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ASSOCIATIONS BETWEEN A MULTIDIALECTAL ENVIRONMENT AND PRE-LINGUISTIC LANGUAGE DEVELOPMENT

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ABSTRACT: *This study produced data from Chinese infants who live in single-dialect and multi-dialect families, in an effort to study how language input might affect an infant's language development at the pre-linguistic stage. The findings reveal that there is a positive association between multi-language input and infants' phonetic ability. Infants at six to eight months of age are capable of distinguishing between phonetic units of dialect and standard language. This phonetic discrimination skill begins to weaken at 9-12 months of age, as confirmed by data from infants living in single-dialect families. However, no data suggests one pronunciation is significantly favoured over another. This is confirmed by tests with 11-month-old infants who live in two-dialect and three-dialect families. Infants raised up in multi-dialect families seem to keep two or three pronunciations of lexicons in mind and switch them depending on who they are communicating with.*

KEYWORDS: Infant, Multidialectal Environment, Pre-Linguistic Language Development

INTRODUCTION

Ever since the 1950s, humans' capacity for speech and language has been studied intensively in different perspectives. This boom has mainly focused upon whether this ability is *nature* or *nurture*. Representative works include the nativism of Chomsky (1959) vs. the learning of Sinner (1959). In the last decade of the 20th century, an explosion on pre-linguistic language acquisition broke out. Since then, a good deal of studies from different countries has been carried out. Best (1994), Kuhl, Tsao and Liu (2003), and Pegg and Werker (1997) argue that language experience plays an important role in the speech perception of six- to eight-month-old infants. Infants after six months of age tend to rapidly acquire phonetic information relating to the mother tongue. Kuhl (1986) points out that infants are able to discern differences between phonetic contrasts in any natural language at birth. In their recent work, Kuhl (2004) and Kuhl, Tsao, and Liu (2003) claim that, along with the improvement in native language phonetic perception, nonnative perception ability declines. Jusczyk (1997)

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proposes that infants' exposure to the ambient language in the pre-linguistic state is crucial to help infants to notice regularities in the sound patterns of the mother language. By the age of 7.5 months, infants can segment some words from fluent speech (Jusczyk & Aslin, 1995). This ability, as Kuhl, Tsao, Liu, Zhang and de Boer (2001) suggest, is owing to language input. That is, infants' language acquisition, i.e. phonemes, lexicon and structure, are acquired simply by listening to the languages surrounding infants. Hart and Risley (1995) and Hoff and Naigles (2002) hold a similar position, i.e. infants' vocabulary is related to the amount of language that parents address to infants. Kuhl (2004) departs from a neuropsychological viewpoint and argues that language acquisition involves neural commitment, i.e. learners commit the brain's neural networks to patterns that reflect natural language input. Conboy et al. (2005) show that 11-month-old infants from monolingual English-speaking families present better discriminating ability in respect of the English target than the Spanish target; meanwhile, for seven-month-old infants, the ability to recognise the English and the Spanish targets appears to be at similar levels.

The existing literature of second language acquisition has mainly focused upon cross-linguistic associations, such as taking English and Spanish as the target languages. Few attempts seem to have been made to study the potential link between multi-dialect input and first year language development.

In China, there are 56 ethnicities and about 80 languages, as well as numerous dialects. Most Chinese speak one or two dialects, in addition to the standard language. Officially, nine types of dialects have been established: Mandarin, Jìnyǔ, Wú, Huī, Gàn, Xiāng, Mǐn, Cantonese, and Hakka. Figure 1 gives a dialect map of China. The green parts stand for Mandarin-speaking areas; the yellow parts are Hakka-speaking areas; the blue parts are Mǐn dialect-speaking areas; the orange parts are Wú dialect-speaking areas; the brownish-red parts are the areas where the Xiāng dialect is spoken; the rose-red parts are Gàn dialect-speaking areas; the purple parts are for Cantonese; and the brown parts are the Jin dialect-speaking areas.

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Figure 1. A dialect map of China (Parker and Hansen 2013)

To make the situation regarding the different dialects even more complicated, each dialect has various sub-dialects, which differ from each other in terms of phonetics as well as lexicons. For instance, Zhejiang is an eastern coastal province with an economy that is ahead of other provinces. Linguistically speaking, the dialects in Zhejiang are quite diverse: most inhabitants speak Wú, which contains a number of variations: i.e. the Hang Zhou, Shao Xing, Ning Bo, Wen Zhou, Tai Zhou, Jin Hua and Qu Zhou dialects. People in one district may speak a dialect that is completely unintelligible to their neighbours in a district that is only a few kilometres away.

