54	-.38
3. Words produced on MCDI (20 months)			__	.54	.35	.57**	-.38
4. Total number of mother utterances (inside and outside JA; 15 months)				__	.66*	.66*	-.43
5. Total number of words produced by mother (token) inside JA (15 months)					__	.64*	-.62*
6. Number of Redirecting utterances (15 months)						__	-.18
7. Number of Following utterances (15 months)							__

Note: Numbers are Spearman correlations. IA = Internationally-adopted children.
* p < .05. ** p < .01

Children's language use during play sessions

There was no significant difference between the total number of word tokens (Mann-Whitney U = 30.0, z = -1.77, p = .085) or word types (Mann-Whitney U = 35.5, z = -1.39, p = .173) produced by the IA and CTL groups during the play sessions at 15 months (see Table 2). Nor was there a significant difference between the type/token ratios of the IA and CTL groups (Mann-Whitney U = 36.0, z = -1.35, p = .197) based on language use during the sessions at 15 months. However, the means suggest that there was a tendency for the CTL children to talk more and to use a wider range of words during the play sessions than the IA children. Details of these results are presented in Table 2.

Mothers' language use

Results concerning mothers' language use are presented in Table 2. The total number of utterances (inside and outside JA episodes combined) produced by IA mothers was significantly higher than the number of utterances produced by the CTL mothers (Mann-Whitney U = 9.0, z = -3.24, p = .001). The total number of utterances produced by IA mothers outside JA episodes was also significantly higher (Mann-Whitney U = 22.0, z = -2.33, p = .020) compared to that of the CTL mothers. There was no significant difference between groups with respect to number of utterances inside JA episodes (Mann-Whitney U = 28.5, z = -1.87, p = .061), and there was no significant difference between groups for percentage of mother's utterances accompanied by gestures (Mann-Whitney U = 53.0, z = -1.41, p = .918). The total number of words (i.e., tokens) produced (inside and outside JA episodes combined) was significantly higher for the IA mothers than for the CTL mothers (Mann-Whitney U = 10.0, z = -3.17, p = .001). The type/token ratio was significantly smaller for IA mothers compared to the CTL mothers (Mann-Whitney U = 14.0, z = -2.89, p = .003). However, there was no significant difference between groups with respect to the number of different words (i.e., types) the mothers produced (Mann-Whitney U = 31.50, z = -1.66, p = .099), suggesting that the IA mothers were using more repetitions.

Mothers' attention regulation strategies

Results concerning mothers' attention regulation strategies are presented in Table 2. There was no significant difference between the IA and CTL mothers with respect to percentage of utterances that redirected successfully (Mann-Whitney U = 51.00, z = -.282, p = .809), redirected unsuccessfully (Mann-Whitney U = 54.50, z = -.039, p = .973) and followed the child's attention (Mann-Whitney U = 51.50, z = -.247, p = .809). However, IA mothers used a significantly larger number of utterances redirecting the child's attention successfully (Mann-Whitney U = 24.0, z = -2.18, p = .029). Thus, the sheer number of utterances that redirected the child's attention was significantly higher for the IA mothers compared to the CTL mothers, but the proportion of redirecting utterances was the same. There was no difference in number of mothers' utterances redirecting the child's attention unsuccessfully (Mann-Whitney U = 54.0, z = -.078, p = .973) or following the child's attentional focus (Mann-Whitney U = 52.0, z = -.211, p = .863). The average number of utterances redirecting the child's attention unsuccessfully was very low in both groups: 1.10 for the IA dyads (representing 0.41% of the mother's utterances) and 1.36 (representing 0.49% of the mother's utterances) for the CTL dyads. Therefore, the number of utterances redirecting successfully and unsuccessfully were merged to form one category -- Redirecting utterances, for further analysis. The difference between the average number of Redirecting utterances (combining redirecting successfully and unsuccessfully) remained significant between groups (Mann-Whitney U = 24.0, z = -2.18, p = .029).

Mothers' use of gestures

As shown in Table 2, the percentage of maternal utterances accompanied by gestures was similar for the groups and was relatively low, 17.76% and 16.10% for the IA and CTL mothers, respectively. We also calculated the number of utterances redirecting the child's attentional focus and the number of utterances following the child's attention focus that were accompanied by gestures. A Mann-Whitney test on the number of utterances redirecting the child's attentional focus with gestures revealed that there was no significant difference between the IA (*M*

= 39.00, range = 22.57-55.43, *SD* = 22.97) and CTL mothers (*M* = 31.55, range= 18.06-45.03, *SD* = 20.07), Mann-Whitney U = 45.0, *z* = -.705, *p* = .512; nor was there a significant difference between the groups with respect to the number of utterances following the child's attentional focus that were accompanied by gestures (IA mothers: *M* = 5.40, range = 1.16-9.64, *SD* = 5.93; CTL mothers: *M* = 8.00, range = 2.95-13.05, *SD* = 7.51), Mann-Whitney U = 44.0, *z* = -.790, *p* = .468. This result suggests that CTL and adoptive mothers were similar with respect to their use of gestures and how they combined them with different types of attention regulation strategies.

