FACTORS INFLUENCING CHINESE IMMIGRANT CHILDREN'S HERITAGE LANGUAGE MAINTENANCE: AN APPLICATION OF SOCIAL NETWORK ANALYSIS AND MULTILEVEL MODELING

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ABSTRACT

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There has been a resurgence of scholarly interest in heritage language maintenance (HLM) in the U.S. in recent years. And there is the tendency of focusing more on the classroom instruction of heritage language (HL) learners, particularly addressing the growing population of such learners of HL in foreign language classrooms at universities. This study argues that pre-college HLM is still very important in providing a good base of further education in HL at college stage. Standing in such a position, this study investigated what factors may influence individuals' HLM with Chinese immigrant children and their parents as informants. In order to address the complexity in this picture of factors interacting and influencing HL proficiency and behavior, this study applied ego-centric social network analysis in combination with multilevel modeling. The models of this study confirmed that a social network of HL did exert positive influence on children's HL proficiency and behavior. This study supported some findings in the research literature but also pointed to interesting phenomena and therefore potential explanations to inconsistencies identified in the literature such as parent attitude, parent education, family income, and modern communication technology. Meanwhile this study testifies again the power of social network analysis and the quantitative method of multilevel modeling in capturing the dynamicity of the interacting factors influencing HLM. Based on these findings, this study argues for the importance of an

impact belief on the side of the parents and other HL-competent people around the children so that social networks of higher quality can be established to improve the immediate environment of HLM.

I dedicate this dissertation to my family:
To my wife Yuping Yang
for her patience, for her sacrifice, and for all her continual support for which any words of appreciation seem plain and blank;
To my wonderful son,
who is my joy and my most powerful weapon in face of difficulties in life;
To my late father and late mother,
who, I always know, would forgive my not being able to reward their love by hanging near, and would take pride in me for every however minor success;
and
To my brother and sisters,
who have been doing their uttermost to take care not only of me from afar but also of everything of the big family on behalf of me while I am studying abroad in America.
I LOVE YOU ALL!

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and how, at the stage of writing, a result can be better presented with a certain kind of graph. I learned from him not only about the research itself but about how to pace myself and write continually. In addition, he also offered valuable information and advice when I was seeking a job in the midst of dissertation writing. It is truly wonderful to have had such a professor on the guidance committee.

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LIST OF ABBREVIATIONS

ENA – Ego-Centric Network Analysis

FL - Foreign Language

FLE – Foreign Language Education

GS – Group Socialization

HLLs – Heritage Language Learners

HLE – Heritage Language Education

HLM – Heritage Language Maintenance

HL – Heritage Language

INLC - Individual's Network of Linguistic Contacts

MLM – Multilevel Modeling

SN – Social Networks

SNA – Social Network Analysis

Factors Influencing Chinese Immigrant Children's Heritage Language Maintenance: An Application of Social Network Analysis and Multilevel Modeling

CHAPTER 1 INTRODUCTION

National Needs and the Assets Overlooked

Recent years have witnessed a dramatic increase in the awareness of the importance of foreign languages (FLs) in the United States. A number of perspectives on the importance of FLs may have converged to result in such enhanced awareness. For example, FL experience is viewed as an essential part of human experience throughout history (National Standards in Foreign Language Education Projects, 1999); it is vital, from the perspective of biological diversity, to keep linguistic diversity and human knowledge that is carried in such diversity (Maffi and Dorian, 2000; Nettle & Romaine, 2000); FL capability is the national resource for the nation to meet the safety challenges (Peyton, Ranard, & McGinnis, 1999b); and FL proficiency is an essential component of the individuals' global competency (Zhao, 2009).

Together with, and in contrast with, the stronger awareness of the importance of FLs is the realization of a clearer picture that this country has been suffering persistent language shortfalls and the inadequacies of current efforts to meet them (Salomone, 2011). As lately as the December of 2010, at a summit of policymakers, members of Congress, Intelligence Community officials, and leading language educators from across the country, Central Intelligence Agency Director Leon E. Panetta still called for making strengthening FL capabilities CIA's top priority (Central Intelligence Agency, 2011).

As Salomone (2011) commented, however, neither Director Panetta nor Education Secretary Arne Duncan at the same summit at the University of Maryland recognized students

from foreign-born families as an obvious part of the solution to fill up the shortfalls in foreign language capabilities. In 2000, the foreign-born population in this country reached over 30 million, slightly over 10% of the U.S. resident population, with a huge influx of 13.3 million immigrants (about 44% of the foreign-born population) into the U.S. within the decade 1990-2000. Meanwhile, nearly 18% of U.S. residents aged 5 and older spoke a language other than English at home (U.S. 2000 census as cited in Peyton, Ranard, & McGinnis, 1999a). According to the latest 2007 American Community Survey Reports (H. B. Shin & Kominski, 2010), this percentage reached 19.7% . Among them, undoubtedly, the percentage of students who speak a language other than English has also risen. These students may be foreign-born or native-born; in either case, they potentially could meet the needs that officials persistently lament (Salomone, 2011). While we work to expand offerings of FL education opportunities to students, we should not neglect such asset that we already possess.

Reality of the Assets and Our Awareness

An examination of such a population as this nation's assets reveals both discouraging and encouraging findings about the reality. What is discouraging, and unfortunate, is that this asset has traditionally been ignored, not just at the above-mentioned FL summit. The U.S. has long been making efforts to naturalize the immigrants through various English as a Second Language (ESL) programs, and immersion programs. To a large extent because of the successes of such programs, the immigrant children who have been "helped" have indeed made rapid progress in English, the dominant language of the society. For the naturalization purpose, immigrant children's first language is usually discouraged. Even when children's first language are encouraged in bilingual programs, the bilingualism principle being carried out is a subtractive one in the sense that the ultimate purpose is to help with their transition

cognitively and psychologically, and the result is for the children to finally shift from their first language to English only (Valenzuela, 1999). The resulted embarrassing and ironic situation is that, when the country needs FL talents (Peyton et al., 1999b; Salomone, 2011) and when we believe the immigrant children have advantages over English-monolingual learners in learning an immigrant language, the immigrant children have not achieved sufficient proficiency in their own language as was expected; worse than this is the fact that many of them have lost their language and totally shifted to English.

What is fortunate in this unfortunate situation is that there are people who have become aware of and also called attention to such problems. Long before Salomone's (2011) comment on the 2011 FL summit, Fishman (2001) and other educators and scholars observed this country suffering from a lack of support for non-English languages that they need and deserve, and called attention to the asset that we should not have overlooked – our immigrant children. Then, there was the Statement of Philosophy by the National Standards in Foreign Language Education Projects (1999):

> *Language and communication are at the heart of the human experience. The United States must educate students who are equipped linguistically and culturally to communicate successfully in a pluralistic American society and abroad. This imperative envisions a future in which ALL students will develop and maintain proficiency in English and at least one other language, modern or classical. Children who come to school from non-English-speaking backgrounds should also have opportunities to develop further proficiencies in their first language. (p. 7)*

The above statement is the first one at the national level, as far as the literature review of this study has covered, that has linked FL education to heritage language education (HLE),

that is, the education of those "children who come to school from non-English-speaking backgrounds." These children are exactly what a widely accepted definition of heritage language (HL) learners defines - "a language student who is raised in a home where a non-English target language is spoken and who speaks or at least understands the language and is to some degree bilingual in that language and in English" (Valdes, 2001, p. 38).

Obviously, discouraging and encouraging aspects of HLE reality coexist. As Salomone (2011) has suggested, it is still a fact that the potential that lies in HL speakers has not drawn sufficient attention from the policymakers. In the current political educational environment, the actual situation about these HL speakers is that many of them are increasingly losing their conversational skills, not to mention their literacy skills.

Starting from identifying with such a call for more attention to the asset we already have, I intend this study to be one of those that inquire into "how" to make use of this asset so that policy makers and other stake holders may recognize that heritage language maintenance (HLM) is not only meaningful but also feasible. One of the questions would be how to maintain or develop heritage language speakers' conversational skills at least. Although good HL spoken proficiency does not necessarily translate into good literacy skills (Xiao, 2006), both research and personal experiences have pointed to the significance of the speaking skills for language proficiency as a whole and to the necessity to lay a good foundation from the beginning (Baker, 2008; Liu, 2010; Xiao, 2006) rather than wait until the HL learners have grown up and learn a HL as a FL at college (Kono & McGinnis, 1999). This is why in this study I focus on the spoken language aspect of HLM, namely spoken HL proficiency and HL behavior. Specifically, this study's major question is what factors influence whether or not a HL speakers speaks his/her HL rather than the dominant English language.

A Different Approach to an Old Topic

The topic of how to help immigrant children develop HL proficiency is both new and old. It is new because new effort is being made to include HLE in FLE, as the above cited statement of philosophy shows. It is also demonstrated in the lately rising field of HLM, as was witnessed in the conferences like Heritage Languages in America: Building on Our National Resources (Peyton et al., 1999b) and in such journals as Heritage Language Maintenance. Whether or not HLM is part of FLE, it seems that the current interest is in providing better support in formal learning environments such as language classrooms and other language instruction programs. This is encouraging progress in many aspects of the society and good opportunities for enhancing HLM. But this emphasis on formal education also seems to have neglected the perhaps more important opportunities both within and outside classrooms, particularly the different domains of life beyond or before students coming to classrooms.

While we observe new effort being made in HLM, we should not forget the fact that HLM has been an interdisciplinary topic for decades with roots in a range of disciplines such as linguistics, education, psychology, sociology, political science, and anthropology (Fishman, 1992), and the different domains of life beyond or before students coming to classrooms have been studied as an effort to save threatened minority languages in situations like Australia (Borland, 2005; Cavallaro, 2005) and New Zealand (Borland, 1994; Schouten, 1992), or reverse language shifts among immigrants in societies such as the U.S. (Fishman, 1991, 2001b). In these lines of research, however, analysis has been focused on how the many macro-social variables such as language policy and economic status influence the HLM of

certain communities. In most cases, communities are the basic unit of analysis[1]; when individuals are studied, they are studied to shed light on the community level.

This study seems to be closer to the "old topic" but only in the sense that this study intends to investigate HLLs' domains of life beyond or before they come to classrooms. In other words, this study, though an educational one, is not intended to tap into classroom instructions. The starting point of this study is that HLLs' domains of life beyond or before they come to classrooms are still important domains where we explore and seek opportunities to make use of in this new round of effort of HLM, that is, the effort to exploit the asset we already have in FLE.

But we may need new approaches to this seemingly old topic. I intend to present the research findings not only to policy makers and educators but also to individual learners and their families. It is true that there has been a lot of research in HLM, or in other terms such as reversing language shift (Fishman, 1991, 2001b) or language planning in language contact situations (Extra & Vallen, 1997). Perhaps due to the difficulty in obtaining demographic data for a complex area of study, however, case studies still prevail and have been the predominant methodology. The literature review has resulted in two of my observations - first, case studies have revealed many variables that may influence HLM; but with so many variables just laid out, whose interrelationships we do not have an understanding at depth, we may lose ourselves in figuring out what exactly we need to do as policy makers, educators, or any other stakeholders. Second, we need an efficient quantitative tool to measure those variables in order that we may finally obtain an understanding how those variables are related to each

[1] Refer to Volume 21 of AILA Review: Multilingualism and Minority Languages for methodology reviews or descriptions of the articles therein included.

other and to what extent those variables individually, or in combination with other variables, play a role in influencing children's HL behavior. These two observations will be further illustrated in the section of literature review.

To fill in the gap of the above two needs in HLM research, I applied ego-centric social network analysis (SNA) for the first need, and the quantitative method of the multi-level modeling (MLM) for the second need. Briefly, SNA enables us to investigate directly how individuals (children in this study) are influenced by factors in their own direct environments; the social network data are directly from the report of the individuals, not from the researchers' observation. Secondly, MLM enables us to investigate the interactions between variables, including those interactions between variables at different levels such as the interactions between the individual level and the network level. Answers to the question of individual-network interactions may inform us of whether some of the environment characteristics are really influencing the individuals so that we may better consider how HLM environment should be constructed. I will discuss the appropriateness of the two methodologies in greater details after I first discuss below what factors are revealed by literature to influence HLM in general. I hope this study will fill in a gap left by the current focus of research on formal HL education and will also be a contribution to the vast research of HLM that has had qualitative methods as a tradition.

With the above methodologies, this study investigated the factors that influence the HLLs' language choice behavior, namely, whether or not they speak their HL (Chinese in this study). HLM refers to both retention of use and proficiency (Fase, Jaspaert, & Kroon, 1992). Although there is the possibility that language use and language proficiency may feed to each other, the rationale of this study places more emphasis on language use. First, language

proficiency is our ultimate goal in our HL learners, and we need to study the means to achieve the goal. Further, research literature does reveal that to acquire the skills in a certain language one must engage in the use of the language – what is called output in the field of second language acquisition (Gass & Selinker, 2001; Swain, 1995). It is no less so with HLM (Kim, 2006). I expect that the findings of such a study on language use will contribute to the knowledge of parents, educators, and other stake-holders on how to better help with HLM.

CHAPTER 2 LITERATURE REVIEW: FACTORS INFLUENCING HLM

This section discusses what factors have been revealed by literature to influence HLM and the reasons why it is necessary to approach HLM research with the new methodologies of social network analysis (SNA) and multilevel modeling (MLM). It is argued that the literature has provided us a case-based, complex picture of the factors influencing HLM, which makes it difficult to guide specific actions at individual or community levels. In addition, specific to this study, the dynamicity of Chinese immigration and immigrant communities also requires new methodologies to measure the new realities.

A Typology of Factors Influencing HLM

Edwards (1997) suggested a typology (see Figure 1), in which there are two major inter-related factors that influence HLM - one tangible and one more subjective. The first is the continuing existence of important domains within which the use of the language is necessary. These domains further depend upon social, political, and economic forces, both within and without the particular language community. "Although the details will clearly vary from case to case, of general relevance are issues of linguistic practicality, communicative efficiency, social mobility, and economic advancement. These four notions are the greatest advantages associated with 'large' languages, and the greatest disincentives for the maintenance of 'small' ones" (p.35). The other, more subjective, factor influencing HLM is the matter of collective will to stem discontinuity, to sustain vigor in the face of the elements just discussed. Edwards added that this subjective factor is related to the larger question of ethnic identity.

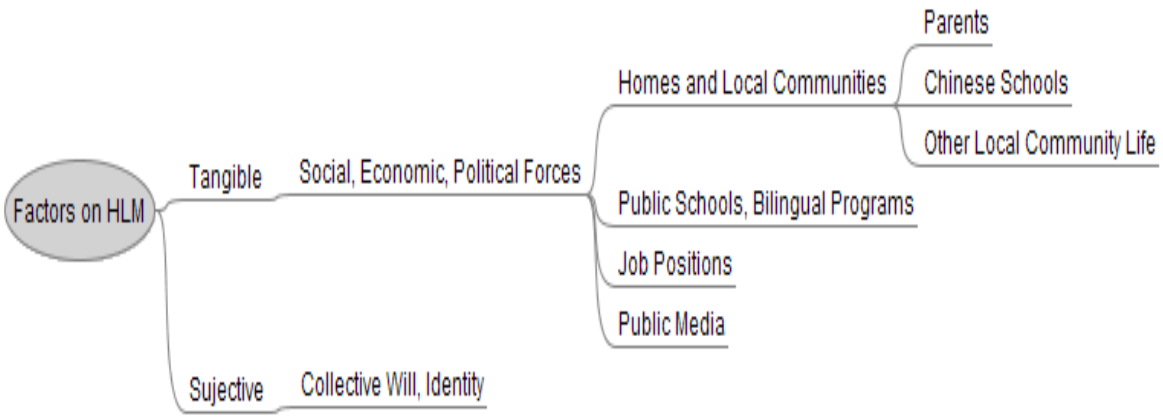

Figure 1. A Typology of Factors Influencing HLM

Note: produced through the concept mapping tool FreeMind based on Edwards' (1997) descriptions.

A side note may be meaningful before I go into a detailed literature review following this typology. Through Edwards' wording, we may recognize that this typology seems to serve the purpose of HLM at the macro-society level, aiming at the maintenance of "the language" that is "small" and at the weak side compared to the dominant language. Although in my study I will take an individual approach to exploring the factors influencing individuals' HLM, I believe Edwards' typology may still serve as a good start.

Next, I review research literature by following each line of these two groups of factors influencing HLM.

Tangible Factors: Families, Communities, and Institutional Support

In the group of "tangible" factors are those that affect the domains in which language is used – homes and local communities such as weekend schools, public schools or bilingual programs housed in them, job positions, public media, etc. As this study intends to investigate the environment of HL for pre-college students, then the domain of job positions is not considered. Bilingual programs housed in public schools etc. are considered under one term –

institutional support. On these tangible factors, literature is found to have revealed a complex picture, and sometimes inconsistent findings.

The Unique Functions of Family and Community

Perhaps there is least disagreement about the importance of the domain of family and its closest community for intergenerational transmission of HL. Baker's (2008) equation of European revitalization of minority languages and Fishman's (1991) Graded Intergenerational Disruption Scale for his theory of reversing language shift have both treated this domain as a fulcrum stage. This is because home, and the world a little beyond it – the larger family, neighborhood, and immediate community – are where the set of daily processes and interactions happen, and are therefore the essential foundation of all elements of language planning to encourage family language reproduction, and use of the minority language in early childhood and beyond for as long as possible.

The center of the domain is parents. Various strands of research have all alluded to the important role parents can play in HL learning and maintenance (G. Li, 2006c). Fishman (2001b) more exactly pinpointed women of child-bearing age using their ethnic language to their children as the critical moments of intergenerational language transfer.

Parents' role includes but is not limited to choosing a language or making a language policy for interactions with children. Parents, in the family they organize, provide the most basic elements for a child to function successfully in the society - self-identity, group identity, sense of responsibility to self, family, and community, the understanding of success and failure, and so on – each and every aspect of a man's (person's) first years of development (Fillmore, 2000). While thoughtful educators are making every effort to create meaningful, purposeful, and authentic reasons for learning a language as a dialog in a social context in

classrooms (Sehlaoui, 2008), those meaningful, purposeful, and authentic reasons exist exactly at home.

Such transmission of the minority language within the family provides a potential for continued participation in the minority language in later years including employment, social networks, mass media, and even further, the formal education of HL at college. Many studies and accounts by the scholars' own stories, e.g. Fishman himself and Sehlaoui (2008), have proved that the disruption of the intergenerational transmission linkage at this level is the start of failure in HLM. Therefore, "the potential has to be realized to the extent that the minority language is lived and not just loved, activated in everyday life and not just a passive ideal" (Baker, 2008, p. 106); families and immediate community as a domain must be protected before we hope for any influences from institutions and larger social environment.

The literature reveals, however, that there exists great variation within families and their local language communities, and that parents, by themselves, may be insufficient in the long run even if they are effective in short term or keep trying to exert influences. Parents are the main factors but not the only factors that may influence HLM. Within families, siblings have been found to talk to each other mostly in the dominant language (De Houwer, 2009) despite parents' positive attitude to and action in speaking the heritage language (Kuo, 1974, as was reviewed in Luo & Wiseman, 2000). In addition, families are not independent of other domains of the society. For social or personal reasons, parents may not hold positive attitude towards HLM; even if they do, they may not be able to turn their positive attitude into effective actions (G. Li, 2006c). This is why, even when they all seemingly have positive attitude toward HLM, families have often been observed to have achieved differently.

In short, the domain of families and their close communities may be the most important but there exists great variation in terms of the process and the result. As an effort to explore this domain, this study collected data about parents' attitude towards HLM, their education, family income, etc. I will make more discussions about these specific factors in Chapter 3. And I will discuss attitude in more details in the section of Subjective Factors in this chapter.

Tangible Factors: Weekend HL Schools

Weekend HL schools can be considered as the domain closest to the family and even part of the closest community because it has been a natural phenomenon of almost any ethnic minority group to set up its own HL school. Every ethnic group has the instinct to pass on its culture for which its language is the most natural carrier (Garcia, 2003).