As a result of economic development, a great number of people have moved to coastal regions to improve their opportunities, which has given rise to an increase in marriages among people from different provinces. Most mothers in China return to work after a three-month maternity leave; therefore infants are most often looked after by grandparents or nannies. Since the grandparents or nannies come from different areas of China, they probably only speak the dialect of their hometowns. The infants' parents also come from different areas and thus communicate with each other in Mandarin, i.e. the standard language. As a result, it is very common for infants to be exposed to two or three dialects at home. This paper refers to such a living environment as a multidialectal environment.

With these circumstances, it would seem to be of great value to investigate the potential link between multi-dialect input and an infant's pre-linguistic language development. The reason for examining phonemic ability is that, among the various language acquisition processes, phonology appears to be the most sensitive to the effect of age of language acquisition (cf. Bongaerts, Planken and Schils 1995). Flege et al. (1999) hold a similar view, i.e. phonology is more sensitive to the age of acquisition effects than grammar. This paper expands on this range of research by analysing data from Chinese infants who live in multidialectal families

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and exploring the development of infants' discrimination skills regarding their phonetic abilities. It particularly sheds light on two issues:

(i) How do the effects of multi-dialect environment input on infants' phonetic ability in the first half-year of life differ from the effects on the infants when they reach 11 months old?
(ii) Is one dialect significantly favoured over another? Or are the different dialects equally favoured?

The paper is structured as follows: Section 1 sets the stage for what follows by drawing on previous studies that have tackled similar issues and giving a brief introduction to the dialect diversity within the Chinese language. Section 2 provides an insight into the methodology. Section 3 analyses the results of the tests – it uncovers the effects of the living environment on (a) infants from a single-dialect family; (b) infants from a two-dialect family; (c) infants from a three-dialect family. Section 4 highlights the results and concludes the paper.

METHODS

Participants

The experiment discussed in this paper aimed to uncover the influence of multi-dialect input on early-life language development. Therefore, three groups of developing infants (19 infants: 9 boys and 10 girls, approximately six months old at the time of recruitment), together with their families, were recruited.[1] The criteria for participants were as follows:

(I) The infants had a gestational age at birth of 40 ± three weeks;
(II) The infants were physically and mentally healthy;
(III) Two or more dialects are spoken at home.

19 families were recruited. The information about each family is as follows.

(a) Nine single-dialect families, i.e. three infants from a Jin Hua dialect-speaking family (Eastern parts of China); three infants from a Wu Han dialect-speaking family (Central parts of China); and three infants from a Chong Qing dialect-speaking family (Western China).

(b) Nine two-dialect families, i.e. three infants from a Jin Hua and Hang Zhou bi-dialectal family; three infants from a Cantonese and Hang Zhou bi-dialectal family; and three infants from a Hang Zhou and Chong Qing bi-dialectal family. It should be noted that the dialects in

[1] In fact, an additional five infants from bi-dialectal families were tested, but data on them were discarded because three infants kept crying and the other two infants were restless during the first experiments.

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the first family, i.e. Jin Hua and Hang Zhou, are from the same province and are mutually intelligible with slight efforts. In the second family, the dialects, i.e. Cantonese and Hang Zhou, are significantly different in phonetics, lexicon and syntax. In the third family, the Hang Zhou and Chong Qing dialects differ a great deal. It is expected that such different bi-dialectal families would bring significant data.

(c) One three-dialect family, i.e. composed of a Cantonese-speaking father, a British English-accented mother, and a nanny with a Philippine English accent.

(d)

It appears necessary to shed further light on the dialect distinctions of the above dialects. Jin Hua is a city located in the centre of Zhejiang Province. It is a typical area whose dialect does not make a distinction between 'R' and 'L'. All words with the starting consonant 'R' are likely to be pronounced 'L', e.g. 热 (RE) 'hot' is pronounced as 乐 (LE) 'happy'. This often leads to misunderstanding in conversations between people from the North and the West parts. Wu Han City is located in the centre of China. In Wu Han, the local adults pronounce 'L' as 'N'. For example, 'LAI' 来 (come) is often identified as 'NAI' 奶 (milk) by adults. The Chinese surname 'LIU' 刘 is pronounced as 'NIU' (牛 cow). Chong Qing is in the west of China. Its dialect appears not to make a distinction between 'F' and 'H', for example, 花 HUA (flower) is pronounced 发 FA. In Standard Chinese, *ship* is written as 船 (ship) and pronounced as *chuan*. In Cantonese, 船 (ship) is pronounced as SHEON. Among them, the Hang Zhou dialect might be the one that is closest to standard Mandarin.