Correlation between maternal attention regulation strategies, input and vocabulary development

In order to examine the relationships between maternal attention regulation strategies and input, on the one hand, and IA children's vocabulary development, on the other hand, Spearman correlations were calculated (see Table 4). The number of utterances that redirected the IA child's attention during the interaction at 15 months was significantly and positively correlated with expressive vocabulary at 20 months (*r* = 0.57; *p* = 0.042). The total number of mother's utterances (inside and outside JA episodes) during the interaction at 15 months correlated strongly with the number of words understood at 15 months (*r* = .79; *p* = .003). The number of words the IA children understood (*r* = .66; *p* = .020) and produced at 15 months (*r* = .79; *p* = .003) correlated strongly with the number of words they produced at 20 months. The total number of mother's utterances (inside and outside JA episodes) during the interaction at 15 months correlated significantly with the total number of words produced by mothers (*r* = .66; *p* = .019) and with the number of redirecting utterances (*r* = .66; *p* = .019); but there was no significant correlation between total number of mothers' utterances at 15 months and number of words IA children produced at 20 months or between total number of words produced by mothers at 15 months and IA children's productive vocabulary at 20 months.

Exposure to French, age at adoption, and vocabulary results

In order to investigate other factors that might have influenced the vocabulary outcomes of the IA children, we correlated number of months of exposure to French and age at adoption with vocabulary scores at 15 and 20 months. There were no significant correlations between age at adoption and number of words understood at 15 months or with the number of words produced at 15 or at 20 months (as measured by the MCDI). None of the correlations between number of months of exposure to French and vocabulary (i.e., number of words understood at 15 months, number of words produced at 15 or 20 months) was significant. The lack of significant correlations might be related to small variability in terms of age at adoption (range: 9 to 13 months).

Discussion

The present research sought to answer three questions: (1) Are IA children from China delayed in acquiring the ability to engage in JA? (2) Do adoptive mothers interact differently with their children compared to birth mothers and, in particular, are they prone to use more directive attention regulation strategies? and (3) Are the interaction and JA strategies of adoptive mothers related to their children's later vocabulary development?

In response to the first question, our results suggest that the 15-month-old IA children were similar to the CTL children in many ways despite the fact that the former had been in their new families and had been exposed to French for only about 5 months, on average. This was particularly evident in their JA behaviors. More specifically, they initiated JA episodes with the same frequency as the CTL children; they spent the same amount of time in JA as the CTL children; and the number of communicative gestures they tried or completed, measured by the MCDI, was equivalent between groups. In these respects, and contrary to our expectations, the IA children's ability to acquire early communication-related skills was not delayed significantly when compared to the CTL children. These results are consistent with those of Hwa-Froelich and Matsuoh (2008) who found that most of their sample, although quite small, scored

within the normal range with respect to communication, social, and symbolic behaviors six months post-adoption. However, the IA children in the present study exhibited considerably more variability in the amount of time they spent in JA than did the CTL children and, as well, there was a higher proportion of IA children (40%) whose time spent in JA was quite brief (less than 600 seconds) compared to the CTL children, none of whom engaged in such short time in JA episodes. It is possible that some of these numeric differences would become significant with larger samples.

We also found that, despite the fact that the 15-month-old IA children had had 8-11 months less exposure to French than the CTL children, they understood and produced the same number of words as the CTL children, according to parental reports. This suggests that the IA children, who were cognitively more mature when they were first exposed to French than the CTL children when they were first exposed to French, did not need extensive exposure to begin learning words in French (see also Pollock, 2005). In contrast, the vocabulary scores of the IA children were significantly behind those of the CTL children at age 20 months and significantly fewer IA children combined words (see also Tang & Yang, 2005). While there is no definitive explanation for this shift in results, it could reflect differential rates of early lexical development for the IA and CTL children which, in turn, might reflect differences in their prior exposure to French. Typically-developing, non-adopted children generally produce their first words around 1 year of age and then go through a vocabulary growth spurt beginning around 18 months of age (Benedict, 1979). The vocabulary growth spurt may be delayed or protracted in IA children because of their lack of exposure to French during the first year of life. Thus, while IA children may be ready to produce their first words in their new language within a few months of adoption (initial assessment of our study), they may experience a relatively slow rate of lexical development subsequently in comparison to non-adopted children of the same age and familial SES due to their lack of exposure to French prior to adoption. Catching up to the CTL children may be even more challenging for the IA children if one considers that the rate of vocabulary growth of the CTL children

may well have been accelerated because these children were being raised in relatively high socio-economic families (Hoff, 2006).

Our second question asked: Do adoptive mothers interact differently with their children compared to birth mothers? Indeed, there was evidence of significant differences. The adoptive mothers talked significantly more with their children than did the CTL mothers -- when talk inside and outside of JA episodes was combined and also when only talk outside of JA episodes was considered. The type/token ratio of the adoptive mothers was smaller than that of the CTL mothers. This result could be misleading if it were interpreted as a sign that the IA mothers exhibited less lexical diversity in their interactions with their children compared to the CTL mothers. In fact, the number of different words (types) used by the IA and CTL mothers was similar. It was the total number of words (tokens) that differed. Thus, the type/token results indicate that the adoptive mothers were using more repetitions compared to the CTL mothers. Research has found that repetitions usually decrease as children get older (Kavanaugh & Jirkovsky, 1982), presumably as children's language skills mature and they require fewer repetitions from caregivers. Our data do not allow us to attribute the IA mothers' language use to their children's language level because the number of words understood and produced was similar for the two groups. However, it is possible that the adoptive mothers adapted their language in these ways because their children had been exposed to French for only a few months and they were seeking to extend their language exposure. It is also possible that repetitions served to establish and/or maintain JA. Indeed, in our informal observations of the interactions between the adoptive mothers and their children, we noted that repetitions were mostly used to encourage JA; for example, adoptive mothers would often repeat what they had said because the child was not paying attention the first time. That the adoptive mothers were actively seeking to get and maintain their children's attention is evident in the finding that they used redirecting attentional regulation strategies significantly more frequently than the CTL mothers. This result is in line with studies among populations of children with special needs (Mahoney et al., 1990; Yont et al., 2003).