Many studies have reported the positive effects of HL schools either qualitatively or quantitatively. A latest example of such studies is Chinen & Tucker (2005), a study of Japanese HL learners, where the authors demonstrated significant correlations among all three variables in question - ethnic identity, Saturday school participation, and HL development.

But the findings about the effectiveness of HL schools are inconsistent. Kim (2006) did not find significant relationship between the length of Korean language instruction at Korean HL schools or at university language classes and the participants' demonstrated proficiency in Korean; some of the low HL proficiency students even expressed that weekend Korean HL schools that they had attended were not helpful. While Man (2006) found that there was positive relationship between a child's pleasant experience with Chinese classes in Canada and the child's frequency of speaking Chinese at home, in school, and outside home and school, Man also found that as many as 36% of the surveyed students were "neutral or indifferent to the classes, citing that the quality of the learning experience in HL classes was

not so attractive" (p. 223), and that as many as 16% of the students rated the HL classes as "unpleasant" or "very unpleasant." In response to this, Man called for curriculum improvement and warned that, unless such challenges are met, it would be difficult to achieve high level success in Chinese language learning that facilitate greater HL use.

If Kim's (2006) and Man's (2006) studies indicated weak effects of instruction in HL schools, Wang's (2003) ethnographic study of two after-school programs at a Chinese school had a finding about the real situation of interactions among students using Chinese language at the Chinese school - that the students predominantly spoke English to each other and to the teacher in the weekend schools, on or off class. Such a finding, in addition to revealing the sad fact that language shift is happening or has already happened, really casts doubt about the pedagogical and socio-psychological effectiveness of Chinese schools. Earlier, Wong (1988) warned that, without improvements on various aspects, Chinese schools run the risk of only serving some social functions such as fostering ethnic pride, social connection, and day care, none of which is the main purpose of weekend HL schools, or even necessarily related to the main purpose of language learning and practice.

In relation to this domain, the current study collected data about children-reported interactions in their HL Chinese in terms of social networks both within and without Chinese schools, i.e. in their life. It would be a different study to research into the instruction-related aspects; the current study was not intended or designed in that direction.

Tangible Factors: Institutional Support – Policy, Public Schools, and Bilingual Programs

Institutional Support refers to the support from such interrelated aspects as policy, public schools, and bilingual programs.

Language policies, either covert or overt, set the development process in motion. They also affect the status, and thus potentially the use for official and unofficial purposes, of both dominant and minority languages. A government's choices to forbid, permit, encourage, or require bilingual education is one important factor in minority-language maintenance, for instance. We can see the negative effect of disruptive educational policy in the example of Native American children being punished in boarding schools for speaking their own languages; this was one result of the United States government's effort to force Native Americans to assimilate to the dominant culture (Thomason, 2001). We can also see the positive effect of institutional support in the case of Canada. By surveying HL students about their HLM environment in Toronto, Canada, Man (2006) suggested that Toronto's excellence in terms of institutional support in the form of government policy, education, culture and the media has contributed towards HLM.

Similar to the effects of families and immediate communities, however, institutional support is not a guarantee of stability, either. Formal language planning on behalf of beleaguered languages, for example, often can do very little to stem the forces of urbanization, modernization, and mobility, the forces that typically place a minority language in danger and that therefore lead to language shift. A decline in the existence and attractions of traditional life styles also inexorably entails a decline in languages associated with them (Edwards, 1997).

Bilingual programs, normally housed in public schools, are usually the manifestation of policy support. However, such support may not be sustainable and the programs' effects are not straightforward or consistent. As Crawford (1992) pointed out, bilingual programs may cause potential political trifles and thus endanger their own survival. Their success also depends on the availability of resources such as qualified teachers and a detailed,

comprehensive curriculum plan (McGroarty, 2001). In addition, they depend on mainstream teachers' attitudes: schools usually play a conservative role and seldom work for the emancipation of a minority language (see Gorter & van der Meer, 2008 for comment on Frisian language in the Netherlands); most teachers do not think HLM is in their range of work but think the major work is to let students graduate (Lee & Oxelson, 2006). Pressures from other policies like No Child Left Behind in the U.S. push teachers even further away from the inclination to support HLM (Abedi, 2007; Crawford, 2007; Lee & Oxelson, 2006; Ray, 2008; S. J. Shin, 2006).

In addition to the above troubling issues, a somehow saddening observation is that even a policy that supports bilingual education may actually not be as supportive for HLM as it seems to be. For an example in the U.S., even from its inception, the Bilingual Education Act of 1968 approached language diversity as a problem rather than a resource, placing a strong emphasis on the English aspect of bilingual programs, aiming to replace the immigrants' HL with English in the end (McKay, 1997).

Similar to other aspects of schooling, or perhaps more so, success of bilingual programs also depends on support from families and communities. Even if a program is established, it is still hard to succeed without the support of the HL students' families (Fishman, 1991) and communities in terms of specific support related to language acquisition itself. A heavy research literature points to the importance of the ethnic families' own positive attitudes toward their HLs (Fishman, 2001a), their family language policies (Kim, 2006), cooperation with teachers (Fillmore, 2000; G. Li, 2006c), activities that involve both adults and children (Fishman, 2001a), and so forth. Consequently, it is meaningful to turn to the discussion of the subjective factor – attitude towards HLM.

Subjective Factor: Speakers' Own Attitude and Its Complex Relationship with Tangible Factors

From a broader perspective, speakers' attitudes are ultimately responsible for the failure, or success, of other substantive predictions about contact-induced language change (Thomason, 2001). Using examples of two villages of two different native languages in Mexico, Thomason demonstrated that the language whose speakers had easier access to the dominant Spanish had, surprisingly, undergone much less interference than the language whose speakers had less access to Spanish, and that the reason for this seemingly abnormal phenomenon lay in the speakers' attitudes toward the dominant Spanish.

The attitude to HL can be positive, negative, or somewhere between positive and negative. Some people believe in the alchemy of English (Kachru, 1986), regarding English as the utmost important sesame code to open the door to economic and social betterment, and therefore considering their HL to be unimportant (e.g. the second village in the above example given by Thomason, 2001), or not so important although they might still "wish" to maintain their HL. Some people are still loyal to their identity in terms of culture and language (e.g. the first village in the above example given by Thomason, 2001). The loyalty can be due to various reasons. But finally it is reflected in the choice made by people. For example, "Thonga women, especially the older women, resist this shift, because women have a higher status in Thonga than in Zulu culture, and the difference in status is reflected in the languages" (Thomason, 2001, pp. 22-23).

The interactions between tangible and subjective factors are very complex so that it is hard to state a straightforward relationship between either group of factors and the actual result in HL speakers' language choice or proficiency.

On the one hand, as was previously reviewed, parents/speakers' attitude towards HL seems to be very critical and can deflect the influences from any other factors. On the other, it seems that the pressure or lure in the society finally may also make people who wish to speak or actually speak a HL not necessarily transmit it (Fishman, 2001), namely that attitude can be deflected by many other factors (Cummins, 2008). The former case can be demonstrated by many of the examples provided by Thomason (2001), as was previously cited. The latter case is demonstrated by the parents in Li's (2006c) ethnographic study of Chinese immigrant families' home literacy practices, in which parents used various strategies and resources for HL, but experienced various barriers in fostering children's positive attitudes toward HL learning and were finally found to have acted away from their beliefs.

One of the barriers mentioned by Li (2006c) was also observed in some other studies that termed it as parents' dual expectations of their children. That is, parents would like their children to be able to speak their heritage language; on the other hand, however, they also expect their children to excel in the mainstream schools and the society. It is these dual expectations that place both parents and children at a cross-road, facing a dilemma and the challenges of maintaining comfortable bilingualism (Luo & Wiseman, 2000; Ou & McAdoo, 1993).

One side of such a dual expectation (usually the side that leads to achievement in the dominant society) may often, if not always, prevail over the other. The declining achievement of Irish in Ireland (Harris, 2008) is an example. According to Harris, the Irish parents seemed to hold a kind of hands-off attitude to Irish, leaving everything to the schools. However, "It is not that these same parents are unconcerned about their children's progress or that the wider Irish public are not concerned about the language … It is just that for personal and historical

reasons many parents are not engaged with Irish, or with their children's learning it, in the same way as they are engaged with other subjects" (p. 64).

After having reviewed Lambert's (1960) study of language attitudes in Canada, Lynch (2002) considered the relationship between HL attitudes and actual language proficiency and use to be 'a bit of a labyrinth' that deserves careful exploration (p. 10). This is no coincidence, and is indeed what this literature review has revealed. For this reason, parents' and children's attitude toward HLM is also a heavily discussed sub-topic in the current study.

Towards New Approaches to HLM Research

The Need for an Individual-Oriented Approach

The previous literature review of factors influencing HLM has revealed a complex picture - everything seems to play a role, and there seems to be a cycling relationship among the so many factors found in literature. As Li's study of multilingual literacy (2006a) and Lynch's review study of HLM pointed out, factors such as parents' perceptions of their minority status in the host society, their attitudes toward the role of heritage language and their own proficiencies in the dominant language, several school and societal factors, such as quality of instruction in heritage language schools, language policies in the mainstream schools, and the media, and social variables such as generation, gender and social class - all played an important role in shaping the children's language choices and patterns of use at home.

While the above complex picture could inform us of the complexity of the issue, especially at the society level, and could also serve as a comprehensive list of factors influencing HLM, more research is needed to make it easier for stake holders, including common people such as parents and their close communities, to figure out what needs to be

done and what can be done by themselves. Some researchers focusing on family literacy call for institutional support (e.g. G. Li, 2006a), while some researchers focusing on institutional support call for positive attitudes and effortful practices from within families and communities (e.g. Fishman, 1991). Out of this cycling research and pursuit of factors, we need to realize that it is the individual that loses the ability to use the language (Fase et al., 1992). Therefore, we need go beyond the general discussion of what factors influence HLM at the group or society level, deeper into the environment of the individuals to see what factors influence their HLM behavior most directly and what relative relations these factors are in. Due to this reason, this study will not seek to account for the relation of language choice or code switching to the broader social, economic and political context, as Li Wei did in the study of Chinese communities in England (Li Wei, 1994), although it would be possible to make some arguments like Li Wei's if a sociolinguistic conceptual framework like his was adopted. For this purpose, this study has defined children's HLM environment to be one that is mainly composed of children's families (therefore these families' characteristics) and of people that interact with children linguistically. To study children's HLM environment in this sense, this study considered and explored the potential in combining the individual-centered egocentric social network analysis and the quantitative method of multilevel modeling. It is my hope that the findings should help depict a more accurate, dynamic picture that is more meaningful when stake-holders consider appropriate actions for the individuals in HLM. Social network analysis as both a conceptual framework and an analysis methodology will be further discussed together with the quantitative method of multilevel modeling in Chapter 3.

The Necessity to Address the Dynamic Ethnic Profiles

Educational research attempts to solve problems (Anderson, 1998). The populations related to our problems – minority people, especially immigrant groups - are characterized by dynamicity, both spacial and temporal, both within themselves and in relation to the different aspects of the macro social environment in the host country or even their homelands. This dynamicity in each specific population needs to be addressed for pertinent research findings even if generalization is one of the ultimate goals. Next I demonstrate with Chinese immigrants in the U.S. how some new characteristics of this population require updated research through new methodologies.

The past two or three decades have witnessed larger scales of Chinese immigration. According to the U.S. Immigration and Naturalization Service (2000), more immigrants were admitted from China mainland, Hong Kong, and Taiwan to the U.S. in the 1980s than the two preceding decades combined. This trend of growth was throughout the 1990s, and it was estimated that the net immigration of the non-Hispanic Asian and Pacific Islander population, of which Chinese population is a major part, is expected to be highest than any other group through the year 2050 (U.S. Bureau of the Census, 2000, as cited in Buki, Ma, Strom, & Strom, 2003). This trend is reflected in the figure of population (5 years and older) speaking a non-English language at home. By 2007, although the Spanish-speaking population was still the largest, the Chinese-speaking population reached almost 2.5 million, which is a 290% increase compared to the 1980 report (H. B. Shin & Kominski, 2010). An intuitive response to these changes is more optimism about Chinese HLM. But it is still a question that deserves investigation.

In addition to the scale of immigration, other characteristics of Chinese immigrants or immigration also call for updated research. The high educational qualification of Chinese

immigration in recent years has been repeatedly reported (e.g. in J. Li, 2001). Their proficiency in the mainstream language (English) may change problems found in the past and create new problems. The educated parents can speak English, so communication with children is no problem. Therefore, the emotional problems in the traditional Chinese families due to family members speaking different languages as described by Fillmore (2000), may not exist anymore. On the contrary, while educated parents may hold positive attitudes towards speaking Chinese, one common scene is that children listen and understand in Chinese but speak English in return (Kuo, 1974; Luo & Wiseman, 2000), which is really a mono-mode bilingual phenomenon. In this case, there is the high possibility that the new immigrants' children get easily adjusted into the mainstream schools and meanwhile keep good emotional relationship with parents in English, thus the possibility, in the long run, that children's HL is lost at a faster speed. Therefore, the effect of parents' educational background deserves further research.

The economic success of China in the past two decades could have influenced the ethnic identity and language attitudes of Chinese immigrants in their host countries. Not necessarily do they make the major decisions of returning and residing in China as those students just studying abroad may easily do; but those who speak Chinese are regarded valuable as a result of increasing job opportunities in China and other parts of the world that have economic connections with China. This "economic advantage and social prestige have become major incentives for language maintenance" (Man, 2006, p. 214). As was previously reviewed, there may be different reasons for HL choice and maintenance; that is, various factors may lead to the same positive or negative attitude towards HLM. Although this study is not going to explore the details of these reasons or factors, the economic reasons reviewed

in this section could be an important part of the dynamicity that entails updated research into Chinese immigrants' HL attitude.

To complicate the situation, the great advancement of communication technology in the past decades has started to play a role in HLM. There might be digital divide in Chinese immigrants as well, which I will discuss in more detail in the section explaining the survey design. But generally, technology is considered a factor that may positively influence HLM if the content or information is delivered in a HL. Traditional media such as newspaper, radio, and television have been something significant in Chinese communities; contact with media in HL may affect individuals' use of HL through the mediation of social-psychological variables (Man, 2006). More recently Internet-based communication technologies have also drawn researchers' attention (Lee, 2006) and Chinese immigrants have been reported using such technologies to communicate with the people back in homeland . Such connections provide authentic opportunities to use the language and support the development of a social network of speakers of that language which then results in greater socio-psychological attachment to the HL and culture (Lee, 2006, also see Li Wei, 2000 and Warschauer, 2000).

Finally, U.S.-born Chinese are also changing the picture of HLM. Growing up with the support of older generations, newer generations of American Chinese are moving out of China town or communities. In addition, the gap between the middle class and the lower class among American Chinese is also increasing (Pan, 1997). In such situations, the advantage of ethnic vitality may not always be available for the children in these families, and thus their attitude toward heritage language and culture may be even less positive.

To help guide the current effort of HLM, we need research into the changing and changed situations of ethnic groups in the U.S. For this study, it is Chinese immigrant

children. As a group, Chinese immigrants are in situations that are no less complex than other groups; in this regard, and as previously suggested, we need approaches that may help us to explore the dynamicity of factors interacting in and around this complex community at the individual level in a systematic way instead of doing individual case analysis. Chinese immigrant children themselves also vary in terms of the level of HLM; in this regard, we also need collect data on a large number of children (De Houwer, 2009). In response to these needs, this study considered the combination of social network analysis (SNA) and multilevel modeling (MLM). The detailed discussion of SNA and MLM in the next chapter will further illustrate why the combination of SNA and MLM holds great potential in answering the question of what factors influence HL speakers' language choice.

CHAPTER 3 THEORETICAL FRAMEWORKS AND ANALYTICAL METHODOLOGY

In Chapter 2, starting with Edwards' (1997) typology of factors influencing HLM, the literature review of this study presented us a long list of factors that work in one way or another and each of which is essential but insufficient and even sometimes results in research findings that seem to be contradictory to us. There is still a lack of a clearer picture of the dynamic and intricate relationships between the factors, particularly those factors probably more directly related to the individuals, that may ease our concern of such complexity and unpredictability (Thomason, 2001). Both this complexity in HLM as a general phenomenon for all ethnic groups and the specific situations of Chinese immigrants as a result of the changing and changed social realities have led us to the challenge of analyzing children's HLM environment through new approaches. I suggested the combination of SNA and MLM, which I shall introduce and discuss in more details in this chapter.

SNA and Its Advantages

The Need to Analyze Social Networks

Language orientation/choice is strongly connected with and shaped by the types of social contacts they have (De Houwer, 2009; Li Wei, 1994). This influence manifests itself both at the macro level - speaking different languages to different people, and at the micro level, where the whole linguistic repertoires of the speakers depend to a large extent on their socializing environments (De Houwer, 2009). This is exactly what Romaine (1995) recognized when linking HLM to the field of second language acquisition research: "what is 'critical' about second language acquisition is not age so much as the circumstances in which it takes place" (Romaine, 1995, p. 240, as was cited in Lynch, 2003). Identifying with

Romaine, Lynch (2003) further pointed out that what is more important is not *how* the speakers are sociologically defined – by their age, gender, social class, or the generation of immigration – but *whom* the speakers speak to. If we take also into consideration another aspect of Li Wei's keen insight that speakers' language use is not only influenced by but also actively contributes to the social relations which speakers maintain (Li Wei, 1994), we can come to the conclusion that speakers' social networks deserve our deeper analysis on the question of what factors influence HLLs' HL use and proficiency.

As a reflection of such recognition of social network's importance in theory, SNA as a methodology has thus gained foot in social science research in recent years.

The Advantage of SNA

SNA was initially developed by anthropologists as a means to examine complex social interactions. Considering the need to analyze social interactions and the original closeness between language issues and anthropology, it is not difficult to understand that Garcia (2003) listed it as one of the major methodologies in HLM research. While traditional approach cannot assess how individuals change their language or combinations of language to meet their needs of communication in a given environment for solving the problems of their everyday existence (Mitchell, 1986), Garcia suggested that SNA is particularly appropriate at the micro-society level. By focusing on the individual's actual interactions, SNA permits a dynamic interpretation of social structure (Hampson, 1988).

Specifically, the power of SNA lies in its focus on the attributes of *relational links between* individuals rather than the *attributes of* individuals (Graham, 2001). In SNA, the individuals are usually called nodes, and the relationships between the nodes are called edges. While theoretical linguistics may have tended to view language as a feature of the nodes,

sociolinguistics taking the perspective of social network may view language as a feature of the edges (Graham, 2001). Similarly, towards the application of SNA to ethnolinguistic research, Milroy and Li Wei (1995) pointed out that social network can account for patterns of language choice more economically than the other, related, variables, such as generation and gender (also see Li Wei, 1994), in that it illuminates the behavior of apparently anomalous individuals as well as that of speakers who fall into the expected groups.

In short, SNA meets the need to assess the impact of the other people in the child's environment (Hampson, 1988) and the need to connect the analysis of individual children's language use behavior perhaps to the macro-society level if we view social networks as forming in response to social and economic pressures (Li Wei, 1994). Next, we discuss a subcategory of SNA that exactly meets the needs of this study.

Ego-centric Network Analysis (ENA)

There are two distinct approaches to SNA. One is the socio-centric (whole) network approach, involving the quantification of relationships between people within a defined group, with the focus on measuring the structural patterns of those interactions and how those patterns explain outcomes.

The other approach is the egocentric (personal) network approach, almost always about people rather than about groups. An egocentric network comprises the people (referred to as *alters*, the ENA name of *nodes*) that a person (referred to as *ego*, another kind of nodes) knows. With its focus on individuals, ENA has been more germane to studies of community than the socio-centric network approach ("Social network analysis," 2011).