Test

This study follows Kuhl (1985), Lalonde and Werker (1995), and Werker, Polka and Pegg (1997) in using a standard behavioural measure, i.e. the head turn test. Tests are scheduled twice. The first round of tests occurs when the participants are seven months old. This is because infants at this age are considered at the cusp of phonetic learning (cf. Kuhl et al. 2005). Follow-up tests take place when participants reach 11 months old. Considering the young age of the infants, in the first round of tests, i.e. in the consonant detection task, isolated words are used. Each test lasts about 6-11 seconds. In the follow-up tests, both isolated words and passages that include the tested consonants are examined. The words and passages appear in the form of questions by the guardians. The questions are similar to those of first tests. Each test for isolated words lasts about 6-11 seconds; each test for passages lasts about 60-70 seconds. Moreover, to avoid scaring the participants, this study does not use a loudspeaker to play the sounds. We ask the guardians to talk to the infants, using their own

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dialects. By doing so, it is hoped that the participants would be able to relax and would present a relatively good performance.

All tests were carried out at a place that was relatively quiet and that was familiar to the participants. The procedure was as follows: participants sat on their parents' knees, and were provided with a silent toy so as to maintain their concentration. Their parents, grandparents or nannies, seated to the right side, talked to the infants using a different dialect. The infants were expected to respond with a turn of the head when they heard the prototype consonant of one salient dialect, so as to determine to what extent in an early stage an infant could discriminate multidialectal phonetic units. An experimenter observed the infants on a video monitor during testing and recorded their judgements afterwards.

TESTS AND RESULTS

Infants living in a single-dialect family

Test 1: Consonant detection task at seven months (A)

As touched upon earlier, the Jin Hua dialect does not make a distinction between 'R' and 'L'. Our test was carried out to determine to what extent infants at 0-8 months of age can recognise L vs. R variants. An investigation was carried out in relation to three infants who were born into Jin Hua dialect-speaking families.

RESULTS AND DISCUSSION

At seven months of age, the participants were questioned by their mothers: (i) are you feeling 热 RE (hot) or not / 热*LE or not; (ii) are you feeling 乐 LE (happy) or not. In our pilot test, the phoneme /le/ 'happy' was identified as /re/ 'hot' by adult Jin Hua dialect speakers. The infants, however, surprisingly recognised the distinctions. It was '热 RE (*Le)' that infants responded to when asked if it is hot. When asked whether they were happy or not, they responded to the sound '乐 LE'. In another consonant pair test, i.e. '人 (people)' REN or *LEN, similar findings are observed.

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Table 1. Consonant detection task at seven months (infants in a single-dialect family)

Isolated words	**Duration**(s)	**Discrimination**[2]
热 RE (hot)	9	○
热 *LE (hot)	11	×
人 REN (people)	9	○
人 *LEN (people)	10	×

Test 2 Follow-up test: Consonant detection task at 11 months (A)

Follow-up tests were carried out when the participants were 11 months of age. The findings are summarised in Table 2.

Table 2. Consonant detection task at 11 months (infants in a single-dialect family)

Isolated words	**Duration**(s)	**Discrimination**
热 LE (hot)	9	○
热 *RE (hot)	9	×
人 REN (people)	11	×
人 *LEN (people)	10	○
Passages		
Passages that include 热 *LE (hot)	65	○
Passages that include 热 RE (hot)	70	×
Passages that include 人 *LEN (people)	68	○
Passages that include 人 REN (people)	64	×

It transpired that the 11-month-old participants are more familiar with the pronunciation ‘LE’ (乐) than ‘RE’ (热), although the latter is the right answer. Regarding the second question, all the participants responded to ‘LE’ (乐). Thus, by the age of 11 months old, consonant L seems to precede R for the participants, which further suggests that a single-dialect

[2] ○ stands for discriminating the consonants in tested words. × stands for not discriminating the consonants in tested words.