The third question asked: Are the interaction strategies of adoptive mothers related to their children's later vocabulary development? There was evidence that they were. Of particular significance, the adoptive mothers' use of redirecting strategies at 15 months was significantly and positively correlated with their children's subsequent expressive vocabulary at 20 months. This finding is not consistent with most studies of typically-developing children raised by their birth mothers in Western cultural settings which have reported negative correlations between the use of directive attentional strategies and subsequent expressive vocabulary (Baldwin, 1991; Tomasello & Farrar, 1986; although see Barnes, Gutfreund, Satterly, & Wells, 1983, for divergent results). However, our findings are consistent with Shimpi and Huttenlocher (2007) who found that use of a *lead-in* style that successfully redirects children's attention for labeling objects was positively correlated with the children's vocabulary and with Masur, Flynn and Eichorst (2005) who found that certain types of directive strategies and, in particular supportive directiveness (i.e., attempt to extent the child's activity in comparison to intrusive directives that disrupt the child's current activity), correlated positively with children's lexical development. The use of directive attentional strategies may be a way for adoptive mothers to encourage JA and may explain why there were no significant differences in IA and CTL children's level of engagement in JA (i.e., time spent in JA). The present findings also corroborate other researchers who suggest that there is not an ideal maternal attention regulation style, but that the style that correlates with lexical development varies according to the type of learner and the context of learning (Akhtar, 2005; Vigil, 2002; Vigil et al., 2006). For adoptive mothers, redirecting their children's attention might be an effective way to foster social-cognition skills and early vocabulary development.

Amount of maternal input (inside and outside JA episodes) during sessions when the children were 15 months of age was significantly related to the IA children's receptive vocabulary at the same age. This relationship was very strong; 62% of the variance in the number of words understood by the IA children could be explained by variance in total number of mothers' utterances. This

suggests, in turn, that the amount of input IA children get plays an important role in the development of their early receptive vocabulary. However, it is possible that the direction of causality is the reverse -- IA children with well-developed receptive skills might have elicited more talk from their mothers. Experimental methodologies would be needed to better understand this mutually driven process (Shimpi & Huttenlocher, 2007). Our findings suggest that it is not only mothers' talk inside JA episodes that plays a role in the development of receptive vocabulary at 15 months, but also mothers' talk outside JA (see also Floor & Akhtar, 2006; Tomasello & Farrar, 1986; Trautman & Rollins, 2006). In contrast, when predictors of the IA children's expressive vocabulary development at 20 months of age were examined, neither total number of maternal utterances (inside and outside of JA) nor total number of words mothers used with their children at 15 months was significantly related to their children's vocabulary at 20 months, although the correlations were still positive. Thus, IA mothers' use of redirecting utterances at 15 months had a more significant relationship with their children's subsequent expressive vocabulary growth than did the volume of maternal input earlier on. These results suggest that quantity of maternal input at 15 months might be particularly important to foster early lexical comprehension, whereas redirecting the IA child's attention at 15 months might play a more important role in later expressive vocabulary development at 20 months of age.

There are of course limitations to the present study. One concerns the directionality of causal relations inferred by the correlations reported here. The use of certain attention regulation strategies may foster language development, but the opposite could also be true -- children with more advanced language and communicative abilities might encourage parents to use certain strategies. However, this possibility does not seem plausible because research has shown that parents tend to use redirecting strategies with children who present developmental delays (Mahoney et al., 1990) or with children who tend to be passive (Prizant, Wetherby, & Roberts, 1993) and not with children who are developmentally advanced. With a larger sample, partial correlations could be done in which vocabulary at 15 months could be partialled out. Another limitation is sample

size; the small sample size limits the generalizability of our findings and may account for the lack of statistical significance in some cases. For example, when differences between the two groups of children with respect to their engagement in JA at 15 months were examined, there were no statistically significant differences although numerically the IA children tended to spend less time in JA compare to CTL children. Since this study involved a specific group of adopted children (girls adopted from China between 9 and 13 months), other studies involving different kinds of groups in term of age at adoption, country of origin, and sex are needed to generalize the results of the present study to other populations. Considering only input and the type of interactions that IA children have with their mothers is an important start but is limited. Paternal input could also have an important influence on IA children's language development and needs to be considered in future research. We are in the process of analyzing data on the communication patterns of IA children and their fathers.

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General Discussion

The main goal of the present studies was to better understand the language development of IA children acquiring French in the context of their cognitive and socio-emotional development as well as their general health. When these studies were first conceived, there were only a few studies that had directly assessed the language abilities of IA children. Most studies at that time had used parental reports, which are informative but limited in the kind and depth of information they offer. Moreover, most studies had focused on language or medical outcomes but did not include a broad range of measures of IA children's development. The latter is important in order to determine if any lags in the IA children's language outcomes reflect generalized or specific developmental lags. To date, no study we know of has conducted in-depth analyses of IA children's language abilities; most studies have focused on general language performance using standardized tests (e.g., Roberts, Pollock, Krakow, Price, et al., 2005; Scott, Roberts, & Krakow, 2008) or parental reports (e.g., Krakow & Roberts, 2003; Tan & Yang, 2005). Finally, no research to date has investigated the role of parental input in the language development of IA children. Newly adoptive parents face a unique situation because of the unusual discrepancy between their adopted children's cognitive maturity and their limited knowledge of the language spoken in their new families.