Comparing the features of the above two SNA approaches, we may find ENA is more appropriate since this study is about children's HLM environment, which is composed of

people that exist in a child's social network representing different domains of life as were demonstrated in Edwards' (1997) typology of factors influencing HLM. In ENA's terms, each child is the *ego* in his network, everyone else in his network is an *alter*, and the relationship between every two alters or between one alter and the ego is a *tie*. These three terms will repeatedly appear in the following sections.

Previous SNA Studies of Specific-Language Maintenance Situations

Through the introduction to SNA's root in ethnography and sociolinguistics, we may be aware that the concept of SNA is not a new one. Bearing in mind the linkage of HLM to bilingualism and to sociolinguistics, we find it not difficult to understand the integration of SNA into the investigation of language maintenance and/or shift (Stoessel, 2002). In this section, I present a review of several studies heavily or peripherally applying SNA to their bilingualism or HLM studies, which will lead to a discussion of what needs to be added upon this foundation.

The work of Allard and Landry (1992; Landry & Allard, 1992) is a good example of applying SNA with a comprehensive model of language maintenance or bilingualism as background. Specifically, they combined societal and individual factors affecting attitudes toward language maintenance or shift in a model set out to account for additive versus subtractive bilingualism for school-aged children in francophone and Anglophone areas of Canada. Similar to Edwards' (1997) typology, which has such tangible factors as social, economic, and political forces, Allard and Landry's (1992; Landry & Allard, 1992) model has the sociological level that include such factors as demographic vitality, the degree of control of the economy, the degree of political power and the cultural capital of each community. Allard and Landry suggested that these factors interact and provide the social

settings that largely determine (at the socio-psychological level) the quantity and the quality of the opportunities for linguistic contacts in both L1 and L2 for members of both communities. It is these opportunities that constitute the individual's network of linguistic contacts (INLC). The language experiences within the INLC will influence both language proficiency and the individual's beliefs about language and then the individual's willingness to use and learn the language. Finally, language behavior - the use of the language – feeds back to INLC. In short, language behavior is both a part of the social network of contacts and the result of past experiences within the network (Landry & Allard, 1992, p. 230). We previously cited Li Wei (1994) about the reciprocal relationship between speakers' language use and their social networks. Actually such common conceptualizations may serve as the common ground for all language choice studies.

In actual studies, Allard and Landry measured the interpersonal contacts with a questionnaire covering L1, L2 and L1/L2 networks. Simply speaking, the social contacts were classified as L1, or L2 speakers. The networks could be L1or L2 networks, or mixed networks. In their correlation tests of hypotheses regarding the relationship between social networks and types of bilingualism (i.e. subtractive vs. additive), Landry and Allard (1992) made use of two scales: the proportion of francophones in the interpersonal network and the proportion of anglophones in the interpersonal network. In SNA terms, these scales measured the structural dimensions of social networks. Based on their data, Landry and Allard concluded that the percentage of L2 contacts in the majority group individual's network strongly correlated with the individual's proficiency in L2, which finally led to additive bilingualism; for a minority group individual, additive bilingualism depended upon retaining the percentage of L1 contacts in the individual's social network – otherwise, subtractive bilingualism would be the result.

Reviewing the work of Allard and Landry (1992; Landry & Allard, 1992), Stoessel (2002) suggested that the phenomenological experience of the individual has to be and can be taken into account more strongly for the study of HLM, as it is this experience that will shape present and future actions with regard to language maintenance and/or shift. Stoessel then studied the phenomenological experiences of ten immigrant women in the United States. Stoessel focused on two social networks of individual immigrants, the old home-country network and the one in the new linguistic environment, to investigate how the social network, in both its qualitative and quantitative components, stands in relation to the degree to which an immigrant can be called a maintainer or shifter in the new language environment. Similar to Allard and Landry's findings, the result was that there was a strong association between maintenance ratings and the ratio of L1 and L2 speakers in the speaker's secondary network in the US.

Adapting Stoessel's (1998) and Cochran et. al.'s (1990) questionnaires, Hulsen, de Bot, and Weltens (2002) investigated the relationship between sociolinguistic processes of language maintenance/shift and psycholinguistic aspects of language processing in three generations of Dutch migrants in New Zealand. This study is more of SNA in nature. The questionnaire consisted of three main parts: the first part having the informants to list all people who are important to them in different domains of their life (i.e. family, friends, etc., in the host or the home country); the second part investigating the multiplexity of the contacts (emotional, practical, or informational); and the third part focusing on the intensity of the contacts, i.e. the extent to which a network member is important to the informant, which was used to distinguish the primary network from the non-primary network. Together with social networks data, Hulsen, et. al. collected data concerning the informants' language use,

language processing, and attitudes toward first-language maintenance. The finding related to SNA is that the social networks of the informants reflect the fast pattern of language shift found in the Dutch community, with the number of HL contacts in the social network positively related to the informants' attitudes toward HLM. In addition, contact with HL speakers in the country of origin was also found to be essential in HLM.

Man (2006) did a study of Chinese immigrant students in Toronto, Canada. Although Man did not use the term of social network analysis, she did collect social network data in addition to other sociolinguistic or sociopsychological variables. Students were asked how frequently they spoke Chinese in three different environments---at home, in school and outside home and school; language spoken by others to students; student language use, all in percentages. Four interpersonal factors were examined: (a) the proportion of Chinese speakers in the students' network; (b) the frequency of contact with such speakers; (c) the quality of the contact; (d) the stability of the contact. The results reflect that (a) it is the older people, i.e. grandparents, parents and relatives, who use much more Chinese than English; (b) the family network is very important in the use and maintenance of the L1.

Finally, but not the least important, I believe a review of Li Wei's (1994) work can be a bridge to my discussion of what needs to be done next. Li Wei's work was in time between Allard and Landry (1992; Landry & Allard, 1992) and Stoessel (2002), but I did not review his work in between the latter two projects because I did not want to disrupt these two projects' connections. Li Wei, however, is also widely recognized for his studies applying SNA, especially *Three Generations, Two Languages, One Family: Language Choice and Language Shift in a Chinese Community in Britain*.

The focus of Li Wei (1994) is on *language choice* and is on the language choice behaviors of different generations of *Chinese immigrants*. In this sense, Li Wei's study is perhaps the closest to my study. His subjects were 58 speakers from ten Tyneside Chinese families in the northeast of England. Employing a combination of participant observation and ethnographic interview to collect information on individual speakers' network ties, Li Wei analyzed three types of social networks: exchange networks in which the ego and his alters form reciprocal relations, interactive networks in which the ego interact frequently with but does not rely on the alters for personal favors or resources and support, and passive networks in which the ego value his alters as a source of influence and support but does not often interact with them. This analysis revealed persistent correlations between language use/language ability and social network structures. For example, those who maintained a Chinese-dominant language choice pattern forged strong exchange networks with other Chinese in the community even though they had plenty of opportunities to interact with non-Chinese people. Li Wei concluded,

"… social networks affect and are affected by their members' language behavior. On the one hand, social networks of individual speakers constrain their opportunities to learn and use particular languages or language varieties; on the other, use of certain language or language variety can contribute to the development of network contacts of individual speakers. Other speaker variables such as age and sex apparently do not have similar dialectic relationships with language, although they are associated in various ways with speakers' language choice and language ability" (1994, p. 180).

Despite these great insights, however, Li Wei's (1994) method of analysis for interactions between inter-speaker and intra-speaker variations in language choice is a source

of concern. He used what was called the *implicational scale technique* – "The basic idea was to rank both the speakers (social dimension) and interlocutors (style dimension) according to the choices speakers made so that we could differentiate fairly clearly not only speakers who made the same choices but also the same speaker's varying choices with different interlocutors" (p. 144). A further look at the scales he developed using this technique (pp. 146-149) tells us that this is essentially an eye-ball observation technique although it made it much easier for observation than the days when this technique had not existed. But to carry out more accurate analysis about the effects of the interlocutors and explore how speaker variables such as age and SES interact with social network in their effect on language choice, we need more powerful quantitative analysis methods that have developed in recent decades but did not yet exist before Implicational Scale came into being or was widely applied to sociolinguistic research[2]. Li Wei himself also called for more sophisticated and systematic procedures such as the General Linear Interactive Modeling he mentioned in his 1994 work that he was planning to use (p. 186). But as far as the current study has reviewed of the research literature, this desired methodological advance does not seem to have been achieved[3] either by his team or by other researchers such as those reviewed by this study earlier in this section.

In addition to the above need for major advancement of analysis technique, some aspects of variable construct or data elicitation in Allard and Landry (1992), Stoessel (2002), and Hulsen, de Bot, and Weltens (2002) also deserve discussion. For example, a "native

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[2] Please refer to Rickford (2003) for more information about the Implicational Scale.

[3] Dr. Li Wei confirmed in an email exchange on 09/26/2011 that his planned project did not go far and ended with no publication.

Chinese speaker" may also be one who is proficient in English and who may not always speak Chinese to his or her child; therefore it is necessary to elicit data that tap into the details such as the proportion of the time he/she speaks Chinese or English. Meanwhile it is not enough to just carry out correlation tests, like in Man (2006), without addressing the complex interrelationships among the so many variables, among which is the important one between whole-network characteristics and the variables at the individual level. Particularly, whether, and to what extent, one's language environment influences his or her language choice is a question that needs an answer with hard evidences.

To address all these concerns, this study explored the power of SNA and MLM at the same time. Combining SNA and MLM was innovated by Wellman and Frank (2001) in their sociological study of social support. In the following section, I make a brief introduction to Wellman and Frank's study as a prelude to the presentation of this study's methodology.

Social Support and Language Social Support in Social Networks

In the process of developing the methods to investigate children's HLM environment, I have taken the above studies into consideration especially in terms of the items in the questionnaires, since the basic research questions are similar: the relationship between HL use/proficiency and the social network and other characteristics in the speakers' social environment. However, a study outside the research field of HL maintenance and bilingualism – the sociology study of Wellman and Frank (2001) on social support – came to help on two aspects: its efficient instrument in eliciting data about a large number of children and social networks, and its analytical method of combining SNA and multilevel modeling.

Wellman and Frank (2001) and Wellman's earlier works (1979) did ego centric network analysis on their questions about social support. When people need help, quite often

they obtain it through their personal community networks---supportive ties with friends, relatives, neighbors and workmates. Such ties supply 'network capital,' with the network member providing multiple dimensions of support including but not limited to emotional aid, material aid, information, companionship, and a sense of belonging, which is the multiplexity mentioned in the above mentioned study by Hulsen, et. al. (2002). The social support is one of the main ways that households obtain resources to deal with daily life, seize opportunities, and reduce uncertainties.

It is meaningful to connect this concept of social support to building a supportive social environment for children's HLM. First, we definitely want this environment to be a supportive one if our ultimate purpose is HLM. A supportive HLM environment is one in which people around children are encouraging through positive attitude and/or by means of speaking to them in the related heritage language. Whatever strategy is used, we need to be sensitive to children's needs and be well ready to support their efforts to talk about every aspect of life including that in their American/English schools (De Houwer, 2009). In short, for HLM to succeed, we must encourage and engage in the use of HL in as many domains of life and work as possible (Edwards, 1997).

Second, language is the tool of communication that almost always accompanies the kinds of help in the social support studies like that of Wellman and Frank (2001). This is where we can take actions about rather than just hope for HLM in daily life. Simply, we cannot live without language, in a general sense. Our purpose is not to study the social support relations as were studied by Wellman and Frank, but, taking the first point also into consideration, we may view each life-support relation with a target language feature (Chinese, in our case) as a language social support relation, and we may study these relations to assess

the degree of HLM support the children receive. Specifically, we may study the language use on each relation between a child and a person in the network speaking English or Chinese to him or her.

Following this conceptual connection of social support and language support, we find that not only can Wellman and Frank's instrument to elicit network data be easily adapted for use in this study but their multi-level modeling (MLM) method can be applied, which may then be a major advancement expected by Li Wei (1994). How Wellman and Frank's (2001) instrument was adapted for this study will be introduced in the section of Methods. Here it is appropriate to introduce how Wellman and Frank creatively integrated MLM into SNA.

MLM Applied to SNA

After having elicited data using questionnaires on social networks, previously reviewed studies dealing SNA and HLM have mostly analyzed data either through qualitative description or through basic statistical methods such as Pearson's Correlation to explore the relation between language behavior and each other variable construct. While the significant correlation efficient may shed light on our knowledge of the relationships among the variables, the lack of controlling the interactions between other variables than the variables in question, a correlation may be easy to detect and the effect of a variable may be over-assessed. Regression-based MLM[4] has great potential in breaking these limitations.

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[4] *Multi-level modeling* has the same meaning as *hierarchical linear modeling,* which may be more prevalent in the literature related to statistics. I decided to use the former because the acronym of HLM for the latter may confuse the reader of this study, in which I use HLM for *heritage language maintenance*.

MLM methods were developed to deal with situations where, for example, every student is considered to be nested in a class, which is then nested in a school, and where variation across individuals bears the effect of variation across classes and schools. More related to SNA, Wellman and Frank suggested the following two advantages of MLM:

> *First, it provides estimates of the effects of variables at the individual, tie and network levels while controlling for effects at the other levels. Where it had been easy to mis-attribute tie effects to network effects (and vice-versa), the multi-level approach enables us to identify the relative strength of individual, tie and network effects on the provision of social support. Second, it captures elusive interactive effects of network capital by examining how the composition and structure of networks affect individual and tie supportiveness… (Wellman and Frank, 2001, p.227)*

MLM was not developed for social network analysis. But by using the method of MLM to reanalyze data in previous social support studies, Wellman and Frank (2001) proved the appropriateness of MLM for studying social network data. The creativity lies in twisting the traditional MLM a little bit to be suitable for SNA, or rather, re-conceptualizing the variables in SNA. Wellman and Frank counted the variables related to individual alters (people in the ego's networks) and ties (the relationship) as level-1 variables, and the variables related to the whole ego network (mostly means and percentages) and the variables related to the ego himself or herself (because it is the ego that defines a network) as level-2 variables.

In the current study, I may use level-1 model to address the question of language choice of the child with different interlocutors, similar to Li Wei's question (1994); but in addition to what Li Wei could do, I may quantitatively measure the extent to which some of the level-1 effects are influenced by the structural or family background characteristics of the child's

network although this study is not intended to address the macro-society aspects as Li Wei's sociolinguistic studies. Therefore, while SNA itself already has the capacity to address the effects of different levels and their interactions (Coleman, 1988, 1990), Wellman and Frank's (2001) MLM approach makes it possible to measure the effects more accurately.

Research Questions

After having reviewed the literature about factors that may influence HLM and about SNA and MLM as both theoretical frameworks and methodologies, we are now able to ask more specific research questions regarding factors that influence children's HL behavior. My thesis is that children's language choice is directly influenced by the people in his social networks and affected by some factors related to his family background such as parents' attitude, education, and social economic status. There may be interactions among these factors and they can be measured through MLM by being placed at different levels.

In order to better answer the above main question, it is interesting and logical to ask whether children's social networks work at all for the HLM purpose. Therefore,

Research Question 1: Does a social network in HL contribute to the child's HL proficiency?

To answer this question, a longitudinal design was applied to collect HL proficiency data twice with about 3 months in between.

For clarity of presentation, the major research question is rephrased as below:

Research Question 2: Who and/or what factors in a child's social networks and immediate environment may influence the probability of him to speak HL?

To answer this question, the previously discussed methodology combining SNA and MLM would be applied.

Methods

Informants

The informants were part of the students and their parents at two weekend Chinese schools in the Greater Detroit area – Ann Hua (AH) Chinese School and the New Century (NC) Chinese School. All together 55 children returned valid and matching packets of questionnaires for Time 1 and Time 2. Those who submitted only Time 1 or Time 2 questionnaires were excluded.

As Table 1 demonstrates, the youngest children were in Kindergarten in English school or Grade 1 in Chinese school, and the oldest children were in Grade 11 in English school or Grade 12 in Chinese school. The means of 3.7 and 4 show us that the majority of the informants concentrate in or around Grades 3 and 4. Among the 55 children, 50 were born in the U.S. or a non-U.S. foreign country (coded as 0), and only 5 were born in China (coded as 1).

Table 1. Children's Profiles

	N	Minimum	Maximum	Mean
American School Grade	55	.10(K)	11	3.68
Chinese School Grade	55	1	12	4.00
Dialect	55	0	1	0.96
Parent Ethnicity	55	3	3	3.00
Birth Place	55	0	1	0.09
Family Language (Policy)	55	0	1	0.93
Valid N (listwise)	55			

In addition, all these 55 children's parents categorized themselves as Chinese although a few of them spoke a dialect (coded as 0) and most spoke Mandarin (coded as 1)

These two schools were approached due to several reasons: 1) availability of a contact person in each school; 2) the relatively larger scale in terms of student population; and 3) the short distance from the researcher's university to these two schools.

Although these two schools were not selected randomly and therefore we need take caution in generalizing any of our findings, the student populations from these two schools do share some values that make any potential findings meaningful for HLM as a whole or at least in the U.S. First, they represent the main force of those who really want to maintain their language; otherwise, they would not have come to attend the Chinese weekend schools. Second, according to Chinese HLM research literature (e.g. Wong, 1988), weekend Chinese school is the major form in which Chinese immigrants provide heritage language and culture education to their children; some life experience in the U.S. may also inform us that most children attend Chinese school at weekend although there are exceptions. Third, children at Chinese school are also the population that our current effort focuses on (as was mentioned in the Introduction), i.e. the people we want to help. And fourth, their life represents the typical features of almost all ethnic American students – typically, the complex situation that "as soon as immigrant children reach school age, outgroup peer relationships increase and the maintenance of ethnic language is weakened" (Luo & Wiseman, 2000, p. 308). In this sense, by (accidentally) excluding those young kids who do not attend either Chinese school or American school (corresponding in most situations), we are approaching the reality closer.

In order to facilitate understanding the social environment of these two schools, I present below an introduction to the Chinese communities in Michigan and the Greater Detroit area.

Population of the Metropolitan Detroit Area

As of 2009, the population of the metropolitan Detroit area that covers the areas of Ann Arbor (where AH is located), Novi (where NC is located), and seven other adjacent counties or metro areas, was estimated to be about 5.3 million. There is no comparison found about the rank of this figure against those of other metropolitan areas in the U.S. But depending on what statistical areas are included, a few less inclusive figures about the population of the core areas of Metro Detroit rank it around the 10th place in the U.S. (Wikipedia, 2011b). Among the 4.4 million people estimated for the metro Detroit that covers Detroit, Livonia, Dearborn, Warren, Troy, and Farmington Hills, about 23 thousand people can be categorized as "Chinese alone or in any combination" (U.S. Census Bureau, 2010), about 0.5 percent of the total.

Population Speaking Chinese at Home

In the state of Michigan, the population age 5 and above speaking a non-English language at home is 9% of the total population, which is much lower than the 19.7% at the national level. But in terms of English proficiency, this population in Michigan is well above the national level, with those at "very well" and "well" (vs. "now well" and "not at all") being 81.9% compared to the national 75.7% (H. B. Shin & Kominski, 2010).

With New York, Los Angeles, San Francisco, and San Jose being the four largest metropolitan areas for the population of age 5 and above speaking Chinese, all other areas of the U.S. only constitute less than 50% of this population (H. B. Shin & Kominski, 2010). Considering this together with the statistics at the level of the State of Michigan, we may categorize Detroit metro area to the "weak" side in terms of macro "Chinese environment".

Chinese Communities: China Town?

Currently there is no "Chinatown" in a real sense as that in several other metropolitan areas such as New York and Los Angeles. As a result of "slum clearance" projects, the old Chinatown in Detroit growing between the 1920s and 1950s disappeared. Although "New Chinatown" re-formed at a different location in the early 1960s, safety concerns caused by high crime and unemployment rates throughout the 1970s and 1980s, especially fear related to the killing incidents of Tommie Lee and Vincent, finally resulted in Chinese Americans in this area moving their families and businesses to the surrounding suburbs (Wikipedia, 2011a). Meanwhile, older generations' hard work and sacrifice for their children's education helped with later generations' successes in every possible aspect in the U.S. society, which then economically enabled Chinese Americans to move out to safer places (Pan, 1997).