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environment may affect language development at the pre-linguistic stage.

Moreover, it seems that the participants have difficulty in discriminating vowel-initial nouns. For instance, 阿姨 A-YI (nannies are referred to as 阿姨 in China). An 11-month-old infant says 姨 'YI', with the vowel 阿 'A' omitted. He (she) often refers to his (her) nanny as 姨 'YI'. This result, together with data found by Mattys and Jusczyk (2001)'s experiment on infants' segmentation abilities in their first year of life, suggests that the grasping of segmentation of vowel-initial words is an ability that is delayed, at least four-five months behind the acquisition of consonant-initial words.

Test 3: Consonant detection task at seven months (B)

Tests on three infants in Wu Han dialect-speaking families were carried out as well. Isolated words for Uncle 刘 (Liu) and Uncle 牛[3] (NIU) were tested, with each test lasting about 10-11 seconds.

RESULTS AND DISCUSSION

All participants successfully distinguished two uncles, namely, Uncle 刘 (Liu) and Uncle 牛(NIU). In another test regarding 'NAI-NAI' 奶奶 (granny) vs. 'LAI-LAI' 来来 (com come), the participants looked at their grandma and responded to the sound of 'NAI-NAI'.

Table 3. Consonant detection task at seven months (infants in a single-dialect family)

Isolated words	Duration(s)	Discrimination
牛 NIU (surname)	10	○
刘 LIU (surname)	11	○
奶奶 NAI-NAI (granny)	10	○
奶奶 *LAI-LAI (com come)	11	×

Test 4: Follow-up test: consonant detection task at 11 months (B)

Tests were followed up four months later. This time, isolated words as well as passages that include the consonants L and N were examined. It is observed that 奶奶 NAI-NAI (grandma) was responded to only when the guardian pronounced it LAI-LAI.

[3] The noun 牛 originally means 'cow'. It is also used as a surname.

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Table 4. Consonant detection task at 11 months (infants in a single-dialect family)

Isolated words	Duration(s)	Discrimination
奶奶 NAI-NAI (granny)	10	×
奶奶 *LAI-LAI (come come)	11	○
Passages		
Passages that include 奶奶 NAI-NAI (granny)	68	×
Passages that include 奶奶 *LAI-LAI	70	○

Test 5: Consonant detection task at seven months (C)

As introduced, Chong Qing is located in Western China and 'F' and 'H' are not distinguished. All lexicons with the starting consonant 'H' are pronounced 'F'. As a result, data from this area would be of great value. Thankfully, this study recruited three infants who live in Chong Qing dialect-speaking family.

RESULTS AND DISCUSSION

The Chong Qing participants were exposed to two isolated lexicons: '花 HUA (flower)' vs. '发 *FA'. Each test lasts about 10-12 seconds. In our pilot investigation, adults in Chong Qing City responded to FA 发 when referring to a flower. During the tests, the participants have done a good job in responding to 花 HUA (flower) when their guardians points to a rose.

Table 5. Consonant detection task at seven months (infants in a single-dialect family)

Isolated words	Duration(s)	Discrimination
花 HUA (flower)	10	○
花 *FA	10	×

Test 6. Follow-up test: Consonant detection task at 11 months (C)

In the follow-up tests, it was the sound *FA rather than 花 HUA that infants responded to when their guardians was pointing to a rose. This embodies the idea that the 11-month exposure to the Chong Qing dialect may have somehow affect the language development, i.e. in this case, the consonant F has taken precedence over H.

Table 6. Consonant detection task at 11 months (infants in a single-dialect family)

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Isolated words	Duration(s)	Discrimination
花 HUA (flower)	10	×
花 *FA	9	○
Passages		
Passages that include 花 HUA (flower)	65	×
Passages that include 花 *FA	70	○

By now, we have collected data from Eastern China, Central China and Western China. Pulling the three sets of findings together, perhaps we can now pause and draw a preliminary conclusion: infants are born capable of treating different consonants distinctively – the influence from the living environment does not have an effect on this ability in the first half-year of life (the age of 0-8 months). After 8-11 months of age, language input has a significant role to play.

Infants living in a bi-dialectal family

Test 7: Consonant detection task at seven months (A)

Having drawn a picture of language acquisition for infants from single-dialect families, this section moves on to see how a two-dialect environment might affect the performance of diverse dialect recognition at the age of seven months old.