Despite the fact that the current longitudinal studies were planned in 2002, before most research focusing on language acquisition of IA children was published, they continue to be unique in many ways. First, the language outcomes of IA children were compared directly to those of non-adopted children who were carefully chosen to match the IA children on factors that have been found to influence language acquisition: familial socio-economic status, sex, and age. Only one study we know of, and published recently, has included such a control group (Cohen, Lojkasek, Zadeh, Pugliese, & Kiefer 2008). Second, the present studies examined IA children's development in diverse domains: language, cognitive, and socio-emotional functioning. Third, we conducted in-depth analyses of IA

children's language outcomes by investigating certain morphological features (Study 2) that have been shown to be vulnerable in children learning French as a second language and children with specific language impairment (SLI), namely complement clitics and tense morphology (Grondin & White, 1996; Hamann, 2004; Paradis & Crago, 2000). Fourth, Study 3 is the first and only study to examine adoptive mothers' language interaction styles and usage and their potential influences on their children's language development. Finally, the present studies are the first we know of to examine the acquisition of French by IA children, although some studies have looked at other aspects of French-learning IA children (Lapointe, Gagnon-Oosterwal, Cossette, Pomerleau, & Malcuit, 2006; Tessier, Larose, Moss, Nadeau, Tarabulsy, & le Secrétariat à l'adoption internationale du Québec, 2005).

Our results suggest that despite the early deprivation and the unique conditions in which IA develop during their first year(s) of life, including a stay in an orphanage and adaptation to a new family and language, these IA children were resilient and their language learning ability was robust and flexible. In fact, for example, the results of Study 3 indicate that most of the IA children were acquiring the adoptive language rapidly, shortly after adoption. Indeed, the 15 month-old IA children in Study 3 were similar to the 15 month-old non-adopted children in terms of number of words produced and understood as well as in term of the time they spend in joint attention with their adoptive mothers. Their general developmental outcomes were similarly good. In this regard, it was also found that the 4-year old IA children in Study 1, who had been in their adoptive homes for 3 years, on average, exhibited non-verbal intellectual abilities and socio-emotional development that was similar to that of non-adopted children of the same sex and familial SES. When compared to test norms, the IA children's language abilities were in the average range after 3 years of exposure to French. Four years and four months post-adoption, the IA children performed in the average range on a variety of French language tests when compared to test norms, with the exception of their performance on the Recalling Sentences of the CELF-R, a point discussed in more detail later. Thus, the results of the present studies

suggest that the IA children were catching up rapidly to their non-adopted peers in their acquisition of French and the language switch they had experienced did not have significant major detrimental effects on their ability to learn their "second first language", consistent with what others have found with IA children learning English (e.g., Roberts, Pollock, Krakow, Price, et al., 2005; Scott et al., 2008).

At the same time, the results of comparisons between the IA children and matched non-adopted children in the present studies make original contributions to the growing body of research on the language development of IA children. More specifically, these comparisons reveal a more complex and precise portrait of IA children's language development than has been reported to date. On the one hand, the IA children performed as well as the non-adopted children raised in similar SES families on measures of receptive vocabulary at 4 and 5½ years of age and on measures of language comprehension at 4 years of age. The IA children were also found to be similar to their non-adopted peers in diverse linguistic domains when their spontaneous language productions were examined (Study 2): mean length of utterance (MLU), overall lexical diversity, verb diversity, and tense morphology (frequency and correct use). These results are impressive given that the control children were from high SES families where the language learning environment was enriched.

On the other hand, comparisons between the IA and control children indicate that the IA children differed in some significant and specific ways from the non-adopted children. In comparison to the CTL group, the 4 year-old IA children performed significantly lower on tests of expressive language (lexical and grammatical skills), and when the spontaneous language productions of a subgroup of these children were analyzed (Study 2), they were found to have significantly more difficulties with complement clitics and direct object clitics in particular. Sixteen months later, around 5½ years of age, the IA children performed significantly lower than their non-adopted peers on tests of expressive vocabulary and expressive language, as was found during the first assessment, but this time they were also significantly lower on a test of receptive language (receptive morpho-syntactic skills). As mentioned earlier, at this age, the IA

children were also performing below the norms on the Recalling Sentences subtest of the CELF. In brief, the differences in language performance between the IA and control children were primarily in domains related to grammar, but also in expressive vocabulary. There are also suggestions in these results that some of the differences exhibited by the IA children relative to the control children might be related to language processing, a point to be discussed in greater detail later.

Early language development as a predictor of later language abilities

The results of Studies 1, 2 and 3 taken together indicate that indices of the IA children's early acquisition of their new language were correlated with their later language abilities. More specifically, IA children who produced their first words in French relatively soon after adoption had greater lexical diversity later, around 4 years of age, than IA children who took longer to produce their first words in French, even when controlling for age at adoption (Study 2). The results of Study 1 similarly indicate that age of production of first words in French was a significant predictor of later expressive and receptive language abilities in French, around 5½ years of age. This predictive relationship is reinforced by the results of Study 3 where it was found that the number of words the IA children produced, according to parental reports on the MCDI, at 15 months correlated significantly (r = .79) with number of words produced at 20 months. In a related vein, the results of Study 1 indicate that performance on the EOWPVT and the EVIP at initial assessment, when the IA children were 4 years of age, correlated significantly with their performance on the same measures when they were 5½ years of age.

These results suggest developmental continuity in word learning, production, and comprehension across time for the IA children and corroborate findings reported in large-scale studies of typically-developing children acquiring English or German as a first language (Fenson, Dale, Reznick, Bates, Thal & Pethick, 1994; Hohm, Jennen-Steinmetz, Schmidt & Laucht, 2007). More specifically, Fenson and collaborators showed strong longitudinal continuity in word production, word comprehension, and grammar in children in their second

year of life. Hohm et al. (2007) found that the expressive and receptive language performance of 10 month-old typically-developing children learning German as a first language predicted their verbal skills 10 years later; this was particularly true for girls. Thus, for first language learners, large scale studies have shown the short-term and long-term predictive significance of infant/toddler language measures. Our findings suggest that the same relation holds for IA children. Thus, it would appear that adoptive children learning a "second first language" replicate the pattern of typical first language acquisition with respect to how their early language development predicts their later language outcomes.