Therefore, the metro Detroit area may not demonstrate the characteristics of strong ethnic vitality as is demonstrated in other metropolitan areas where "Chinatown" may serve at least as a symbol.

Positive Signs of Chinese Vitality

The weak macro environment does not mean the Chinese Americans in this area do not form a non-residence-based community. The Association of Chinese Americans, the Detroit Chapter of the Organization of Chinese Americans (OCA), is said to be the only branch to have a fully operational community center as well as two satellite service centers (Wikipedia, 2011a).

Chinese schools, as in most cases about heritage language schools, also serve as venues where Chinese Americans meet as a community (Wong, 1988).

Ann Hua Chinese School is located in Ann Arbor, the home of the University of Michigan. While the percentage of "Asian persons" in all Michigan is about 1.8 according to

the 2000 Census, the percentage of "Asian persons" in Ann Arbor is 11.9 (U.S. Census Bureau, 2011). There is no further breakdown of the "Asian persons" category, but the fact of Chinese Americans being a major sub-group of Asian Americans (City-Data.com, 2011) may still help us estimate the overall meaning of Ann Arbor as the environment for Ann Hua.

New Century Chinese School is located in Novi of Michigan. The school is part of the Michigan New Century Chinese Center established in 2000, and a member of the Chinese School Association in the United States. The Chairperson of the Board Mr. Lianggen Zheng has been an activist for Chinese language and culture for many years.

Brief conversations with a few parents at both schools revealed that the University of Michigan and the auto industry in the metro Detroit area may somehow serve as indicators of many parents' educational background, a variable to which this study is very sensitive.

Instruments: The Survey

The survey is composed of two questionnaires (Refer to Appendices). The first is the main one, on children, to elicit the child's profile information and social network data. The second one is on parents, to elicit parents' information and their evaluation of several aspects of their children's HLM. Both questionnaires were administered twice due to the requirement of a longitudinal design for Research Question 1.

Children's Questionnaire, the Network Generator, and Major Variables Resulted

The major section of the children's questionnaire is what is called the network generator in SNA research. It would be impractical and unnecessary to ask the child to list all people in his network (Li Wei, 1994). After Wellman and Frank (2001), therefore, I asked the children respondents (or with assistance from parents) to provide information about at most eight people they often spoke to and felt closest to.

Here it is necessary to make an explanation about the wording of "often speak to and feel closest to," which is different from Wellman and Frank's "most intimate" in their social support study. Putting "often speak to" and "feel closest to" together was out of a concern about the relationship between closeness and the frequency of interaction. This is quite similar to Li Wei's discussion of passive ties "who for various reasons are physically distant … but who are still regarded as important relations" (1994, p. 119). There is the possibility that someone to whom one feels close (important) is not someone he often speaks to, and the possibility that someone he often speaks to is not someone he feels close to (important). Since my study is not intended as a sociological study, or not even a sociolinguistic one, but only a study of speaking as a relation, I went to the concept of frequency directly by adding it to the definition of close or by using it together with close. This would lead to some global understanding in the mind of the informants, but I believe this would be better than the situation where the informants offered information mainly about closeness rather than language behavior while our interest was in the latter.

The network generator is composed of five questions that lead the informant through the process of providing a list of eight people at most that they often speak to and feel closest to, arranging them in the order from the most frequent to the least frequent, and then estimating the frequency of the informant (ego) speaking to each named person (alter) face-to-face and by telecommunication, and the proportion of speaking Chinese/English in each direction, i.e. "speaking to" and "being spoken to". After answering all these questions for each named person, the informant is also asked to indicate in a "checking" table each pair of named people who talk to each other in Chinese.

The above process produces data for the following major variables:

Chinese Input: whether an alter speaks Chinese to the ego child. If an alter was estimated by the child to speak Chinese 75% of the time (usually) or above (almost always), then the alter was categorized as Chinese speaker, coded as 1; otherwise, 0.

Chinese Output (Dependent Variable): whether the ego child speakers Chinese to an alter in his network. If the child estimated himself to speak Chinese 75% of the time (usually) or above (almost always), then the child was categorized as Chinese speaker, coded as 1; otherwise, 0. This is the dependent variable in this study. This outcome variable is dichotomized due to several reasons. First, it is because of the dichotomy nature of Research Question 2, and this dichotomy is due to a common concern or interest in HLM, which is the question of language choice behavior of the immigrant children. A common question in immigrant parents' conversations is "Does your child speak Chinese?" This is a question that demands an answer of "yes" or "no", or something between the two. Even for the latter situation, i.e. "something between the two", there is not much continuous variation in description except for using words such as *basically, completely, most of the times*, and *half*. Such a question, together with the non-continuous nature of the data elicited, demands a treatment of dichotomization. In addition, by taking the log-odds of the dichotomized outcome, we are still able to answer the research question of what we can do in terms of social network to decrease the possibility of language erosion or language shift. Actually it may have become more meaningful when we tweak the question a little bit towards how probable it is for a child to speak the heritage language as a result of his social network. This is our ultimate concern.

A note needs to be made about the way to construct the above two variables. Because of the dynamic and cumulative nature of language development influenced by a mix of socio-

structural/socio-cultural and social-psychological factors that are at play in various formal and informal contexts of learning (Kondo-Brown, 2006), different types of bilinguals have their bilingual abilities fall along a continuum(Valdes, 1999). In this study, percentages are used to express the relative frequency of each language in the interaction between the child and every interlocutor in the ego child's personal network. Obviously, since these data are obtained through questionnaires, they are "perceived", rather than a result of calculations out of actual code-switching data that are normally obtained by recording and transcribing interactions, which are considered unnecessary by this study since it is not intended to link the linguistic-level analysis to the research questions.

Type of Relation: whether the alter is a father, mother, grandfather, and so on. Obviously these were the individual relations in the child's ego-centric network. As this study's emphasis is not on the analysis of gender differences, e.g. between father and mother, but on the analysis of important domains, for which we were informed by Edward's (1997) typology of factors influencing HLM and by the reviewed literature, some types of relations were, in actual analysis, combined into appropriate, new categories or types of relations. For example, *father (dad in the questionnaire)* and *mother (mum)* were combined into *parent*, and *English-school teacher* and *English-school classmate* were combined into *English-school relations*. By such re-categorization, therefore, also in consistence with the general interest from the public, this study may be able to focus on and reveal the effects of the global (vs. individual) social relations that the child has, that is – parents, the core of most family domains; siblings, the potential factors in families; relatives, the people less close to families; Chinese school relations, those who belong to the immediate community; and English school relations, those in the domain of mainstream society.

Tie Closeness: how close to the ego child each alter is located. For perceptual convenience, the closer the alter is to the ego, the higher the rating is. The range is from 8 to 1, with 1 indicating the 8th person in the ego child's network.

Chinese Tie Percentage: the percentage of ties in Chinese among the alters in the total number of non-ego ties in the ego child's social network. It was hypothesized that an environment of heritage language may influence ego child's language behavior indirectly. That is, if the people in a child's network speak to each other in Chinese, but not to the child, there may still be an influence on the child. This influence may happen in one of two or both mechanisms: conforming to groups (Li Wei, 1994), and exposure to language input by overhearing others speaking (De Houwer, 2009).

Parents' Questionnaire and Major Variables Resulted

Parents' questionnaire elicits data about the following major variables: Parents' educational background, family income as an indicator of economic status, parents' nationality/ethnicity as an indicator of native language being Chinese or not, types of dialects, birth place of the child, length of residence in the U.S. if the child was born in China, the number of times of taking the child to visit homeland, parents' desire (attitude) for the child to speak Chinese, and the child's frequency of access to Chinese media. These variables are about the child's family background, the immediate environment in which they live.

The parent's questionnaire also asks about the availability of Chinese language programs and Chinese TV channels as an indicator of institutional support, and estimates of "Chinese atmosphere" as an indicator of Chinese ethnic vitality.

Last but not least important, both child's questionnaire and parent's questionnaire elicit data about the child's Chinese oral proficiency and attitude towards Chinese speaking with the

difference being self-perceived or parent-perceived. The average of the perceived ratings from the child and his parent was calculated and used as the adjusted estimates of the child's actual attitude and oral proficiency. The variables of attitude are both "perceived" measures and do not reflect specific reasons or sub-structures such as HLM for the purpose of job opportunities or for the purpose of returning to homeland.

Oral proficiency[5] is also measured based on participants' perceptions. The American Council on the Teaching of Foreign Languages does have a test named Oral Proficiency Interview (OPI), and the Chinese government started providing spoken Chinese tests in 2010, but these tests are mainly intended for learners of Chinese as a FL. In addition, due to the "interview" nature for spoken language, and due to other feasibility issues related to large-scale questionnaire studies (Fuligni, Kiang, Witkow, and Baldelomar, 2008), few studies of Chinese HLM have been found to quantitatively address oral proficiency. The few studies located addressing oral proficiency (e.g. Fuligni, et. al. 2008; Kiang, 2007; Liu, Benner, Lau, & Kim, 2009) have either taken the frequency of the use of the language as an indication of proficiency or used 4 or 5-point scale to elicit the participants' self-perceived proficiency. I took the latter approach. It was expected that taking the average of the child's report and the parent's report would result in a more accurate estimate of the child's oral proficiency.

Specifically, the child's questionnaire elicits the child's rating of his/her own oral proficiency on a 7-point scale (low to high). The question is in plain language: "How well do you think you speak Chinese?" And also on a 7-point scale, the parent's questionnaire elicits

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[5] Elsewhere in this dissertation, "spoken proficiency" and "conversational skills" are also used to refer to "oral proficiency. And on page 4 of the Introduction, literature related to the difference and relation between spoken proficiency and written proficiency was briefly introduced.

the parent's "perception of your child's Mandarin (spoken) Chinese language proficiency." Children's Time 1 self-perceived proficiency level (mean = 5.16) is a bit higher than the parent-perceived proficiency level (mean = 5.09); but these two estimates are significantly correlated (p <). Finally, the average of these two perceived ratings was used as the estimate of the child's actual Chinese oral proficiency (mean = 5.13) for Time 1.

Table 2 demonstrates the descriptive statistics of some major variables to be built into the models to answer the two research questions. The mean of 3.47 for Parent Education shows that most parents report themselves to have a master degree or higher, and a yearly family income of $50,000 - $75,000 or more towards the higher end of $75,000 or more. Figure 2 and Figure 3 may give us a better picture with information that a majority of the parents have a master or a doctoral degree and a yearly family income in the range of $75,000 or above. Up till the time of the survey, these families had taken their children to visit the homeland country China 2-3 times averagely. In addition, the Chinese Media Availability was reported to be 2.4, meaning the children "watch digital media or read books in Chinese ... such as movies, TV programs, DVD cartoons, multimedia on the Internet, etc. at a frequency between "once or twice every month" and "once or twice every week."

Table 2. Descriptive Statistics of Four Major Family Background Variables

	N	Minimum	Maximum	Mean	S.D.
Parent Education	55	1	4	3.47	0.84
Family Income	55	1	4	3.66	0.77
Number of Homeland Visits	55	0	6	2.37	1.54
Chinese Media Availability	55	1	5	2.43	1.06
Valid N (listwise)	55				

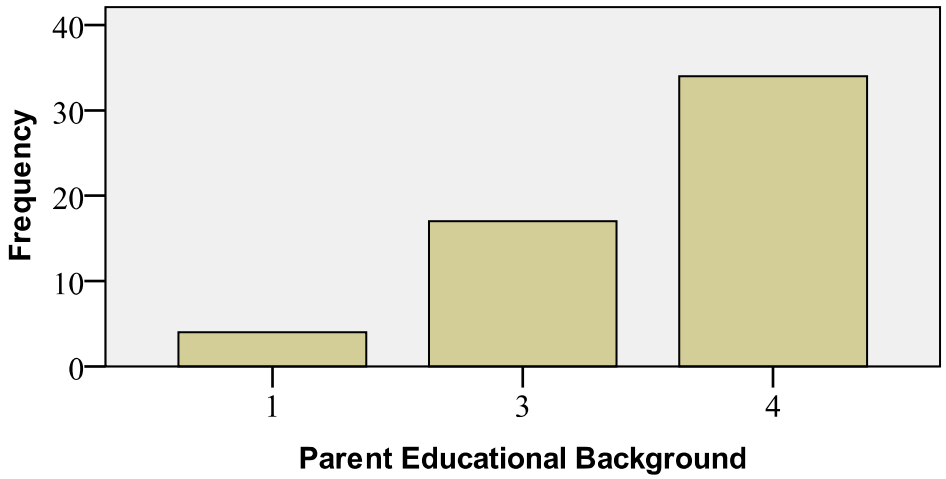

Figure 2. The Educational Background of the Participant Children
1 = High School or below, 2 = Bachelor, 3 = Master, 4 = Doctorate. For the interpretation of the references to color in this and all other figures, the reader is referred to the electronic version of this dissertation.

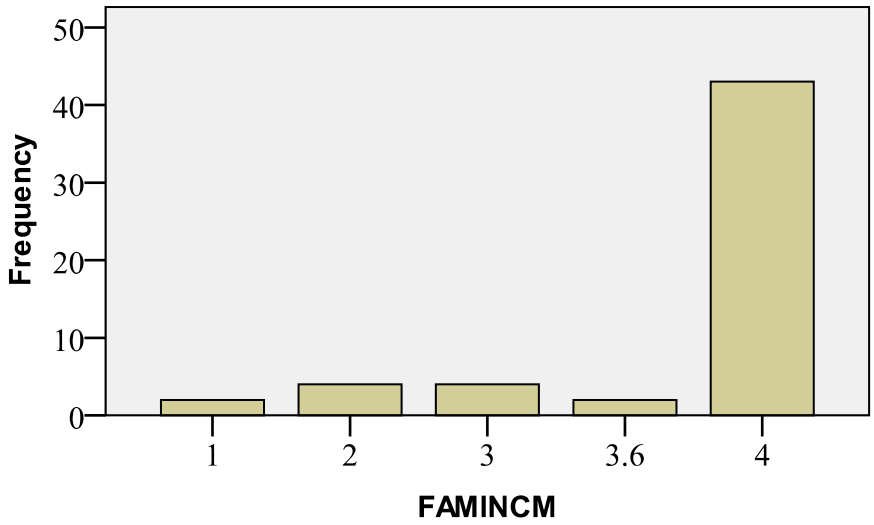

Figure 3. The Economic Status of the Participant Children's Family
1 = below $25,000; 2 = $25,000 - $50,000; 3 = $50,000 - $75,000; 4 = $75,000 or above; 3.6 indicates a progress towards a doctoral degree.

A Special Note: The Necessity to Include Technology in the Survey

In Chapter 2, I argued that engaging in connections with the far-away native speakers of one's HL with the help of modern communication technology is already a reality for some

people and that we need reflect this change in HLM research. It is appropriate now that I introduce how the effects of technology were addressed in the questionnaire.

There is variation among individuals in using or access technologies. Digital divide also exists among immigrant families. In her exploration of the connections between migration, identity, social class, and education, and how these relations create contemporary transnational Latino-American individuals, Sancho (2009) demonstrated that social stratification has been reflected in the individuals' patterns of using technology. For example, middle class families communicated with their family and friends back home utilizing the Internet, while poor Latino families communicated with their home country through telephones and cell phones, computers not being frequently used in homes or at schools. Although Sancho seemed to be focusing on how adults have used technology to enhance connections with their homeland, which suggests technology's potential for HLM, and on how digital divide may affect children's education in the U.S., whether and/or how technology as environment or as means of interaction facilitate children's HLM should be an interesting question to explore.

Technology is represented in the questionnaires in two occasions. One is when informants are asked to include not only face-to-face interlocutor but also anyone he speaks to over a long distance through modern communication technologies, and are asked to indicate what communication media are used: telephone, or CMC such as Skype, MSN, and Yahoo Messenger; the other is when they are asked to gauge the availability of literacy resources through technology such as TV, radio, newspaper, and websites in HL. The former, involving two-way communication is part of the SNA. The latter, only involving the receptive language skills, will be considered as a level 2 variable (i.e. media environment) in MLM together with

other variables representing the structural characteristics of the social networks. Pan (1997) suggested the rapid development of science and technology making Chinese media in faraway Chinese-speaking countries easily accessible. This mostly means websites reading, online media watching, and listening; this kind of behavior is considered to be of the latter in nature, i.e. media as resources, a characteristic of the child's environment.

Data Collection

The questionnaires were delivered to each classroom when Chinese schools convened on Sunday. Students were allowed and encouraged to take questionnaires home and work with parents to complete them. They were told to take the completed questionnaires back the next week.

Time 1 collection happened in January. Time 2 collection happened sometime three months after, with some students and their parents to complete the questionnaires later due to early dismissal by a fire alarm. Some of these later questionnaires were completed online using the online version administered in SurveyGizmo.

For each collection, raffle activities, with funding support from the Department of Counseling, Educational Psychology, and Special Education of Michigan State University, were organized to encourage participation.

Analysis Software Package

The MLM software package used for this study is HLM 6.06 by Stephen Raudenbush, Anthony Bryk, and Richard Congdon. The HLM in the software name means *hierarchical linear modeling*, not *heritage language maintenance*. Simple analyses such as descriptive statistics and correlation analyses were through the most current version of SPSS at Michigan State University computer labs.

CHAPTER 4 RESULTS

In all 55 children and their families returned usable Time 1 and Time 2 questionnaires. These 55 children reported 412 alters in their social networks. Some of the descriptive statistics were already reported in Chapter 3. Please refer to Appendix A for more details of these statistics. In this chapter I focus on reporting the results of the two research questions. Both questions involve regression modeling. Whether a variable is included in a model is based on two standards: 1) the evidence of its significance in research literature; and 2) the statistic significance in this study. The former standard guides the order of the one-by-one variable testing procedure. The latter standard guides the decision of whether to keep a certain variable in the model. For example, parents are found to play important roles in HLM research, as was shown in the literature review section of this study, then I first tested the effect of parents for the Level 1 model, which addressed the effects of the alters, i.e. the various "others" in the child's ego-centric networks. Similarly, those factors at Level 2 (i.e. the characteristics of the networks including family backgrounds) that are believed to influence those Level 1 effects are also generally tested in the order of their significance in the literature. For example, to explore the factors that predict the effect of parents, family income was tested at Level 2 for "alter is a parent" before the child's attitude was tested, since it was more intuitive and the literature does mention families' social economic status more frequently than children's own attitude. When a variable is considered to be of similar significance with another in research literature, either of them could be tested separately at first to see its statistical significance, for example, in the case of a parent's educational background as a predictor of the effect of "alter is a parent." In addition, in order to abide by the principle of "Less is more" in multiple regression modeling, effort has been made to keep

a balance between reducing the number of variables in the model and building a model demonstrating the major findings.

Results for Research Question 1

Research Question 1 asks whether a social network of HL contributes to the HLL's oral proficiency. In order to answer this question with more power in causality interpretation, an influence model was proposed. In this model, students' Time 2 proficiency is the dependent variable, and their Time 1 proficiency is an independent variable and also one that we intend to control so that we may observe whether the variable of interest – the exposure to the target HL between Time 1 and Time 2 – is a unique, significant predictor of the students' final language proficiency.

The influence model for this group of Chinese heritage language learners (CHLLs) from two weekend Chinese schools in the metro Detroit area gives a positive answer to Research Question 1. Specifically, the total number of people speaking Chinese to the child in his/her social network is a significant predictor of this child's Chinese oral proficiency.

As Table 3 shows, both the number of Chinese speakers in the child's social network and the child's own attitude towards the heritage language are significant predictors of the child's Time 2 proficiency, with $p < .05$ in both cases. It is not surprising that the child's Time 1 proficiency seems to be the number one predictor of the Time 2 proficiency, with $p < .001$. In regard to our Research Question 1, what we can conclude from these statistics is that the number of people speaking Chinese to the child in the network is a significant predictor of the child's Chinese oral language proficiency, even though controlling the child's previous proficiency and the child's own attitude.