RESULTS AND DISCUSSION

The first three infants come from Jin Hua and Hang Zhou bi-dialectal families. The tests were carried out as followed: the participants were seated in the lap of their father. Their mother talked to them individually with isolated words, using the Hang Zhou dialect. One day after the tests, another three tests were carried out: the participants were seated in the lap of their mother. Their father talked to them individually with isolated words, using the Jin Hua dialect.

It was observed that when exposed to '热 RE (hot)' or '热 *LE (hot)' by their mothers, the infants presented an active response; when exposed by their Jin Hua father, the participants gave an equally active response to the pronunciation '*LE'. It seems that infants from a bi-dialectal family show sensitivity to consonant contrasts and seem to keep two versions of describing *hot* in mind, switching them depending on who they are responding to. This is

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further related to the issue of whether phonetic learning of one dialect suppresses the phonetic learning of another equally input dialect.

Table 7. Consonant detection task at seven months (infants in a bi-dialectal family)

Isolated words	Duration(s)	Discrimination
热 RE (hot)	9	○
热 *LE (hot)	9	○
人 REN (people)	11	○
人 *LEN (people)	10	○

Test 8: Follow-up test: consonant detection task at 11 months (A)

A follow-up observation took place when the participants were 11 months old. By this age, the participants had been exposed to two dialects for 11 months. Both isolated words and passages were included in the tests. The finding reveals that participants respond to 热 RE (hot) from one parent and respond to *LE (hot) from another parent. This is summarised in Table 8.

Table 8. Consonant detection task at 11-months (infants in a bi-dialectal family)

Isolated words	Duration(s)	Discrimination
热 RE (hot)	9	○
热 *LE (hot)	9	○
人 REN (people)	10	○
人 *LEN (people)	9	○
Passages		
Passages that include 热 RE (hot)	65	○
Passages that include 热 *LE (hot)	70	○
Passages that include 人 REN (people)	68	○
Passages that include 人 *LEN (people)	64	○

This confirms the idea that the infants are capable to master two dialects at the same time and at the same level. It also supports the idea that infants may keep two versions of pronouncing

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a lexicon in mind and may switch them depending on the person they are communicating with.

Test 9: Consonant detection task at seven months (B)

To further confirm the result, three tests on another bi-dialectal family were carried out. The participants' fathers are from the city of Guang Zhou (Southern China), speaking the Cantonese dialect. The mothers are from the city of Hang Zhou (Eastern China), speaking the Hang Zhou dialect. The parents communicated with the participants in their own dialects. Cantonese is very different from the Hang Zhou dialect. For instance, in Standard Chinese, *ship* is written as 船 (ship) and pronounced as CHUAN (Hang Zhou dialect also pronounces CHUAN). In Cantonese, 船 (ship) is pronounced as SHEON.

RESULT

Tests were carried out on infants at the age of seven months old. The mothers showed a real boat to the participants and pronounced the word for ship in the Hang Zhou dialect, i.e. CHUAN. One day later, a boat was shown to the participants, and their Cantonese fathers said SHEON. The findings are as follows: the infants understood that both the Cantonese dialect SHEON and Hangzhou dialect CHUAN refer to the same object: a ship. Crucially, they clearly distinguished the two dialects.

Test 10: Follow-up test: consonant detection task at 11 months (B)

In the follow-up tests, two participants, when hearing CHUAN from their Hang Zhou mothers, immediately looked at the ship through the window of the house. When hearing SHEON from their fathers, they also immediately turned to the ship outside. Another participant failed to concentrate. As a result, the test did not go well. Anyhow, at this stage, we might contend that the infants at 11 months of age appeared capable of discriminating two vowels and certainly can distinguish two dialects that refer to the same object.

Test 11: Consonant detection task at seven months (C)

A third test was carried out on a bi-dialectal family raising infants, i.e. Chong Qing and Hang Zhou bi-dialect families. The fathers are from Chong Qing City, speaking the Chong Qing dialect, which means they are likely to pronounce the consonant 'H' as 'F'. The mothers are from Hang Zhou, speaking the Hang Zhou dialect. The parents communicated with the participants in their own dialects; the input of each dialect is assumed to be equal.

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RESULTS AND DISCUSSION

Participants, at the age of seven months old, were exposed to two pronunciations in regard to 花 (flower), namely, HUA vs. FA (the latter pronunciation is nonstandard. The participants distinguished the Chong Qing pronunciation FA and the Hang Zhou pronunciation HUA for the word 花 (flower), as in Table 12.