These results suggest that the onset of word production and other indices of early acquisition of the adopted language might be an important clinical marker. Variation in age or delay in onset of word production in the adopted language, in particular, could be used as a predictor of individual differences in IA children's ability to acquire their new language. Variation in IA children's delay in producing their first words in the new language might, in turn, be related to pre-adoption language learning experiences, a language reserve that survived the effects of institutionalisation (Croft et al., 2007), or other pre-adoptive variables. Future studies of IA children are called for in order to better understand the factors that might be linked to onset of word production.

Maternal language use and interaction styles

Soderstrom (2007) argued that an essential component of understanding the language development of young children is the nature of the input they receive, irrespective of the theoretical approach one takes. To our knowledge, Study 3 is the first, and to date only, study to investigate the nature of adoptive mothers' language input and attention regulation strategies with their adoptive children soon after adoption. We learned from Study 3 that the nature of the input IA children get upon adoption might be different from that directed to biological children. Indeed, the adoptive mothers in Study 3 tended to be more talkative and to use more repetition compared to the control mothers. This suggests that the adopted mothers were adapting their language use to the particularities of their adopted child. Two possibilities might explain the reasons behind these

adaptations. Adoptive mothers' language patterns might be intended to promote the lexical development of their children using the same kinds of input that biological mothers use with young children in the early stages of language acquisition (Kavanaugh & Jirkovsky, 1982). Alternatively, the language usage patterns of the adoptive mothers might be intended to establish or maintain joint attention with their adopted children, strategies which, in turn, could promote language development, including vocabulary acquisition. Indeed, the adoptive mothers were more likely than the non-adoptive mothers to redirect their child's attention and their use of redirective strategies when the IA children were 15 months of age was positively related to their lexical development when they were 20-months old. These results suggest that adoptive mothers adapt their interactional style and language use in general in order to encourage the language development of their newly adopted children. Globally, our results suggest that the enriched environment in which IA children are placed and the way their adoptive mothers adapt to them might help them to catch-up linguistically to their non-adopted peers.

Rate of language development

The longitudinal design of the present studies made it possible to examine the rate of language development of IA children in comparison to that of non-adopted children who had been exposed to French since birth. Findings from study 3 indicated that the lexical development of the IA children evolved rapidly in the first months post-adoption: after 5 months of exposure to French, the IA children had vocabularies similar to those of 15 month-old non-adopted children. This finding is in line with what others have found (e.g., Pollock, 2005; Snedeker, Geren & Shafto, 2007). For example, Snedeker et al. found that after 3 months of exposure to English, IA children had vocabularies equivalent to that of 24-month-old children (as assessed by MCDI norms). Comparisons with Snedeker et al.'s study should be made with caution because the IA children in that study were adopted at much older ages (mean age at adoption = 4 years of age compare to 10 months for Study 3) and were not matched with controls for familial SES or sex. At the same time, findings from the present studies also suggest that rapid

language development immediately after adoption might be followed by a period of slower acquisition. Evidence of slower rates of development among the IA children was apparent in both their receptive language abilities and their vocabulary development. To be specific, at 15 months, the IA children's vocabularies were similar to those of the non-adopted children; but, at 20 months of age, the number of words that the IA children produced was significantly lower than the CTL children. The rate at which new words were acquired by the IA children between 15 and 20 months of age was approximately 18 words per month, whereas, for the non-adopted children, the rate was approximately 39 words per month. One possible explanation for these findings is that the IA and non-adopted children had the same or similar lexical repertoires initially since this developmental period is generally characterized by slow growth (Benedict, 1979). However, whereas typically-developing non-adopted children usually experience a vocabulary growth spurt around 18-months of age (Benedict, 1979), IA children may not. This would explain why a discrepancy in vocabulary became apparent between the two groups after the initial testing in Study 3. Since Study 3 did not continue beyond 20 months, it is not possible to determine if the IA children would have exhibited a vocabulary spurt later. The slowed vocabulary development of the IA children after their first few months of exposure to French may reflect their delayed exposure to French and/or their overall reduced exposure to this language, a point to be discussed further later. Further evidence of slowed development by the IA children after their initial exposure to French comes from Study 1. Here it was found that the receptive language abilities of the IA children (as measured by Comprehension Scale of the PLS-III) were initially similar to those of the CTL when they were around 4 years of age, but they were significantly lower than the control children by 5½ years of age on the Receptive Language Scale of the CELF-R. In accordance with Study 3, the results of Study 1 suggest that, for some IA children, differences with the CTL children might increase with time at least in the preschool period.

Finally, the present results also suggest that the receptive language abilities of IA children tend to be better developed than their expressive abilities.

In this respect, the profile of IA children learning French is similar to that of second language learners (Marton, 1977) and to that of IA children acquiring English (e.g., Croft et al., 2007).

Explanations for the performance of the IA children's language development

The present results suggest that the exceptional circumstances in which IA children acquire their "second first language" can result in language lags in certain domains in comparison to matched control children. Previous studies might not have been sensitive to such differences because they did not implement SES and gender controls, except for Cohen et al. (2008) who found results similar to the present results. From a theoretical point of view, the question arises: are these delays due to the fact that the IA children had less total exposure to French compared to the non-adopted children (*amount of exposure hypothesis*) or are they due to the fact that IA children were not exposed to French in their first year of life (*age of acquisition hypothesis*)? This is a complex question which cannot be answered with certainty using the data available in the present set of studies because age of exposure and amount of exposure to French in the case of the IA children are confounded. However, the present results tend to suggest that the IA children's lags in comparison to control children are not only due to amount of exposure to French.