Based on the results presented in Table 3, therefore, this study proposes the following model to explain the relationship between social networks in HL and children's HL proficiency for the Chinese immigrant children in this study –

Time2 Proficiency
*= 0.591 + 0.495*Time 1 Proficiency*
+ 0.138(number of people speaking Chinese)*
*+ 0.324*Time1 Attitude*

In other words, controlling the child's Time 1 Chinese proficiency and the attitude towards this heritage language, with each additional member speaking Chinese to the child in his/her social network, there is an increase of 0.138 in the child's Chinese proficiency on a 7-point scale.

Table 3. Research Question 1 Influence Model Coefficients

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	0.591	0.655		0.903	0.371
Time1 Proficiency	0.495	0.131	0.453	3.791	0.000
Time2 Chinese Ties	0.138	0.06	0.246	2.291	0.026
Time1 Attitude	0.324	0.138	0.265	2.339	0.023

a. Dependent Variable: Time2 Proficiency

A positive answer to Research Question 1 presents us evidence for the effects of social networks in HL for the purpose of HLM, and also leads us into the question of *how* social networks contribute to language acquisition. As I proposed earlier, it may be that social networks engage all members in the networks in interactions in one language or another, or in a combination of languages, and that using a language in these interactions thus drives the improvement of language proficiency. Consequently, the answer to Research Question 2 –

what factors influence whether or not the child speaks Chinese - becomes more meaningful. The results of the statistic analyses for that question are presented below.

Results of Research Question 2

Research Question 2 asks what factors in the child's social network predict whether or not the child speaks the heritage language. To answer this question, a survey was administered to each child to elicit information about the child's social network such as who they interacted with, the frequency of language use in either direction between Chinese and English, and the child's family background in terms of family income, parent education, etc. as the characteristics of the child's social network as a whole. As was discussed in the chapter of conceptual framework and methodology, these variables are considered to belong to different levels, i.e. the individual level or the network level. It was suggested that the individual alters' influence on the dependent variable may vary across the ego children or their ego-centric social networks. It was for this reason that the statistical method of multilevel modeling was used to analyze the data elicited from the social network survey and the parent survey that was administered as a supplement to inform the social network survey.

But for comparison purpose, I first present a model without interactive variables and their effects before I propose a comprehensive model. As the following equation demonstrates, Level 2 variables were not considered, and neither were any potentially interactive variables at Level 1 such as the closeness (position) of a person in the child's social network. For clarity, the empty Level 2 model is not presented. What we see, therefore, is only the following (Level 1) model, which includes the five major types of social relations in children's social networks.

The log-odds of speaking Chinese

$= \beta_{0j}$

$+ \beta_{1j}*(\text{alter is a parent})_{ij}$

$+ \beta_{2j}*(\text{alter is a Chinese school teacher or classmate})_{ij}$

$+ \beta_{3j}*(\text{ alter is an English school or classmate})_{ij}$

$+ \beta_{4j}*(\text{ alter is a relative})_{ij}$

$+ \beta_{5j}*(\text{alter is a sibling})_{ij}$

The effects of the variables in the above model are demonstrated in the following Table 4.

Table 4. Final Estimation of Fixed Effects at Level 1 without Interactions: (Unit-specific model)

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	-2.245656	0.530603	-4.232	54	<0.001
For Alter is Parent, β_1					
INTRCPT2, γ_{10}	1.884579	0.549077	3.432	352	<0.001
For Chinese School Relations, β_2					
INTRCPT2, γ_{20}	1.941856	0.578592	3.356	352	<0.001
For English School Relations, β_3					
INTRCPT2, γ_{30}	-2.288509	1.136470	-2.014	352	0.045
For Relatives, β_4					
INTRCPT2, γ_{40}	5.102182	0.731830	6.972	352	<0.001
For Siblings, β_5					
INTRCPT2, γ_{50}	0.485436	0.642017	0.756	352	0.450

Table 4 demonstrates that the variables that represent parents, Chinese school relations, English school relations, and relatives are all significant predictors of the child's probability of speaking Chinese, either at the .05 level or at the 0.001 level. Of these variables, not to our surprise, the variable of English school relations is a negative predictor while other variables are positive predictors. Both to our surprise and to our expectation, however, siblings exert

very weak, positive influences on the probability for the child to speak Chinese, with no significance at the .05 level. As previously reviewed, siblings tend to speak to each other in the dominant language (De Houwer, 2009). Therefore, the variable of siblings will not be considered in the comprehensive model further down below. For demonstration purpose, I provide an interpretation of other major variables in terms of their effects on the probability of the child to speak Chinese based on the statistics presented in Table 4.

Specifically, controlling other variables, the log-odds of the child to speak Chinese (– 2.25 + 1.88 = - 0.07) when the alter (person) in his network is a parent is higher by 1.88 than the log-odds when the alter is a non-parent person (-2.25). We may interpret this in terms of probability. When the person is not a parent, the probability for the child to speak Chinese is 0.095; when the person is a parent, the probability for the child to speak Chinese is 0.483. The difference can be as high as 0.388.

Table 5. The Log-Odds of Child Speaking Chinese Translated into Probability

	Log-Odds	Probability	Difference in Probability
Average/Intercept	-2.25	0.095	
Parent	-0.07	0.483	0.388
Chinese School	-0.31	0.423	0.328
English School	-4.54	0.011	- 0.084
Relative	2.85	0.945	0.85
Sibling	-1.76	0.147	0.052

For clarity and brevity, the log-odds for other variables, together with that for the parent variable, are listed and translated into probability in Table 5. These results only reflect the effects of those variables while interactive variables and their effects are not considered. Next, we include those effects in a comprehensive model that have two sub-models respectively named Level-1 Model and Level-2 Model. In Level-1 Model, we consider the closeness of the alter to the child, i.e. the position of the alter in the child's ego-centric

network. And in Level-2 Model, we consider some major variables that may play important roles according to our literature review in the previous chapters. Therefore, the following models have been proposed to answer Research Question 2.

Level-1 Model

The log-odds of speaking Chinese
$= \beta_{0j}$
$+ \beta_{1j}$*(*closeness or position of the alter*)$_{ij}$
$+ \beta_{2j}$*(*alter is a parent*)$_{ij}$
$+ \beta_{3j}$*(*alter is a Chinese school teacher or classmate*)$_{ij}$
$+ \beta_{4j}$*(*alter is an English school or classmate*)$_{ij}$
$+ \beta_{5j}$*(*alter is a relative*)$_{ij}$
$+ \beta_{6j}$*(*interaction between "alter being a relative" and the alter's position*)$_{ij}$

Level-2 Model

$\beta_{0j} = \gamma_{00} + \gamma_{01}$*(*parent education*)$_j + \gamma_{02}$*(*family income*)$_j + \gamma_{03}$*(*times of home visits*)$_j$
$+ \gamma_{04}$*(the child's *Time 1 Chinese proficiency*)$_j + \gamma_{05}$*(*parent's attitude*)$_j$
$+ \gamma_{06}$*(*availability of media in Chinese*)$_j + u_{0j}$
$\beta_{1j} = \gamma_{10}$
$\beta_{2j} = \gamma_{20} + \gamma_{21}$ *(family income)*$_j$
$\beta_{3j} = \gamma_{30} + \gamma_{31}$ *(parent attitude)*$_j$
$\beta_{4j} = \gamma_{40}$
$\beta_{5j} = \gamma_{50} + \gamma_{51}$ *(home visits)*$_j$
$\beta_{6j} = \gamma_{60}$

The coefficients, p-values and other related information for the above models are listed in Table 6. With all numbers inserted according to Table 6, the above Level 1 and Level 2 models are concretized to be –

Level-1 Model

The log-odds of speaking Chinese
$= \beta_{0j}$

$+ 0.07*(\textit{closeness or position of the alter})_{ij}$

$+ \beta_{2j} *(\textit{alter is a parent})_{ij}$

$+ \beta_{3j} *(\textit{alter is a Chinese school teacher or classmate})_{ij}$

$- 2.47*(\textit{alter is an English school or classmate})_{ij}$

$+ \beta_{5j} *(\textit{alter is a relative})_{ij}$

$+ 1.02*(\textit{interaction between "alter being a relative" and the alter's position})_{ij}$

Level-2 Model

$\beta_{0j} = -1.63 + 0.85*(\textit{parent education})_j - 0.15*(\textit{family income})_j - 0.05*(\textit{home visits})_j$
$+ 0.97*(\text{the child's } \textit{Time 1 Chinese proficiency})_j + 0.15*(\textit{parent's attitude})_j$
$+ 0.43*(\textit{availability of media in Chinese})_j + u_j$

$\beta_{2j} = 1.7 - 1.51 *(\textit{family income})_j$

$\beta_{3j} = 2.12 - 0.81* (\textit{parent attitude})_j$

$\beta_{5j} = 2.59 + 1.52 (\textit{home visits})_j$

Table 6 demonstrates that the variables that represent parents, Chinese school relations, and English school relations are still significant, either positive or negative, predictors of the child's probability of speaking Chinese, either at the .05 level or at the 0.001 level, as we previously analyzed. Obviously, however, the single variable of relatives is no longer a significant predictor; instead, the interaction between the alter being a relative and this relative's position is a significant predictor, which means the effect of relatives depends on their positions in the child's egocentric social network.

Next, I present more details of the interactive effects from those variables in the Level 2 Model. But before going into the details, I would draw the reader's attention to the fact that the slopes of these Level 1 variables are not kept random in this study; therefore, we do not see the residual terms in the Level 2 models that predict the Level 1 effects. This is due to the consideration of keeping enough degrees of freedom. As Raudenbush and Bryk (2002)

pointed out, it would make sense to constrain the residual to be zero for reasons of both statistical efficiency and computational stability (p.28).

Table 6. Final Estimation of Level 1 and Level 2 Fixed Effects (Unit-specific model)

Fixed Effect	Coefficient	Standard error	*t*-ratio	Approx. *d.f.*	*p*-value
For INTRCPT1, β_0					
INTRCPT2, γ_{00}	-1.631815	0.463293	-3.522	48	<0.001
Parent Education, γ_{01}	0.845580	0.365546	2.313	48	0.025
Family Income, γ_{02}	-0.148411	0.453359	-0.327	48	0.745
Home Visits, γ_{03}	-0.048473	0.141292	-0.343	48	0.733
Time1 Proficiency, γ_{04}	0.967765	0.268693	3.602	48	<0.001
Parent Attitude, γ_{05}	0.151336	0.283500	0.534	48	0.596
Chinese Media, γ_{06}	0.433352	0.236117	1.835	48	0.073
For Tie Closeness, β_1					
INTRCPT2, γ_{10}	0.070405	0.115884	0.608	348	0.544
For Alter Is Parent, β_2					
INTRCPT2, γ_{20}	1.701441	0.528105	3.222	348	0.001
Family Income, γ_{21}	-1.506176	0.563229	-2.674	348	0.008
For Chinese School Relations, β_3					
INTRCPT2, γ_{30}	2.121283	0.535373	3.962	348	<0.001
Parent Attitude, γ_{31}	-0.806549	0.414523	-1.946	348	0.052
For English School Relations, β_4					
INTRCPT2, γ_{40}	-2.469659	1.080273	-2.286	348	0.023
For Relatives, β_5					
INTRCPT2, γ_{50}	2.589610	1.807006	1.433	348	0.153
Home Visits, γ_{51}	1.518481	0.754174	2.013	348	0.045
For Closeness*Relative, β_6					
INTRCPT2, γ_{60}	1.015235	0.466353	2.177	348	0.030

First, we look at the main Level 2 predictors for the effect (β_{0j}) of the Level 1 intercept.

The mean log-odds (β_{0j}) of the child speaking Chinese, controlling the factors specified in the Level 1 Model, is – 1.63, which is a probability of 0.164. Several Level 2 variables are significant predictors of the mean log-odds. First, the child's previous oral proficiency is significant with $p < 0.001$, $\gamma_{04} = 0.9678$. With all other factors controlled, a unit of increase in oral language proficiency (s.e. = 0.968) will result in an increase of 0.9678*1 = 0.9678 in log-odds of the child speaking Chinese.

Second, parents' education is also a significant ($p < 0.05$), positive, predictor of the mean log-odds of the child speaking Chinese, $\gamma_{01} = 0.85$. With all other factors controlled, a unit of increase in the level of parents education (s.e. = 0.84) will result in an increase of 0.85*1 = 0.85 in log-odds of the child speaking Chinese.

Third, significant at 0.1 but not at 0.05 is the variable of availability of Chinese media at home, with $p = 0.07$, $\gamma_{06} = 0.43$. With all other factors controlled, a unit of increase in the availability of Chinese media at home (s.e. = 1.06) will result in an increase of 0.43*1 = 0.43 in log-odds of the child speaking Chinese.

The Level 2 model also demonstrates the interactions between the Level 2 variables and the Level 1 variables. In other words, main effects at Level 1 can be predicted by Level 2 variables. Specifically, at Level 2, family income is a significant ($p < 0.01$), negative predictor of the effect of parents at Level 1, $\gamma_{21} = - 1.51$, $t = 0.56$. In other words, higher family income is associated with a less steep slope of parent-child speaking Chinese. Controlling all other factors, one unit of increase in family income above the average level, which is one standard deviation (0.77), will lead to the decrease of "the alter is parent" effect by (- 1.5*0.77) = - 1.115, essentially eliminating the parent effect of 1.7.

Therefore, while there is a general positive relationship between an alter being a parent and the child speaking Chinese, this relationship is significantly moderated by the family's income, or economic status. A discussion of the reasons will be carried out in next chapter. Here, to better illustrate such dynamic relationships, a graph was generated through the HLM 6.02 software.

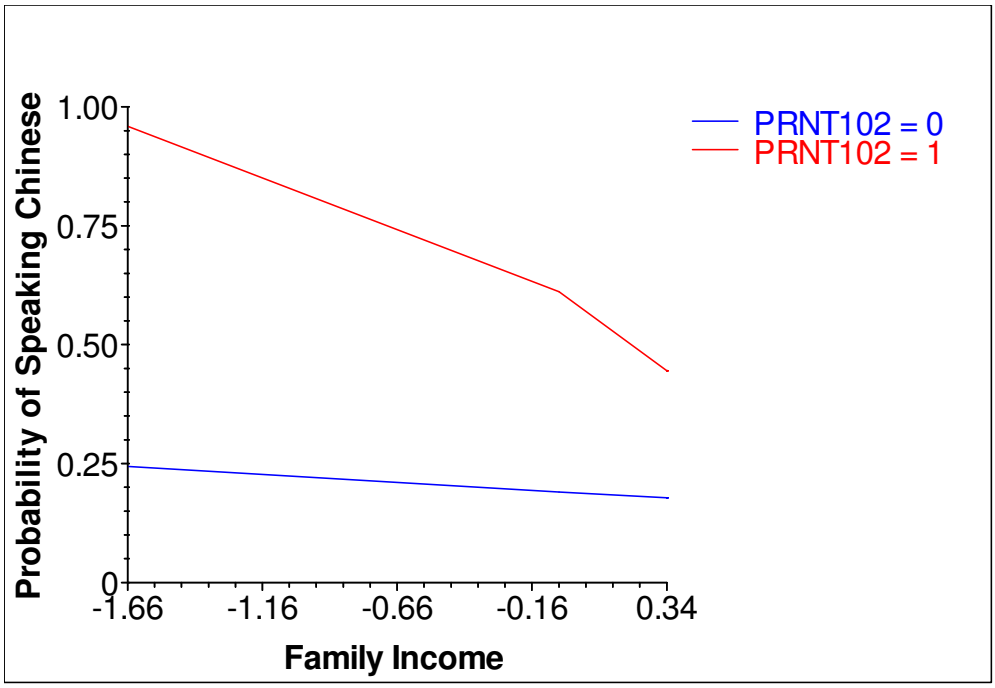

Figure 4. The Interaction between Family Income and the Alter Being a Parent. FAMINCM = Family Income; CHOUT102 = Probability of Child to Speak Chinese. The red line = PRNT102 = The Alter Is a Parent. The blue line = PRNT102 = The Alter Is a Non-Parent.

Similar situation exists for parent's attitude towards heritage Chinese language maintenance. Parent's attitude is negatively (marginally significant at 0.05 level) associated with the slope of Chinese school teachers or classmates on the log-odds of the child speaking Chinese. A unit of increase in parent's attitude, i.e. a standard deviation of 0.9, could result in a decrease of "the alter is a Chinese school relation" effect by (- 0.81 * 0.9) = - 0.720, partially eliminating the Chinese school effect of 2.12. That is, contrary to our intuition,

higher parent attitude actually results in less positive effect from the Chinese-school related social relationships. The reason behind this phenomenon will be discussed in next chapter. Still, a graph (Figure 5) is provided below to illustrate this tendency.

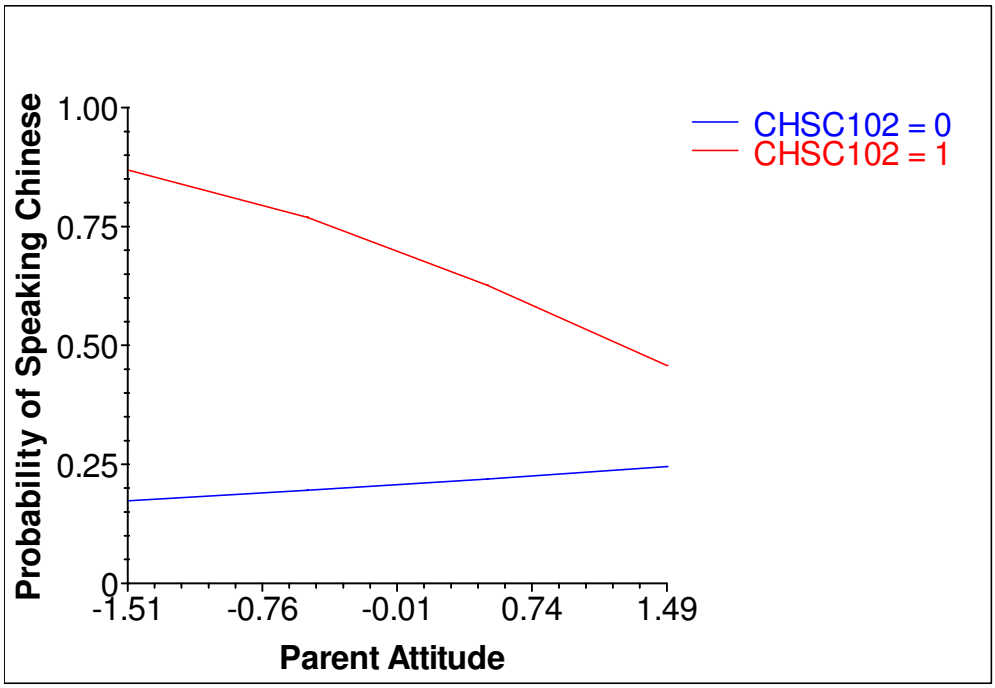

Figure 5. The Interaction between Parent Attitude and Alter Being a Chinese School Relation.
ATTDPRNT = Parent's Attitude, CHOUT102 = Probability of Child to Speak Chinese. The red line = The Alter Is a Chinese-School Relation. The blue line = The Alter Is a Non-Chinese-School Relation.

The interaction term, CLOSRELA, reflecting the interactions between the two variables of closeness/position and the alter being a relative, is a significant ($p < 0.05$) predictor of the log-odds of the child speaking Chinese, with $\gamma_{60} = 1.02$, $t = 2.18$. This significant interaction, together with the fact that the variable of being a relative itself is not a significant predictor, means the effect of relatives depends to a large extent on the position or the closeness of the relative to the child. To avoid adding to the difficulty in interpreting the

coefficients, no effort was made to test the effect of an Level 2 variable on CLOSRELA, which is already an interaction term.

The effort, however, was made to test the effect of Level 2 variable on the effect (β_{5j}) of the alter being a relative. The result is that the child's number of times visiting the home country (China) is a significant ($p < 0.05$), positive, predictor of the slope of the alter being a relative on the log-odds of the child speaking Chinese. With every additional unit of times (which is the standard deviation 1.54) over the average (2.37), the effect of "the alter is relative" is enhanced by 1.54*1.52 = 2.34. This positive effect of home country visits can be illustrated by the graph below.

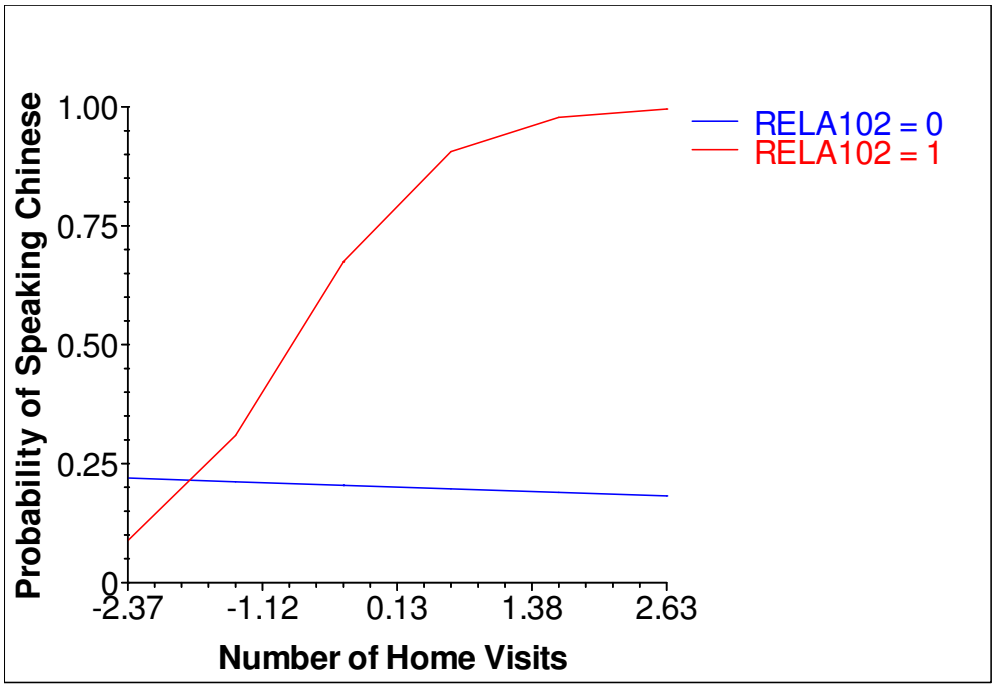

Figure 6. The Interaction between the Home Visits and Alter Being a Relative. HMVST1 = The Number of Homeland Visits, CHOUT102 = Probability of Child to Speak Chinese. The red line = The Alter Is a Relative. The blue line = The Alter Is a Non-Relative.

This is indeed a very complex picture, with negative factors intermingling with positive factors, all of which are exerting direct or indirect influence on the probability of a child speaking Chinese to the people in his or her social network.

CHAPTER 5 DISCUSSION

Impact Belief and Language Social Support - Discussion of Research Question 1

Research Question 1 addresses the overall effect of the social networks on heritage language proficiency. In this section I discuss this effect and its relation to language shift; the effects of specific characteristics of factors within the social networks will be discussed in relation to Research Question 2.

The result of Research Question 1demonstrated that social networks did work. Specifically, those in a child's social network that spoke the target/heritage language to the child did have positive influence on the child's language proficiency. The more people that speak Chinese, the higher the child's Chinese spoken proficiency. This means that the HL speakers in the child's social networks, the only people with the "technical" potential to speak the HL to the child, must be aware of their own potential and power. As De Houwer (2009) suggested, it is not enough to just have positive attitudes; parents and other people speaking a HL in children's networks must have an *impact belief*. Only with an impact belief can parents and other adults of HL "undertake specific steps to foster their children's language development" (p. 95). The findings from the influence model of this study have provided strong evidence and support to De Houwer's call for actions as a result of impact belief. In addition, the evidence in this study clearly points to one possible direction of these actions – being part of the children's social networks and speaking to the children in HL. Back in Chapter 3, I suggested the concept of language social support. Then an impact belief in

language social support should be an appropriate conclusion from the answers to Research Question 1.

We need avoid an overstatement, however. The positive, significant effect of the social networks in HL does not necessarily indicate the prospect of reversing the language shift. To reverse the language shift, there needs to be the expansion of the children's social networks in the heritage language to the whole society, at least the whole social networks around him or her, which is neither possible in a society where the mainstream language is another language, nor desirable by the children and parents themselves since they do face the challenge of acculturation into the mainstream society.

In addition, the descriptive statistics in this study are consistent with and support the society's "common sense" that immigrant children's heritage language proficiency tends to be lost or weaker in the long run. Comparing the means, we find that the children's Time 1 Proficiency in this study was 5.13 on a 7-point scale while their Time 2 Proficiency 3-5 months later was 5.04, which actually suggests a minor decrease in proficiency (See Table 7).

Then how do we interpret the model built to answer Research Question 1, in which Time 2 Proficiency seems to be higher than Time 1 Proficiency since every independent variable in the model seems to be contributing "positively"?

From Figure 7 we can see that about one third of the 55 children gained some proficiency from Time 1 to Time 2. A few less than one third of them stayed the same. And More than one third lost some proficiency. The interesting question is who these three groups of children were in relation to the effect of social networks, i.e. the number of people speaking Chinese to them in their networks?

In exploring the answer to the above question, I categorized the 55 children into three groups based on the mean and the standard deviation (see Table 8). Those children whose number of Chinese speakers in their networks is within a half standard deviation around the mean are categorized as the Medium Group. In turn, those whose number of Chinese speakers in their networks is more than half a standard deviation away from the mean are either in the Low Group at the low end or in the High Group at the high end.

I next graphed Time 2 and Time 1 proficiency in relation to the Low, Medium, and High Groups. With both Figure 8 and Figure 9 considered, evidently, we can see that the Low Group (18 children) had their Time 2 proficiency remaining almost the same; the Medium Group, a relatively larger group (23 children) had their Time 2 proficiency lower than Time 1; and the High Group, a smaller group (14), had higher proficiency at Time 2. Therefore, the majority of the children, composed of those who had about 4 or less people speaking Chinese to them in their networks, had a Time 2 proficiency either the same as or lower than their Time 1 proficiency, with more tendency to the lower side. This situation may well remind us of the language shift topic in HLM. On the other hand, against that general trend of lower proficiency, therefore language shift, there are those who have gained some proficiency, and these are the Higher Group in this study, those who had more than 4 people that speak Chinese in their social networks. This indeed confirms what has been revealed about the effect of Chinese social networks in the regression model to answer Research Question 1.

Therefore, my argument is that the model has actually indicated some deep relationships between the variables. The social networks in HL *were contributing positively in reducing* the difference between Time 2 and Time 1 proficiency. Specifically, those who had more Chinese-speaking people in their networks, against the overall English-dominant

background, were less likely to decline in their Chinese proficiency; on the other hand, those who did not have or had fewer Chinese speakers in their networks lost some proficiency. In other words, the social networks in HL still work; without these social networks, there could

Table 7. Descriptive Statistics of Children's Time 1 and Time Proficiency

	N	Minimum	Maximum	Mean	S.D.
Time 1 Proficiency	55	3	7	5.13	0.97
Time 2 Proficiency	55	1.5	7	5.04	1.06
Valid N (listwise)	55				

Note: A child's oral proficiency measurement is the average of his self-perceived proficiency and his proficiency perceived by his parent on a 7-point Lickert scale.

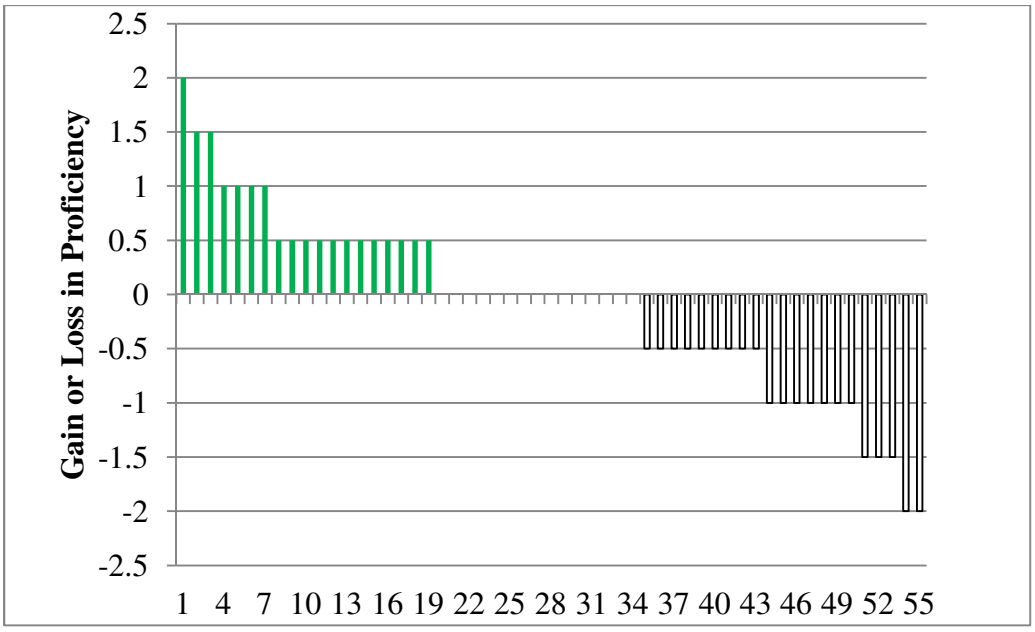

Figure 7. Change in Proficiency as Time 2 minus Time 1 for 55 Children. Green color = positive change from Time 1 to Time 2; black color = negative change from Time 1 to Time 2.

Table 8. Descriptive Statistics of the Number of People Speaking Chinese in Children's Social Networks

	N	Minimum	Maximum	Mean	S.D.
Number of Chinese Spakers	55	0	8	3.31	1.91
Valid N (listwise)	55				

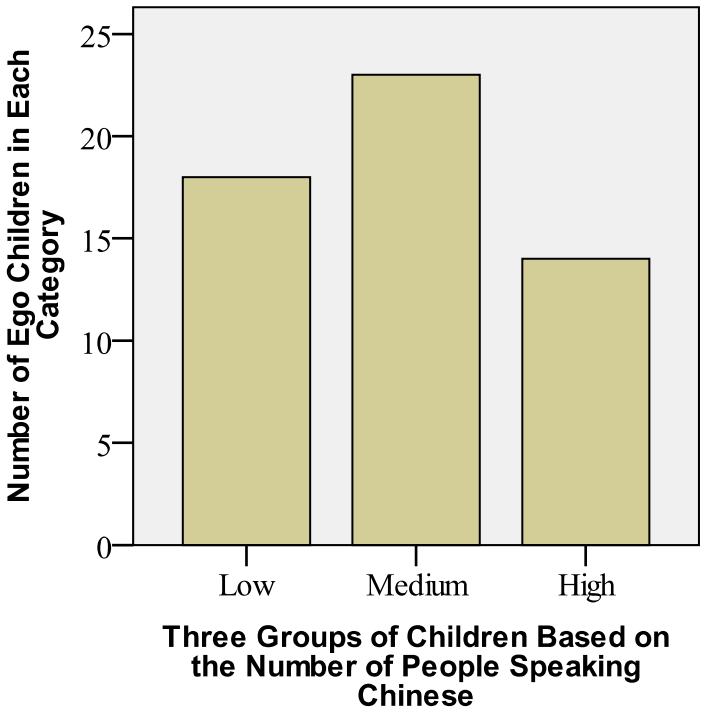

Figure 8. Histogram of the Low, Medium, and High Groups of Children in Relation to the Number of People Speaking Chinese in Their Networks

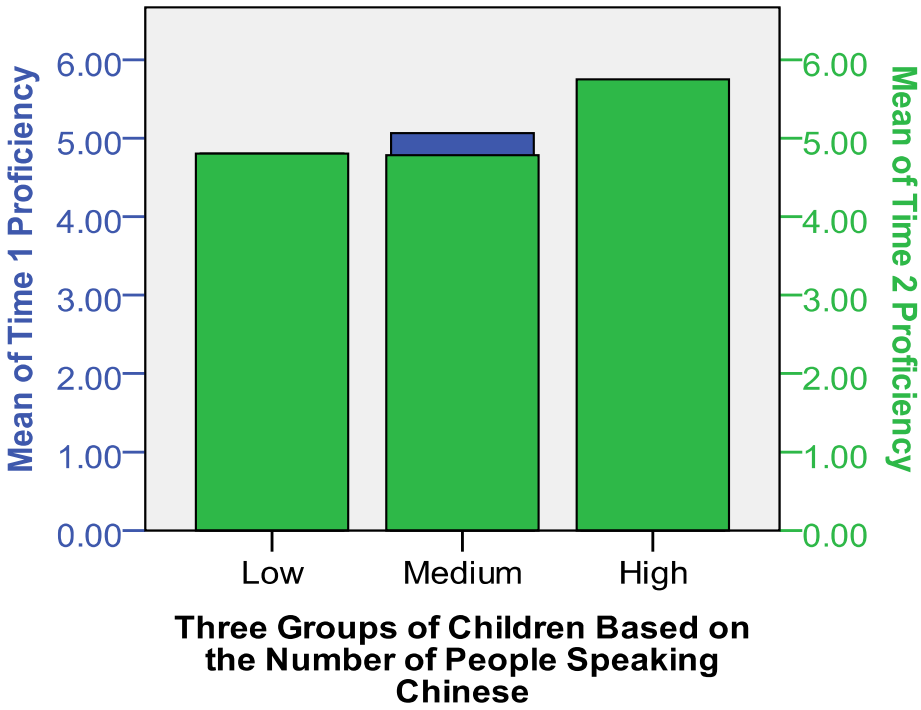

Figure 9. Children's Time 1 and Time 2 Proficiency in Relation to the Low, Medium and High Number of People Speaking Chinese in Their Social Networks

have been faster loss of the HL in children. It can be considered a "use it or lose it" argument. Similar to Frank, Zhao, Penuel, Ellefson, & Porter (2011)[6] in another research area, the suggestion is that interactions are more important than some other sources of knowledge in certain situations, or for certain level of implementers or learners. In our case, the proficiency

[6] In a study of how different sources of knowledge flow into schools and then diffuses from teacher to teacher within schools, (Frank et al., 2011) point to the need to match knowledge source with initial level of implementation (of computing). While other knowledge sources are significant for the other two initial levels of implementation, "the effect of interactions with others was statistically significant for those at the highest initial levels of implementation." Similar to my study, in which children's heritage language proficiency declined, those teachers at the highest initial levels in Frank, et. al (2011) were also likely to decrease in their use of computers. In such a situation, therefore, interactions with colleagues become more important.

of the heritage language learners is likely to decline if they do not use the language in interactions.

Finally, the emphasis of this study on social networks does not exclude the effect of the children's own attitude towards the HL (Refer to Appendix A for detailed statistics). Although children's attitude toward Chinese language (mean = 4.66) is not as high as that of their parents' (mean = 5.78), a rating closer to 5 on a 7-point scale definitely indicates a positive attitude. The model built in this study obviously indicates the positive effect of this positive attitude. It is only natural that those who hold positive attitude towards their HL and who would like to use it in their life will be able to improve their HL proficiency or maintain it as long as possible. In addition, the highly correlated and positive effect of Time 1 language proficiency also evidently points to the continual nature of learning. A person's current effort and achievement is always the foundation upon which further improvement could be made. With both the effect of HL social networks and the effect of the child's own positive attitude towards HL considered, the indication of the whole influence model is clear for both adults and children – action and persistence.

Having reported and interpreted the model that answers RQ1, I believe it is time to add a little note about a question interesting to many scholars. One major aspect of the language shift is that children's HL proficiency and use decrease as they grow up (Please refer to Appendix A for the statistics about age, which was indicated by the Year in English School). How is children's age related to their Chinese proficiency? Children's age in this study was not significant enough to figure into the influence model for RQ1. This insignificance is also reflected in the Pearson correlation statistics (Table 9). While the correlation between attitude and proficiency is highly significant, there seems to be no relation at all between children's

Year in English School and attitude or proficiency. This is further evidence that age or year is not a decisive factor and that such other factors as social networks and children's own attitude may be important factors in efforts to slow down language shift and achieve balanced bilingualism.

Table 9. Correlations between Time 2 Proficiency, Age, and Attitudes

	Year in English School	Child's Attitude	Parent Attitude
Year in English School			
Child's Attitude	0.08		
Parent Attitude	-0.037	.348**	
Time 2 Proficiency	0.027	.364**	.391**

Note. **. Correlation is significant at the 0.01 level (2-tailed).

Next, I turn to the discussion of the second research question and have a deeper examination of how attitudes and some other factors play into the mechanism of those processes that affect the heritage language behavior.

A Picture of Dynamicity: Discussion of Research Question 2

The Co-Existence of Positive and Negative Factors for HLM

As the Level 1 model in the previous chapter demonstrated, parents, Chinese school relations, English school relations, and relatives (depending on their positions in the child's ego-centric network) are all important players and factors that influence the child's behavior of language choice, or the probability of speaking Chinese. Among these variables, English school relations (English school teachers and classmates), as was expected, have negative effects on children's HL behavior. By including these several variables in the model, we are witnessing children's dynamic language environment, in which there are both positive and

negative factors that exert influences on children's HL development. Children's final achievement in HLM or bilingual ability is a result of many factors balancing with each other.

We need to be aware, however, that the actual effects of English relations may be larger than it appeared in the current study. According to the descriptive statistics, these English speakers constituted about 20% of all people listed by the children in their social networks. This was already a large percentage. But it might have been larger. In the survey, the children were asked to list at most 8 people to whom they most often spoke to. Considering the fact that the children in this study, like most HLLs in the U.S., were also attending their regular American schools, we may safely estimate the total number of English speakers in children's social networks to be well above the specified limit of eight; although those relations may not be considered "close", the accumulated amount of interactions between them and the children in our study, and the accumulated effect from these interactions should not be neglected. Therefore, the existence of three positive variables (parents, Chinese-school relations, and relatives) versus one negative variable (English-school relations) in the model does not necessarily suggest language shift being reversed or a totally positive HLM situation. The model established in the current study is no evidence to support those who are concerned that children's HLM may dominate and that their chances of English acquisition may be diminished.

The positive effect of Chinese-school relations (that is, teachers and classmates at Chinese weekend schools) on the probability of the children to speak Chinese deserves our attention in evaluating the status of HL schools in HLM. In the literature review of weekend ethnic language schools in Chapter 2, we were impressed that students spoke to each other mostly in English both on class and after class (Wang, 2003), and that some students provided

negative comments about the effectiveness of weekend language schools on their HL development (Kim, 2006; Man, 2006). Obviously, the findings of the current study, against some literature doubting the functions of HL schools, are showing that HL schools may be contributing to HLM not through the curricula under criticism by some scholars such as Kim (2006) and Man (2006) but through some profound ways such as facilitating the formation of HL social networks. In this sense, we should celebrate where Wong (1988) showed the concern that Chinese HL schools were only functioning as venues of social connections and identity formation.

Keeping in mind both the scenario described by Wang (2003) about children speaking English at Chinese HL schools and the finding from the current study about social networks, we may come to a tentative conclusion that there is variation, perhaps large variation, across the weekend schools, some of which perform better than some others in fostering a good environment and motivating students to engage in heritage language and culture and therefore in HL behavior. If so, such variation must be quantitatively detectable, and then a next step could be quantitative research into larger number of schools to detect such variation, following which qualitative research may explore how the good schools are good in fostering HL use. The two schools in the current study might be among those successful in this regard.