The most direct evidence that the difference between the IA children's and control children's performance might reflect age of acquisition effects, at least in part, comes from findings of an increased lag in the IA children's language performance relative to that of the control children over time; this was evident in both Studies 1 and 3. In other words, increased exposure to French for the IA children resulted in more, not reduced, differences. Additional evidence that exposure alone cannot account for these differences comes from the lack of significant correlations between amount of exposure to French and the IA children's language outcomes in some domains. More specifically, while lexical measures (expressive vocabulary, as measured by performance on the EOWPVT in Study 1) and by the type-token ratio for all words during spontaneous language production (in Study 2), correlated significantly with amount of exposure to

French, grammar-related measures did not; more specifically, MLU and performance on the Formulated Sentences subtest of the CELF-R were less highly correlated with amount of exposure, and percent incorrect use of complement clitics was not correlated at all. This pattern of correlations suggests that it is differences in the grammatical domain in particular that cannot be explained solely on the basis of amount of exposure.

Additional, albeit indirect, evidence that amount of exposure alone might not account for the differences between groups found in the present studies comes from the finding that there was a significant proportion of IA children who scored low on the Recalling Sentences subtest of the CELF-R. In Study 1, 30% of IA children scored 2 standard deviations below the norm on this subtest, suggesting a severe delay in this sphere, and an additional 26% scored between 1.25 and 2 standard deviations below the norm, suggesting a moderate delay (see Table 1). It is important to note that some control children performed below the norms on this subtest. Therefore, the prevalence of delay might be somewhat overestimated when the performance of the IA children is compared to the norms because the task might be slightly more difficult for French-speaking children. Nevertheless, the percentage of IA children scoring below the norms was considerably greater than the percentage of control children: 56% and 26%, respectively. Furthermore, an important proportion of IA children scored significantly below the average performance of the control children; 35% of the IA children scored 1.25 standard deviations or more below the mean of the control children on the Recalling Sentences subtest. It has been argued that sentence recall tests, which are widely used as a marker of specific language impairment (e.g., Conti-Ramsden, Botting, & Faragher, 2001; Stokes, Wong, Fletcher, & Leonard, 2006), assesses language processing abilities, including memory for spoken language (Semel, Wiig, Secord & Sabers, 1987) and are related to grammatical development (e.g., Devesovi & Caselli, 2007). According to Mayberry (1993), recall of complex sentences necessitates high levels of language proficiency. Mayberry and her collaborators have found that performance on sentence repetition tasks are highly sensitive to age of acquisition among both first and second language learners (Mayberry &

Eichen, 1991; Mayberry & Fischer, 1989). For example, she found that, despite approximately 50 years of exposure to and experience with American Sign Language (ASL), late second language learners of ASL (i.e., children who acquired English from birth as their first language and then had to learn ASL as a second language in childhood because they became deaf) had significantly lower scores compared to native ASL learners on a recalling sentences task in which they had to recall long and complex sentences in ASL (Mayberry, 1993). Their performance was compared to that of native speakers of ASL with the same amount of exposure. The point here is that the difference in language performance between the IA and control children found in the present studies might reflect difficulties in language processing, rather than amount of exposure per se, and that these language processing difficulties might, in turn, be due to delayed exposure to French (*age of acquisition hypothesis*). Preliminary results from a follow-up assessment of IA children in our lab indicate that these children are still scoring significantly lower than non-adopted children on the Recalling Sentences subtest of the CELF-4 at 7 to 8 years of age (Delcenserie & Genesee, 2009). However, further investigation of the ability to recall sentences is needed in order to determine if IA children continue to lag behind in this sphere despite several years of exposure to French. An alternative hypothesis could be that subtle attentional difficulties affected the IA children's ability to listen carefully to the sentences and, therefore, lowered their performance on recall. Indeed, some studies have suggested that IA children are more at risk for attention and hyperactivity problems, although this has been found mostly for boys and for IA children from Eastern Europe (e.g., Glennen & Bright, 2005). While it is not possible to exclude this possibility entirely, results from the present studies and behavioral observations during testing suggest that attentional difficulties are not a likely explanation for the lags obtained on the Recalling Sentences subtest. Only one of the IA children in the present studies was suffering from an Attention-Deficit/Hyperactivity Disorder (ADHD) and, from a qualitative perspective, the IA children appeared attentive while the examiner was reading the sentences to them.

Future studies should investigate attentional abilities along with the ability to recall sentences to clarify this issue.

It is important to repeat that amount of exposure to French is confounded and, therefore, correlated strongly with age at adoption. Thus, it is not possible to identify the unique role of each variable. Furthermore, it is not possible to tell if the differences between the IA children and the control children will disappear with time and/or whether they will affect these children's ultimate language attainment because the IA children were assessed only until they were 5½ years of age. While the enriched language experiences that IA children will get in school might serve to enhance their language abilities, it is also possible that the augmented language demands of schooling will be linked with continued and even larger differences between some IA children and their non-adopted peers.