With the Level 2 model considered at the same time, we can also see that these influences are not always straightforward, as those Level 2 variables, such as family income, parent's attitude, and the number of home country visits, are interacting and moderating those effects, making the whole picture of factors and processes complex and dynamic. I believe these interactions between variables can provide some explanations about the inconsistent findings introduced in the literature review section. Next, I present my discussions across the

factors at Level 1, but for each factor at Level 1, I will immediately discuss how some Level 2 factors are exerting influences at the same time, if there are any significant Level 2 variables for an L1 variable in the model.

The Influence of Parent HL Behavior and Its Interaction with Family Income

This study has revealed positive relationship between parents' and children's HL behavior. Overall, at least for the group of children in this study, their parents mostly engaged in speaking Chinese to them, and the parents' communication with the children in Chinese did significantly, positively predict the possibility for the children to speak Chinese. This finding is in consistence with the major research in HLM and confirms the important role parents may play in HLM (Fishman, 2001b).

However, although generally speaking parents are a source of positive effect on children's heritage language behavior, such effect is not of the same strength across the families. The HLM research literature has reported this variation among parents (De Houwer, 2009), but there exist controversies regarding what factors in what ways have caused such variation. In some qualitative research, several factors such as parents' educational background, family economic status, attitudes, and residence localities have been reported to have played a role (G. Li, 2006c). As is demonstrated in the results of the second research question, family income is a significant predictor of such variation in parents' influences across families.

As Figure 4 indicates, with the increase of family income, there is a decrease of parents' positive effect on children's HL behavior. In other words, the parents in families of higher income exert less positive influence on children's HL behavior. This phenomenon was once

mentioned in (Pan, 1997). But Pan hypothesized that parents of higher SES held more positive attitude towards acculturation and less positive attitude towards HL.

Although this study still cannot give a definite answer, it is necessary to raise other hypothesis. At least in this study, parents, as a whole, are indeed the people who speak HL Chinese to the children in their social networks. And parents' attitude towards their HL Chinese, reported as their desire for their children to be able to speak Chinese, is impressively positive (5.5 for Time 1 and 5.8 for Time 2 on 7-point Likert Scale). Therefore, we need a better, or a different, explanation beyond the hypothesis concerning parents' attitude or their desire to acculturate.

While we should always take caution in hypothesizing or claiming any causal relationship between family income and parents' effect on children's HL behavior, the exploration of family income as a factor may shed light on our understanding of HLM since it is a significant predictor for parents' effect in this study.

In Table 10 we find three factors that significantly correlate with family income – parents' education level, children's birth place, and availability of media in Chinese at home.

Table 10. Correlations between Major Variables

	Parent Education	Family Income	Birth Place	Chinese Media	Chinese Proficiency (T2)
Parent Education					
Family Income	.602**				
Birth Place	-0.104	-.356**			
Chinese Media	-0.082	-0.186	0.072		
Chinese Proficiency (T2)	0.124	-0.13	-0.002	0.087	
Parent Attitude (T2)	0.016	0.028	-0.062	0.097	0.231

**. Correlation is significant at the 0.01 level (2-tailed).

First, family income correlates positively with the parents' education level. It seems that children whose parents earn the most are also those whose parents have higher educational background such as doctoral degrees. The parents who have higher educational background usually have better English proficiency either as a result of education itself or as a result of taking TOEFL or GRE tests to meet the admission criteria of the U.S. universities. It is no less reasonable to hypothesize that it is the parents' better English proficiency that has made it easier for them to communicate with their children in English, especially when their children find it difficult to communicate in Chinese.

Second, family income correlates negatively with children's birth place. This study codes the child's birth place as 0 if it is the U.S. and 1 if it is China. Therefore, the negative correlation means that children whose parents have more income are likely to be those children who were born in the U.S. An inference to be made from the birth place variable could be that U.S.-born children's parents are likely to be those with greater length of residence in the U.S. and less likely to be those who have recently immigrated to the U.S. It could be that, despite of their attitude towards HL or acculturation, these higher-income families have resided in the U.S. for a relatively longer time and therefore better acculturated into the mainstream society; and both/either due to parents' change of habit of language behavior and/or due to children's better proficiency in English (and perhaps also due to the reciprocal effects between the two sides), parents' effect has decreased. This process is exactly the process of language shift.

Third, family income also correlates negatively with the availability of media in Chinese at home, which means that there are less Chinese media at home when the family has higher income. The very first response in our minds to a lack of home resource in the main

stream society would be that the family cannot afford it. Here in regard to the availability of HL media in this study, this is obviously not the case. On the contrary, the data in this study simply suggest that richer families spend less on HL media. The actual reasons or processes may be very complex. Here I tentatively present two explanations:

1) Richer families, as discussed in the second point above, might just have resided in the U.S. for a longer time and therefore have less close relationship with the home country, which has reduced their probability in obtaining media (especially non-electronic media) in Chinese from China; on the other hand, those families that are less rich and that happen to have immigrated to the U.S. in recent years are still keeping those media they have brought from China.

2) Richer, acculturated families face less pressure of keeping their children to study Chinese as a backup lest their children will not be able to keep up in schooling once they need go back to China; on the other hand, new immigrant families do have such concerns and are therefore more motivated in accumulating for their children HL resources in either electronic (including the Internet) or paper forms.

To summarize the above discussion of the three correlations between family income and three other variables, it seems that family income is a negative predictor for HLM. Although this predictor relationship cannot be considered as causal relationship, the data of this study and the above discussion do point to the hypothesis that family as a variable has condensed onto itself the effects of several other variables. In a sense, as time goes, all these variables participate in a vicious circle, perhaps the so-called process of language shift – higher education level, better jobs, longer residence, higher income, more acculturated, more used to English, poorer Chinese proficiency in children, parents more adjusted to children …

These variables do not necessarily work in a linear way, but may feed into each other. Considering parents' positive attitude towards Chinese HL in this study, it is improper to only hold parents' attitude accountable for the loss of HL; it is just that, as a Chinese saying goes, time and *situation* change a person [时位移人]. This *situation* could well be interpreted as a combination of those tangible factors, in Edwards' (1997) typology.

The Interaction between Parent Attitude and Chinese-School Relations

In examining the interaction between parent attitude towards HLM (i.e. parents' desire for the child to speak Chinese) and Chinese-School Relations' effect on the probability of speaking Chinese, I found a relationship that contradicts our intuition. On the one hand, at Level 1, the effect of those social relations of Chinese schools was positive. On the other hand, however, parent attitude at Level 2 negatively predicted that Level 1 effect. In other words, if a parent held better attitude towards Chinese HLM, his/her child would benefit less from those Chinese-school teachers or classmates in terms of the probability of speaking Chinese.

Perhaps this is related to Chinese parents' beliefs and practices in language learning. Chinese parents lay heavy emphasis on literacy rather than on speaking. In addition, they value hard work of their children in terms of rote memory and repeated practice (G. Li, 2006b). It is possible that, when parents turned their attitude into action, what they are doing is engage their children in isolated learning in literacy and, unconsciously, pay less attention to meaningful social interactions in HL as a legitimate approach to language acquisition. In the end, higher motivation of parents for their children to maintain Chinese as a HL unfortunately resulted in less probability for the child to speak Chinese. In the process of examining this interaction, we have again witnessed the labyrinth surrounding language

attitude (Lynch, 2003) and the possibility for parents' attitude to be deflected due to various reasons (G. Li, 2006c).

The Influence of Relatives and Its Indications

The variable of relatives did not exert its influence independently; what was statistically significant was the interaction between "alter is a relative" and "the alter's position in the network." In other words, relatives' effect on the probability of a child to speak Chinese depends to a large extent on how close the alter relative is to the child in the ego centric network.

That said, the existence of such effect from relatives is itself worthy of further analysis. We should not have expected many relatives to be named by the child into his social network if it had not been for the questionnaire items that inquired both about face-to-face talk and about distance communications through technology. In a sense, this is evidence that technology could make passive ties far away in homeland turn into active ties (Li Wei, 1994)**.** Therefore, the effect of relatives actually demonstrated how modern communication technology may change or contribute to our HLM environment in a substantial way.

Clearly, our data and model have revealed not just how technology might help. In addition, another way we may push our children's HLM is taking them to visit the homeland. The Level 2 variable, i.e. the number of times of home visits, significantly predicted the effect of a relative at level 1. This is clear quantitative evidence for qualitative studies that have suggested the significance of homeland visits for HLM (Borland, 2006; Demos, 1988).

The Three Level 2 Variables That Explain the Level 1 Intercept

In this section I discuss the three variables that significantly predicted the intercept of Level 1, i.e. the average probability of the child to speak Chinese when the person named in

the social network was not a parent, Chinese-school relation, English-school relation, or a relative, and when the person was at the position of average closeness (4.5) to the ego child (Controlling closeness in this analysis was because the interaction between closeness and the alter being a relative was significant). Next, I discuss the three Level 2 effects in the order of the availability of Chinese media at home, Time 1 Chinese proficiency, and parents' education.

Although the variable of Chinese media availability at home was only marginally significant in predicting the average probability, it deserved to be included in the model since it confirmed to a certain extent our consensus about the importance of exposure and input in language acquisition. In particular, this variable was actually predicting the average probability when controlling other variables - such as the alter person named in the social network not being a parent or a relative; what this means is that media environment is an effective supplement to other parts of the language environment composed of people who speak HL to children. We are then clearly reminded that this is where we can take action and do something – the building of resource either on paper or online and thus the building of a rich language environment.

Time 1 Chinese proficiency was also significant in predicting the average probability of the child to speak Chinese when controlling other factors. This is similar to our discussion of its significance in predicting Time 2 Chinese proficiency when answering Research Question 1, where Time 1 proficiency was considered to be the foundation on which Time 2 proficiency was maintained. The significance of Time 1 proficiency here demonstrates the reciprocal relationship between language use and language proficiency. The more the child uses the language, the more proficient he is; the more he is proficient at a language, the more

likely he keeps using it. This phenomenon of feeding into each other suggests that HLM should be a daily, continual effort, and that each instance or period of abstention from HL use might contribute to more difficulty in recovering this continuity.

Previously, based on the positive correlation between parent education and family income and the fact that family income instead of parent education was a significant predictor of the effect of parents' HL behavior on the probability for the child to speak Chinese, we hypothesized that parent education (and then English language proficiency) served as a mediator for family income. Now the variable of parent education is right in a position of significantly predicting the child's average probability of speaking Chinese. Controlling other factors, therefore, parent education is a positive factor in HLM. The mechanism of how it played its role was not clear by looking at the current data. One possibility would be that parents of higher educational background were mostly professionals, who devoted more time talking to their children as a result of their own rich social experiences and expectation of their children (Hart & Risley, 1995). When in the Foreword summarizing Hart and Risley's longitudinal work of 42 American families, Lois Bloom emphasized that frequency matters and that some children have learned more words than others simply because they engaged in many more interactions with language in their homes. While this possibility exists, however, the fact that parent education is not a significant predictor of the effect of parents HL behavior on children's probability of speaking HL still reminds us that parent education may be exerting its influence in ways unknown to us. Based on the findings in this study and the discussions I just presented, it may be reasonable to suggest two points: first, higher parent education is a positive factor for HLM; second, how parent education plays its role into HLM is a line of research worth more efforts.

The Effects of Technologies

Although the effects of technologies were not directly addressed by the models that answer the two research questions, the effects of technologies is a topic that has drawn much attention in the HLM research, as was previously mentioned in Chapter 3.

Data related to technology was obtained in two places of the questionnaires. One is when informants are asked to include not only face-to-face interlocutor but also anyone he speaks to over a long distance through modern communication technologies, and are asked to indicate what communication media are used: telephone, or CMC such as Skype, MSN, and Yahoo Messenger; the other is when they are asked to gauge the availability of literacy resources through technology such as TV, radio, newspaper, and websites in HL. The latter is labeled as Chinese Media Availability in this study and has been discussed where its interaction with the Level 2 intercept was discussed. As for the former, the communication technologies, the Time 2 survey asked about both people using technology and people not using technology, so the data is "global", which does not allow me to discuss the unique contribution of technology. This is also why technology did not figure into the models build to answer RQ2, which was based mainly on Time 2 data. But Time 1 data do allow me to infer about the effect of technologies.

Previously I inferred about the contribution of communication technology to the effect of relatives in the multilevel model that answered RQ2. I inferred that it was because of the communication technologies that relatives became a significant part of the children's social networks. A correlation analysis of Time 1 data now confirms this.

Table 11. Correlations between Talking through Technology and Alter Is Relative

	F2F	Through TECH
Talk Face to Face		
Talk through Technology	-0.041	
Alter Is Relative	-.473**	.132**

Note. N = 1025. F2F = Talk Face to Face. Through TECH = Talk through Technology
**. Correlation is significant at the 0.01 level (2-tailed).

In Table 11, we can see that there is a significant, negative correlation between Alter Is Relative (1 vs. 0) and Talk Face to Face (frequencies represented by 1-5). This is obviously in accordance with our common sense since relatives are mostly back in the homeland country. Meanwhile, there is a significant, positive correlation between Alter Is Relative and Talk through Technology. Therefore, while it is difficult to talk face to face with the relatives back in the homeland country, modern communication technologies have made it possible for those far-away relatives to become part of the children's social networks. This is concrete statistical evidence for what Li Wei (1994) suggested about the potential of modern communication technologies in turning passive ties into active ties.

Finally I would add an interesting observation of the technology use in this study in relation to Zhang (2010). In her social network analysis of Chinese students learning English as a FL, Zhang found that second language learners used technology mainly to get language input but rarely to get language use or receiving feedback. In my study here, in addition to the finding related to media availability at home, which is for language input, I have also found that technology was used for language use, i.e. interactions, which further suggest the possibility of meaning negotiation or feedbacks. If we consider that foreign language learners are using technology and learning basically in isolation, and that HL learners in this study are interacting with their relatives in the homeland through technology, we may come to the

conclusion that it the social needs that have predetermined whether technologies can be used for interaction purposes. Therefore, while the suggestion for students in Zhang's study is that social connections be created for those students to engage in interactions, the suggestion for HL learners might be that their current connections with relatives back at homeland be maintained or enlarged.

In summary, considering communication technologies (that connect far and near) and media technologies (at home) together, we should always remember to keep technologies as an option when we make efforts in HLM.

Conclusion

Direct Conclusions from This Study

Answering the two research questions has given us important insights about children's HLM environment and about what we can do.

First, by answering the first research question, we have gained firm evidence that a social network in HL contributes to the improvement of language proficiency, or at least can prevent it from decreasing fast in the situation of overwhelming trend of language shift. The importance of social networks for HLM is of course not a new finding. But the quantitative evidence in this study may serve us as an immediate guide of action for HLM. In addition, because we witnessed the effect of action in the form of social networks, we should be more confident about the impact we are going to make. This is what De Houwer (2009) called for as *impact belief*. If such impact belief can be instilled in HLM educators and any other people in children's social networks who have the potential to interact with the children in HL, more opportunities of HL use will be created, and the HL environment for children will have the

prospect of facilitating an additive bilingual development rather than a subtractive bilingualism or language shift.

Second, by answering the second research question, we have come to know more details about the dynamicity in children's HLM environment.

As some structural characteristics of the children's ego-centric networks such as the density of Chinese ties did not find their way into the model we built to explore the major factors that influence a child's language choice, that is, his probability of speaking Chinese, one important conclusion we may draw may be that the child's choice of language mostly depends on to whom they are speaking, and is not influenced by the "atmosphere" in his environment. In this sense, what De Houwer (2009) hoped for from "overhearing" was not supported. Therefore, when we take action following our impact belief, what we most need to do is to engage ourselves in speaking to them directly, rather than just speaking among us adults or only paying attention to providing services or resources to children (although media environment is equally important). We need to speak to them, directly, in our HL. Needless to say, language is only the medium for communication. Therefore, while the grand environment may not be as helpful as expected, providing language social support by creating actual, moment-by-moment opportunities engaging the children in meaningful use of the HL (W. He, 2006) should be our goal.

We have also discerned 1) the positive effects of weekend language schools in that they have contributed to the formation of children's social networks in HL, which is encouraging while literature has revealed some disappointment in HL schools' effectiveness; 2) the positive effects of modern communication technology in that distant homeland people have been brought closer to the children; and 3) the positive effects of HL media available at home

in that they may have provided more exposure or input to the children as a supplement to the exposure created by those who speak to children in HL. All these aspects are what we should keep in mind and retain or improve in future HLM effort.

The analyses by means of combining SNA and MLM have also revealed the dynamicity among some environmental factors (Level 2) that influence children's HL behavior either directly or indirectly. Family income was found to interact with the effect of parents' HL behavior, parent attitude with Chinese–school-related effect, and home visits with relatives' effect … These dynamic relations may still be viewed as complex. But the process of attempting to explain them and to form a whole picture is still revealing. For example, the negative effect of family income may actually inform us of the powerful force of the society (interpreted as *time and situation*) against which background other factors and efforts may be playing their roles. And the surprisingly negative effect of parent attitude on Chinese-school relations' effect may offer a mirror for Chinese parents to examine their educational philosophy. In the end, maybe an appropriate way to interpret all this dynamicity is the word *change*. Nothing is fixed. Everything can change.

And finally, as part of the above picture of dynamicity, there seems always to be opportunities for *attitude* to come back in and play its role. Because of the variation of attitudes across people, and because of people's different ways and competencies of actualizing their attitude, it is only natural that the whole picture is even more complex and that the relationship between attitude and other factors for HLM will remain a myth (Lynch, 2003). While this myth may be a truth, we have learned that an impact belief and its resulted actions are what we can depend on to push the dynamicity toward the direction of HLM.

The Impact Belief, the Group Socialization Theory, and the Bidimensional Acculturation Model

Towards the end of the writing of this dissertation, my committee brought my attention to J. R. Harris's Group Socialization (GS) theory and John W. Berry's Bidimensional Acculturation Model. To discuss these two theories in detail would be going out of the social network analysis framework of this current study. However, since I identify with De Houwer's (2009) call for the impact belief[7] and its related action in language social support by parents and other capable adults in children's immediate social networks, and since the GS theory debunks the roles of parents but attributes decisive functions to peers, I believe it is necessary to strengthen my argument by dispelling the potential confusion brought by the GS theory. Meanwhile, Berry's acculturation model provides a space in which we think about the impact belief, so it will be discussed briefly in relation to the findings of this study at the end of this section.

The Impact Belief and Group Socialization Theory

Socialization is the process of one becoming "an acceptable member of his or her society – one who behaves appropriately, knows the language, possesses the requisite skills, and holds the prevailing beliefs and attitudes" (J. R. Harris, 1995). In answering the question of "where is the child's environment", J. R. Harris (1995) presented her group socialization theory of development. She contends that socialization is context-specific and that outside-the-home socialization takes place in the peer groups of childhood and adolescence and that the home environment has no lasting effects on children's psychological characteristics,

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[7] The term *impact belief* from De Houwer (2009) was first introduced and referred to in the discussion of Research Question 1 at the beginning of Chapter 5.

which include code switching and language shift (J. R. Harris, 1995, 1998). In regard to immigrant children, Harris writes, “If the peer group’s culture differs from the parents’, the peer group’s always wins. The child of immigrant parents or deaf parents invariably learns the language of her peers and favors it over the language her parents taught her. It becomes her native language” (J. R. Harris, 1998, p. 358, as was cited in Jacobs, 2012).

I believe Harris’s contention does not necessarily affect but may instead enhance my argument for parents and close community’s impact belief and action in HLM.

I agree with her prediction that peer influences will dominate; otherwise there would not have been concerns about HLM or research on language shift. Actually my study provides support for Harris’ GS theory in that the English school relations in the children’s ego-centric networks exerted significant, negative influences on the probability of the children to speak their HL Chinese, and that the children, as a whole group, did have lower oral proficiency (reported by parents and children) at Time 2 compared with Time 1.

Meanwhile, however, my study also suggests the significant, positive influences from parents, relatives, and Chinese school relations (in models addressing RQ2), and the global influences from all people speaking Chinese to the children in their networks, as was evidenced in the influence model addressing RQ1.