Table 1

Percentage of adopted children above and below the mean of the language test's norms

SD	Expression Scale (PLS-III) %	Comprehension Scale (PLS-III) %	EOWPVT %	EOWPVT %	EVIP %	EVIP %	Recalling Sentences (CELF-R) %	Receptive Language Scale (CELF-R) %
	Time 1	Time 1	Time 1	Time 2	Time 1	Time 2	Time 2	Time 2
-2	17.4	0	0	0	0	0	30.4	0
-1.25	0	8.3	8.7	4.3	4.4	4.4	26.1	4.3
-1	0	4.2	8.7	13.0	0	0	13.0	8.7
0	60.9	58.3	78.3	78.3	60.9	30.4	30.4	65.2
+1	8.7	12.5	4.3	4.3	4.4	4.4	0	8.7
+1.25	8.7	8.3	0	0	13.0	26.1	0	13.0
+2	4.3	8.3	0	0	17.4	34.8	0	0

Note. PLS-III = The Preschool Language Scale-Third Edition; EOWPVT = Expressive One-Word Picture Vocabulary Test-Third Edition; CELF-R = Clinical Evaluation of Language Fundamentals Revised. The performance on the French adaptation of the Formulated Sentences subtest is not included in this table because this task was more difficult than the original English version. Indeed, the CTL children also performed below average on this subtest.
For the Receptive Language Scale of the CELF-R, the Expression and Comprehension scale of the PLS-III, and for the EVIP, standard scores were assigned a mean of 100 and a standard deviation of 15. For the EOWPVT, standard scores were assigned a mean of 100 and a standard deviation of 10. For the subtests of the CELF-R (Recalling Sentences and Formulated Sentences), standard scores were assigned a mean of 10 and a standard deviation of 3.

Individual differences

Another aspect of the present data that deserve further consideration is relatively large individual differences among the IA children on many of the language measures. Some of the IA children were functioning very well in all language domains and especially in the receptive domain (see Table 1) in comparison to carefully-matched control children. Thus, the early deprivation and language switch experienced by the IA children did not have a deterministic or categorically negative effect on their subsequent language development. Nevertheless, there were large individual differences among the IA children, larger than that exhibited by the control children. Some individual IA children were scoring 1.25 to 2 standard deviations below the mean of the control children or below the test's norms. Explanations for these differences are not clear from the present data. One possibility is that they reflect individual IA children's initial preparedness to acquire a new language. That some IA children were better prepared to acquire their adopted language was evident from the finding that age of onset of word production in French (Study 1) and time taken to produce first words in French (Study 2) were significantly correlated with later language outcomes -- at age 4 or 5½ years of age. In a similar vein, Croft et al. (2007, p. 41) have suggested that the minimal language skills that IA children have upon arrival in their adoptive families represents "some kind of language/cognitive reserve or capacity". Although the measure of early language ability used in the present study (i.e., age of onset of word production) is different than that used by Croft et al. (i.e., ability to imitate speech sounds on arrival), there is some support for the hypothesis that some IA children might be more prepared to learn a new language and that this has an impact on their later language outcomes.

Another possible explanation for variation in initial preparedness to acquire a new language might be found in the level of privation framework suggested by Gunnar, Bruce and Grotevant (2000). More specifically, early orphanage conditions might be very different from one child to another, and different levels of privation might have different developmental effects. Amount and quality of stimulation and care might vary from child to child, even in the

same orphanage, depending on the caregiver, the compatibility between the caregiver and the child, the child/caregiver ratio, the availability of food and toys, the financial support that the orphanage receives, etc.

Yet another possible explanation of individual differences in the IA children's outcomes is related to potential bias in parent reports. Since age of first words was collected retrospectively from parents, it is possible that their reports were biased by their perceptions of their children's current language abilities; that is, parents of IA children who had exhibited rapid language development might have been prone to report more favourable early language behaviors, such as age of first words. It is also possible that the time taken to produce first words is related to some characteristic(s) of the adoptive family and not the child's preparedness to learn a new language per se. As suggested by findings from Study 3, some interaction strategies and maternal input characteristics might be related to the early lexical development of IA children.

Clinical implications

The result of the present studies can guide clinicians who conduct assessments of IA children in order to determine if clinical intervention is necessary. The present results suggest that clinicians should expect IA children to acquire receptive vocabulary that falls within the average range by 2 years to 4 years post-adoption. Nearly 96% of the IA children in Studies 1 performed in the average range on the EVIP, a test of receptive vocabulary, within 2 to 4 years after adoption. Receptive language abilities, measured by the Comprehension Scale of the PLS-III, also tended to fall in the average range 2 to 4 years post-adoption when compared to test norms. Consequently, delay in the receptive domains after 2 or 4 years of adoption should raise clinical concerns since it is not typical of all IA children.

More variability in the language outcomes of IA children is expected in the domain of expressive language, even though results from the present research indicate that a sizeable proportion of IA children can be expected to function in the average range when compared to test norms. After an average of 3 years of exposure to French, nearly 83% of the IA children were in the average range, or

above, when compared to test norms on the Expression Scale of the PLS-III. A similar percentage was found for expressive vocabulary, measured by the EOWPVT, within 2 to 4 years post-adoption. Thus, it seems that performing below norm on the Expression Scale of the PLS-III or the EOWPVT after 2 to 4 years of adoption could be cause for clinical concern because most of the IA children in the present study were functioning in the average range. Of course, clinical judgment is called for to determine need for clinical services.

The present results also suggest that delays in the ability to recall sentences is frequent in IA children even after 5 years of exposure to their new language. Indeed, only 30% of the IA children performed in the average range when compared to the norms of the Recalling Sentences subtest of the CELF-R. Longitudinal studies aimed at determining if IA children eventually catch-up in this domain are needed. Studies investigating the impact of this lag on the long term linguistic and scholastic functioning of IA children would be very useful for clinical and theoretical purposes. The present results suggest that the use of the French adaptation of the Formulated Sentence subtest of the CELF-R might be misleading for clinicians since the French adaptation appears to be harder than the English version. Caution is thus required when interpreting the performance of IA children on this subtest.

The results of Study 3 on joint attention suggest that, despite privation prior to adoption, IA children can be expected to demonstrate the same joint attention skills and early communicative and lexical abilities as non-adopted children 5 months after arrival in their new families. However, between 15 and 20 months, IA children might exhibit a slower rate of lexical acquisition compared to non-adopted children. These results suggest, in turn, that most IA children will not experience major difficulty interacting with their adoptive mothers shortly after adoption and that, by inference, IA children who do experience communication difficulties might be at risk for language development. However, larger scale longitudinal studies are needed in this domain to establish the validity of this suggestion.

Limitations of the Studies

The current studies, of course, have limitations. Because IA children are not an easy population to recruit, the sample size in our studies are relatively small. Replication with larger samples is needed to confirm the findings of the present studies. As Scott and collaborators (2008) point out, sample bias is also a problem in research on IA children. For example, it is possible that parents who are concerned about there child's development are more inclined to be interested in participating in research. However, the percentage of parents in the present studies who reported being concerned about their child's language development was low (as indicated by their response to a question in the *Developmental Questionnaire*). Moreover, the impact of such a bias might have been minimal in Study 3 because investigation was done early after the children's arrival. At this point post-adoption, the adoptive parents knew less about the way their child would acquire their new language compared to the parents in Studies 1 and 2. It is also possible that parents who accepted to participate in the control group did so because they had concerns about their child's language development.

As noted earlier, the pre-adoption experiences of IA children vary widely depending on the child, the orphanage, and the country of origin, thus limiting the generalizability of our findings across different populations of IA children. Furthermore, the lack of information about the IA children's backgrounds (i.e., concerning their biological parents, peri-natal history, pre-adoption experiences, etc) limits the interpretability of our findings since these variables cannot be taken into account or controlled for. Furthermore, only girls were included in the present studies, limiting the generalizability of our findings to this population. Some studies have found that adopted boys tend to have lower academic achievement and more behavioral problems compared to adopted girls (e.g., Dalen, 2001; Glennen & Bright, 2005). Another limitation concerns the control group. This group was considerably different from the IA children in that they did not experienced separation from their birth parents and institutional rearing. During the conceptualization of this study, we considered including a group of children born in a French-speaking family and adopted by a French-speaking

family. However, the number of local adoptions in Quebec is very limited and is often associated with neglect or maltreatment.

Although the studies presented in this thesis have their limitations, studying a group of IA children with exceptional early experiences constitute a rich natural experiment. Research on this phenomenon would not have been possible with a conventional experimental design for obvious ethical reasons. As others have suggested (O'Connor, 2003), natural experiments, as opposed to experimental approaches, offer unique advantages and are needed in order to study the effects of early experience on later psychological and language development. Additional research is needed in order to investigate the long-term outcomes of IA children especially in the sphere of expressive language and language processing. Administering demanding language tasks to IA children at later ages might help elucidate possible early age of acquisition effects among IA children.

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Appendix A

Past and Present Health and Developmental Problems

Health/developmental problems	Presently (Initial assessment)		In the past	
	IA % (*n*)	CTL % (*n*)	IA % (*n*)	CTL % (*n*)
Respiratory difficulties	12.5 (3)	13.6 (3)	12.5 (3)	9.1 (2)
Hearing impairment	0	0	0	0
Fetal alcohol syndrome	0	0	0	0
Physical disability (e.g., polio, cerebral palsy)	0	0	4.2 (1)	0
Infectious or parasitic disease (e.g., gardia, hepatitis B)	4.2 (1)	0	8.3 (2)	0
Ear infection or other ear related problems	4.2 (1)	9.1 (2)	33.3 (8)	40.9 (9)
Vision impairment (e.g., poor vision, strabismus)	8.3 (2)	4.5 (2)	12.5 (3)	0
Weight or height below the 10th percentile	0	4.5 (1)	12.5 (3)	4.5 (1)
Feeding difficulties	0	0	16.7 (4)	0
Neurological problem	0	0	0	0
Gross motor delay	0	0	16.7 (4)	4.5 (1)
Mild developmental delay milestones)	0	0	4.2 (1)	4.5 (1)
Attention-deficit hyperactivity disorder	4.2 (1)	0	0	0
Other health or development problems	4.2 (1)	9.1 (2)	12.5 (3)	13.6 (3)
Total instances of reported problems	9	10	32	17

Note. IA = Internationally-adopted children; CTL = Control children.

Appendix B

Past and Present Health and Developmental Problems

Health/developmental problems	Presently (at 20 months)		In the past	
	IA % (*N*)	CTL % (*N*)	IA % (*N*)	CTL % (*N*)
Respiratory difficulties	0	0	20 (2)	27.3 (3)
Hearing impairment	0	0	0	0
Fetal alcohol syndrome	0	0	0	0
Physical disability (e.g., polio, cerebral palsy)	0	0	0	0
Infectious or parasitic disease (e.g., gardia, hepatitis B)	0	0	0	0
Ear infection or other ear related problems	10 (1)	0	10 (1)	72.7 (8)
Vision impairment (e.g., poor vision, strabismus)	0	0	0	0
Weight or height below the 10^{th} percentile	20 (2)	0	70 (7)	0
Feeding difficulties	0	9.1 (1)	10 (1)	9.1 (1)
Neurological problem	0	0	0	0
Gross motor delay	0	0	0	0
Mild developmental delay	10 (1)	0	0	0
Behavioral problems (e.g., aggressiveness, severe anger outbursts)	0	0	10 (1)	0
Emotional problems (e.g., anxiety, attachment difficulties)	0	0	30 (3)	0
Other health or development problems	0	0	10 (1)	0
Total instances of reported problems	4	1	11	12

Note. IA = Internationally-adopted children; CTL = Control children