The subtlety is that Harris does not claim that parents do not have effects; it is just that parents do not have *lasting* effects on children’s development. The word *lasting* hints a tendency issue. The tendency is that peer influences will win and home influences will wane. Harris’s claim and my findings, as were just reiterated, do not conflict on this point. Instead, there is a good mesh between the two if we aim at making parents’ effects last long enough until the children become adults, enter college, and make their own decisions in regard to

whether or not to continue their effort in HLM. If every parent makes an effort in at least slowing down the speed of language loss, and if two or more children from such families gather and communicate, there will be great probability that the children maintain certain HL proficiency so that it will be easier for them to recover and improve it when they desire to at college. This is one of the starting points for my study. And in the end, my study shows that helping children form social networks with HL speakers could be a very effective approach to HLM.

The Impact Belief and John W. Berry's Bidimensional Acculturation Model

John Berry's acculturation model (1974, 1980) proposed two independent dimensions for the processes of immigrants acculturating in the host society. The first dimension is the maintenance of heritage, culture, and identity, and the second dimension is the involvement with or identification with aspects of their host societies. These two dimensions create a quadric-modal space outlining acculturation strategies used by individuals and groups. The four sections of strategies include assimilation, separation, marginalization, and integration. In assimilation, immigrants seek to be acculturated into the mainstream society while having little interest in cultural maintenance; separation, opposite assimilation, is where immigrants seek cultural maintenance and avoid involvement with the mainstream society; in marginalization, immigrants neither seek cultural maintenance nor identify with the mainstream society; and finally in integration, both cultural maintenance and involvement with the mainstream society is sought.

The social and psychological processes may be much more complex than Berry's model suggests. From a perspective of social justice, for example, Ngo (2008) critiqued that the bidimensional acculturation theories cannot provide a holistic explanation of inequitable

socioeconomic realities facing some immigrants and may pathologize a marginalized population. Despite this complexity, however, I believe Berry's acculturation model provides a space for us to further discuss and strengthen the impact belief. We do not need to stretch our imagination to believe, and the literature also suggests, that immigrants would seek integration if possible. This might be a struggling process (See Li, 2006c; Luo & Wiseman, 2000; Ou & McAdoo, 1993). It is in this struggling process that we need to emphasize the effect of the impact belief. It would be beyond this study's framework to argue at the cultural level or the sociological level; but this study's findings through social network analysis has provided evidence at the psychosocial level that heritage language maintenance, an aspect of the acculturation process, is where we may make more effective efforts in helping immigrant children to achieve integration or a comfortable bilingualism.

Facing the Complex Reality with Simplicity

Our realization of the need to hold our impact belief and to take a social network approach to building children's immediate HLM environment may be more important and meaningful now if we are aware that Fishman and Crawford's warnings (Crawford, 1992, 1998, 2007; Fishman, 2001b) about institutional support are still valid. Despite federal government's recognition of a huge demand of proficient speakers of world languages, the 2011 fiscal year has already witnessed substantial federal funding cuts to those programs under Title VI supporting the teaching of world languages to K-12 and college students. Among the programs affected by the cuts are those that have exactly been working to provide professional training, resource creation, and assessment support to heritage language education (Language Educator, 2011). While these cuttings may be the result of economic depression, they reflect the fragility of FLE and HLM in face of undependable institutional

support. In such a situation, we of course need to express our concerns and call for at least retention of those supports (Language Educator, 2011; Zehr, 2011), but one thing that is equally important but that we may often neglect is to help families and their close communities to play their roles (Fishman, 2001b).

The reality is complex and may be harsh. The dynamicity revealed by this study seems to have evidenced the complexity. I believe, however, actions we need to take do not need to be complex. On the one hand, when we know the true situation and thus avoid naivety, we may keep our effort consistent and achieve better results. On the other hand, out of the dynamicity revealed by this study, there is also simplicity - social networks do work, and parents can do a lot. To be a little more specific, although it is hard to reverse the language shift as a whole group in face of the dominating mainstream society, parents can do a lot in organizing or helping children to form HL social networks, which can at least slow down the speed of language loss until sometime in future when children become adults and make their decisions in relation to HLM. I hope this study's findings may reveal to people how that effort CAN be made.

Limitations, Caution, and Future Research

First, the two schools and thus the informants were not randomly selected; they were just convenient samples. Therefore caution is needed when we make generalization. Perhaps a better way to deal with the findings of this study is to connect them with the profiles of the informants and the schools, and expect different dimensions of new analyses.

Second, the 55 children reported altogether 412 people in their social networks, which might have made it easier to attain statistical significance at Level 1, i.e. the alter level,

especially for the effect of parents, since parents were reported by almost every child. Therefore we may want to take some caution in interpreting those alter level effects.

Third, perhaps due to the families' concern of privacy, I failed in eliciting data of and then detecting the "network" effect, i.e. the effect of those who do not speak to the children directly but speak among themselves. We do have literature that prove from the linguistic perspective that the frequency with which children hear words in the input and their level of lexical development are closely related (De Houwer, 2009; Hart & Risley, 1995, as was reviewed in De Houwer, 2009). It is not hard to imagine that an environment in which as many people as possible speak the HL will create more opportunities for children to learn *naturally*. It will be interesting to know whether such Level 2 network characteristics really predict children's HL proficiency or choice. And it is equally desirable to know, at a higher level, whether an environment like San Francisco will really exert more environment influence upon children than an environment like a small city like East Lansing. For this reason, more informants need to be recruited across various macro-environment (e.g. in different cities); and for that purpose, a three-level MLM design may be considered.

We also need to be cautious in drawing causality conclusions. Perhaps the only causal relation we can draw is about the contribution of the social networks in Chinese detected through the longitudinal design. Despite of this, we still need to recognize that language choice and social networks that the learners form are in a reciprocal relationship. As A. W. He (2010) put it from her socio-cultural constructivist approach, "learners contribute to the socialization process of the very people who socialize them to use the HL. Heritage language learning has the potential to transform all parties involved in the socialization process" (p. 78). In this sense, the social network approach is only part of all possible efforts.

APPENDICES

Appendix A.

Table 12. Descriptive Statics of Major Variables

LEVEL-1 DESCRIPTIVE STATICS

VARIABLE	N	MEAN	SD	MIN	MAX
Alter Is Parent	412	0.26	0.44	0	1
Alter Is Chinese School	412	0.16	0.36	0	1
Alter Is English School	412	0.19	0.4	0	1
Alter Is Relative	412	0.14	0.35	0	1
Alter Is Sibling	412	0.12	0.33	0	1
Child Speaking Chinese (1-5 scale)	412	2.72	1.63	1	5
Child Speaking Chinese (dummy)	412	0.36	0.48	0	1

LEVEL-2 DESCRIPTIVE STATICS

VARIABLE	N	MEAN	SD	MIN	MAX
Year in English School	55	3.68	2.55	0.1	11
Year in Chinese School	55	4	2.64	1	12
Parent Education	55	3.47	0.84	1	4
Family Income	55	3.66	0.77	1	4
Home Visits	55	2.37	1.54	0	6
Parent Attitude	55	5.78	0.94	4	7
Child Attitude	55	4.66	0.85	3	7
Chinese Meida Availability	55	2.55	1.14	1	5
Time 1 Oral Proficiency	55	5.13	0.97	3	7
Time 2 Oral Proficiency	55	5.04	1.06	1.5	7

Appendix B. Children Questionnaire

Questionnaire for Children

Your name （你的名字）: _____
Your American School and Grade/Year （你的美国学校名称和年级）: _____th Grade, _____School.
Your Grade/Year in the Chinese School （你在中文学校的年级）: _____th Grade (年级)

Step 1. Answer the question: How well do you think you speak Chinese? Please check the box in front of your choice (第一步. 请回答问题：你觉得你的中文说得怎么样？请在你的选项前边的方框里打‘X’) .

☐Extremely poor 极差 ☐Very Poor 很差 ☐Poor 差 ☐Average 一般 ☐Good 好 ☐Very Good 很好 ☐Excellent 非常优秀

Step 2. Answer this question: What do you think of your desire to speak Chinese? i.e. Do you like to speak Chinese? Please check the box in front of your choice (第二步. 请回答问题：你觉得你说中文的愿望强烈吗？即，你愿意说中文吗？请在你的选项前边的方框里打‘X’).

☐Extremely weak 极其微弱 ☐Very Weak 非常微弱 ☐Weak 微弱 ☐Average 一般 ☐Strong 强烈 ☐Very Strong 非常强烈 ☐Extremely Strong 极其强烈

Step 3. Please fill in and complete the table below**. Read the instruction carefully**.

Q1. Please answer this question**---In the past half year, in whatever language, who do you often speak to and feel closest to?** Think of no more than 8 people. Please write **in the second column of cells** their relation with you and their **whole names** (such as Frank Woo), or just the relation with you if they are your parents or grandparents. Attention: Person 1 should be the person you feel the closest to and most often speak to; Person 2, less close; … Person 8 should be the least close of the 8 people you think of. （请回答这个问题 **------ 在过去半年中，不管说什么语言，你觉得和谁最亲近、说话最多？**想出最多 8 个你感觉最亲近又经常和你说话的人，把他们与你的关系以及他们的全名 （例如： 吴亮），或者只写和你的关系（如果他们是你的爸爸妈妈或爷爷奶

奶），从“最亲近、最常说话”开始按顺序填写在**表中第二栏相应方格内**。注意：第 1 个人是最亲近、最常说话的，第 2 个人少一点……第 8 个人是这八个人中和你相互间说话最少的。）**【Please place your responses in the table on the NEXT page! 请把答案填在下页的表格里！】**

Q2 – Q5. About each person you listed in answering the first question above, please answer four more questions, which are horizontally listed as Q2 – Q5 in the table. （第二至第五个问题：在回答上面第一个问题时，你列出了几个人。关于每个人，下面的表格都横向列出了四个问题，即第二至第五个问题。请按要求回答这些问题。）

Person Number ↓	Q1: The person’s relation to you **and** the name in whole? (Just specify relation if the person is parent or grand parent) 关系以及姓名，或者只写关系（如果是父母或爷爷奶奶） **[Only fill in each cell below with a letter out of A –K that represents your choice. If you select K, please specify the relation]【只把 A – K 中代表你的选择的某一字母填入下面各个空格; 如果你选 K, 请说明是什么关系】** A. Dad （爸爸） B. Mum （妈妈） C. Grandpa/grandma （爷爷/奶奶） D. Brother /sister （兄弟姐妹） E. Aunts/uncles （叔舅姑姨） F. English-school teacher （英语学校老师） G. English-school classmate （英语学校同学） H. Chinese-school teacher （中文学校老师） I. Chinese-school classmate （中文学校同学） J. Neighbor （邻居）K. Other （其它）	Q2. How often do you talk to each other **face to face**? (你和他或她经常**面对面**说话吗？) **[Please fill in each cell below with a letter out of A – E that represents your choice about each person.]** **【关于每个人，请把 A –E 中代表你的选择的某一字母填入下面各行空格】** A. Never/Very seldom （从来没有/很少） B. Once or twice every month)（每月一两次） C. Once or twice a week（每周一两次） D. Once or twice every day （每天一两次） E. Many times a day （每天好几次）	Q3. How often do you talk to each other **by international phone call or through the Internet?** （你和他或她经常**通过国际长途电话或互联网**说话吗？） **[Please fill in each cell below with a letter out of A – E that represents your choice about each person.]** **【关于每个人，请把 A –E 中代表你的选择的某一字母填入下面各行空格】** A. Never/Very seldom （从来没有/很少） B. Once or twice every month)（每月一两次） C. Once or twice a week（每周一两次） D. Once or twice every day （每天一两次） E. Many times a day （每天好几次）

第 1 人	→	→	→
第 2 人	→	→	→
第 3 人	→	→	→
第 4 人	→	→	→
第 5 人	→	→	→
第 6 人	→	→	→
第 7 人	→	→	→
第 8 人	→	→	→

Person Number		Q4. What languages and how much do **you** speak with him/her in each language?（**你**对他/她说话时用英文还是中文？如果都用，哪个多？） **[Please fill in each cell below with a letter out of A – E that represents your choice about each person.]【关于每个人，请把 A –E 中代表你的选择的某一字母填入下面各行空格】** A. Nearly always in English. （几乎总是说英语 B. Usually (like 75%) in English. （通常说英语，例如 75%） C. About half in English, half in Chinese. （一半英语，一半中文） D. Usually (like 75%) in Chinese. （通常说中文，例如 75%） E. Nearly always in Chinese. （几乎总是说中文）	Q5. What languages and how much does **she/he** speak with you in each language?（**他/她**对你说话时用英文还是中文？如果都用，哪个多？） **[Please fill in each cell below with a letter out of A – E that represents your choice about each person.]【关于每个人，请把 A –E 中代表你的选择的某一字母填入下面各行空格】** A. Nearly always in English. （几乎总是说英语） B. Usually (like 75%) in English. （通常说英语，例如 75%） C. About half in English, half in Chinese. （一半英语，一半中文） D. Usually (like 75%) in Chinese. （通常说中文，例如 75%） E. Nearly always in Chinese. （几乎总是说中文）

第 1 人	*Reminder*: If necessary, please refer back to the previous page and remember who each person is. *提示*：如有必要，请参照前页，回想你所列的是哪些人。→		
第 2 人			
第 3 人			
第 4 人			
第 5 人			
第 6 人			
第 7 人			
第 8 人			

Step 5. You are now near the end of this questionnaire! Please think about this last question: **Of the people you listed in the above table, who and who often speak Chinese to each other?** Each cell of the following table represents an opportunity of someone speaking to another. Please put an 'X' in any cell that you think the two related people speak Chinese to each other. DO NOT mark any grayish cells. Please only use the bottom half the table. If you are still now sure how to fill in the cells, you may look at the example further below. （你现在马上就要答完这份问卷了！请回答这个问题：你在上面列出的人中，谁和谁最经常互相说中文？下表中每一个空格都代表某个人有机会与另一个人说话。如果你认为两个人常互相说中文，就在与两人同时有关的空格内填入'X'. 不要填在灰色空格内；请只使用表的下半部分。如果你仍然不明白怎样填，请参考下面第二个表格。）

	第 1 人	第 2 人	第 3 人	第 4 人	第 5 人	第 6 人	第 7 人	第 8 人
第 1 人								
第 2 人								
第 3 人								
第 4 人								
第 5 人								
第 6 人								
第 7 人								
第 8 人								

Example Table: How to Check the Cells

	第 1 人	第 2 人	第 3 人	第 4 人	第 5 人	第 6 人	第 7 人	第 8 人
第 1 人								
第 2 人	X							
第 3 人								
第 4 人			X					
第 5 人		X	X					
第 6 人								
第 7 人								
第 8 人								

【This table shows that Person 1 and Person 2 speak Chinese to each other. The same is true between Person 2 and Person 5, Person 3 and Person 4, and Person 3 and Person 5. 】

Thank you! 谢谢！ ☺

Questionnaire for Parents
（家长问卷）

Attention please: If you have two or more than two children who are responding to this set of questionnaires, please indicate that this parent questionnaire is filled in for _____ (child's name); otherwise, please just go ahead （**请注意**：如果您有两个或两个以上的孩子在回答这次的问卷调查，请注明这份家长问卷是关于_____(填写孩子姓名)的。否则，请直接回答以下问题）→

Please check the box in front of your choice (请在您的选项前边的方框里打'X').

1. The highest academic degree achieved by you or your spouse（您夫妇中最高学历）:

☐A. High school diploma or below 高中毕业或以下 ☐B. Bachelor 学士学位 ☐C. Master 硕士学位 ☐D. Ph.D. 博士学位

2. Your yearly family income （您的年家庭收入）:

☐ ≤ $25, 000
☐ $25,000 - $50,000
☐ $50,000 - $75,000
☐ ≥ $75,000

3. You couple are both Chinese（您夫妇都是中国人）.

☐A. True （对）
☐B. False，one is not （错, 有一方不是）.
☐C. False, neither is （错，都不是）

4. Most of the time you speak Chinese at home （大多数时间您在家里是说中文的）.

☐A. True （对） ☐B. False （错）.

4.1 If true, the Chinese language you speak at home on a daily basis is（如果对，您说的是）:

☐A. Mandarin Chinese (Putonghua) or close dialects. （汉语普通话或相近方言）
☐B. Wu （吴方言）
☐C. Cantonese （粤语）
☐D. Min （闽方言）
☐E. Xiang （湖南话）
☐F. Hakka （客家）

☐G. Gan （赣语）

5. Your child was born in （您的孩子出生在）:

☐ China （中国） ☐ America （美国）
☐ Some other country (please specify) 其它国家 （请注明）: _____

6. **If your child was born in China**, the child has been in America for _____ years （如果您的孩子出生在中国，您的孩子已经在美国生活了_____ 年）.

7. No matter whether your child was born in China or not, how many times have you taken him/her back to visit families and relatives in China? And about how many weeks is it each time in average? Your reply （无论您的孩子是否出生在中国，您迄今为止带孩子回过中国多少次？每次大概几个星期？您的回答）:

_____ times; about _____ weeks each time in average.
（_____次; 大约平均每次_____ 个星期）

8. Your perception of your child's Mandarin (spoken) Chinese language proficiency （您觉得您孩子的汉语口语水平）：.
☐Extremely poor 极差
☐Very Poor 很差
☐Poor 差
☐Average 一般
☐Good 好
☐Very Good 很好
☐Excellent 非常优秀

9. Your perception of your child's reading comprehension ability in Chinese （您觉得您孩子的中文阅读理解能力）:
☐Extremely poor 极差
☐Very Poor 很差
☐Poor 差
☐Average 一般
☐Good 好
☐Very Good 很好
☐Excellent 非常优秀

10. Your perception of your child's writing ability in Chinese （您觉得您孩子的中文书写能力）:
☐Extremely poor 极差

☐Very Poor 很差
☐Poor 差
☐Average (“so-so”) 一般
☐Good 好
☐Very Good 很好
☐Excellent 非常优秀

11. The strength of your desire that your children should be able to speak Chinese（您希望孩子会说中文的愿望）：
☐Extremely weak 极其微弱
☐Very Weak 非常微弱
☐Weak 微弱
☐Average 一般
☐Strong 强烈
☐Very Strong 非常强烈
☐Extremely Strong 极其强烈

12. Your children’s desire to speak Chinese （您的孩子说中文的欲望强度）：
☐Extremely weak 极其微弱
☐Very Weak 非常微弱
☐Weak 微弱
☐Average 不强不弱
☐Strong 强烈
☐Very Strong 非常强烈
☐Extremely Strong 极其强烈

13. The frequency your children watch digital media or read books in Chinese with or without you, such as movies, TV programs, DVD cartoons, multimedia on the Internet, etc. （您孩子经常阅读中文书籍或观看其它中文媒体，如电影、电视、DVD 动画、互联网多媒体等吗？）
☐A. Never/Very seldom （从来没有/很少）
☐B. Once or twice every month（每月一两次）
☐C. Once or twice a week（每周一两次）
☐D. Once or twice every day （每天一两次）
☐E. Many times a day （每天好几次）

14. The richness of ‘Chinese’ atmosphere where you live (either linguistically or culturally)（您居住的地方“中国味”（无论语言还是文化）浓厚吗？）:

☐Extremely Poor 极其淡薄
☐Very Poor 非常淡薄

☐Poor 淡薄
☐Average 一般化
☐Rich 浓厚
☐Very Rich 非常浓厚
☐Extremely Rich 极其浓厚

15. Does your child's school have Chinese as a required or selective course or an after-school program?（您孩子的学校有必修或选修的中文课、或者课后中文活动吗？）

☐A. Yes. （有） ☐B. No （没有）

16. Does your city or town have local TV channels in Chinese?（您所在城市现有电视频道中有中文频道吗？）

☐A. Yes. （有） ☐B. No （没有）

You have come to the end of the survey for parents - ☺

Thousands of Thanks!
万分感谢！

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