Table 12. Consonant detection task at seven months (infants in a bi-dialectal family)

Isolated words	Duration(s)		Discrimination
花 HUA (flower)	7	○	
花 *FA (flower)	9		○

Test 13: Follow-up test: consonant detection task at 11 months (C)

In the follow-up tests, one participant, when hearing 花 HUA from her Hang Zhou mother, looked at the flower in the house; when hearing 花 *FA from her father, she also turned to the flower.

Table 13. Consonant detection task at 11 months (infants in a bi-dialect family)

Isolated words	Duration(s)		Discrimination
花 HUA (flower)	7	○	
花 *FA (flower)	9		○
Passages			
Passages that include 花 HUA (flower)	65	○	
Passages that include 花 *FA (flower)	68		○

The data from bi-dialectal families supports the hypothesis that infants may keep two versions of pronouncing a lexicon in mind and may switch them depending on the person they are communicating with.

Infant living in a three-dialect family

Test 14: Consonant detection task at seven months (A)

Wilcox (1978) argues that Chinese adult learners of English in China are more successful in comprehending Singaporean-Malaysian English than British English or General American English. Recently, it seems more and more common in Eastern China to employ a nanny

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from the Philippines, with intention to give a full English-speaking environment to the baby. We are now in a position to find out how infants from three-dialect families recognise multiple dialects. This study recruited a participant who was a part of a three-dialect family. The infant's father comes from Guang Zhou, speaking Cantonese only. Her mother is also from Guang Zhou but has studied at Oxford University, England (for six years). The mother speaks non-rhotic British English. The infant's nanny is from the Philippines, and speaks Philippine English, which is considered to be rhotic. The mother communicates with the nanny in English with a British accent. The nanny speaks Philippine English to the infant; the mother speaks British English to the infant; the father speaks Cantonese to the infant. The parents communicate with each other in Cantonese.

The nanny was educated and trained in housekeeping at a university in the Philippines. But she appears not to make any vowel contrasts, for instance, SHEEP/SHIP, FULL/FOOL and BOAT/BOUGHT. Moreover, the distinction between /ʃ, ʒ/ and /s, z/ is not made either. As a result, the nanny pronounces PLEASURE as 'PLESHURE'; and CARS as KARSS. In the fist test (i.e. infant at the age of seven months), the participant was exposed to isolated words, as in Table 14.

Table 14. Consonant detection task at seven months (infants in a three-dialect family)

Isolated words		Duration(s)	Discrimination
SHEEP	7	○	
SHIP	9	○	
#SHEON	8	○	
FULL	6	○	
FOOL	7	○	
BOAT	8	○	
BOUGHT	7		○
PLEASURE	6	○	
*PLESHURE	7	○	
CARS	7	○	
*KARSS	8	○	

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RESULTS AND DISCUSSION

The participant can discriminate the English words SHEEP and SHIP from her mother's British English. The participant also successfully responded to 'ship' in Philippine English, which was pronounced as SHEEP by the nanny. When exposed to the Cantonese SHEON (ship) by the father, the participant showed understanding as well. This reflects the idea that infants are indeed born citizens of world: whichever language you input for them, they can make distinctions.

Test 15: Follow-up test: consonant detection task at 11 months (A)

A follow-up observation was made when the participant was 11 months old. The tests included isolated words and passages. Each test lasted for about 64-67 seconds.

Table 15. Consonant detection task at 11 months (infant in a three-dialect family)

Isolated words	Duration(s)	Discrimination
SHEEP	7	○
SHIP	9	○
#SHEON	8	○
FULL	6	○
FOOL	7	○
BOAT	8	○
BOUGHT	7	○
PLEASURE	6	○
*PLESHURE	7	○
CARS	7	○
*KARSS	8	○
Passages		
Passages that include SHEEP	65	○
Passages that include SHIP	66	○
*Passages that include SHEON	66	○
Passages that include FULL	65	○
Passages that include FOOL	67	○
Passages that include BOAT	65	○
Passages that include BOUGHT	66	○
Passages that include PLEASURE	67	○

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*Passages that include PLESHURE	66	○
Passages that include CARS	64	○
*Passages that include KARSS	64	○

The above finding suggests the discrimination of each lexicon is equal, i.e. the participant keeps three versions for describing 'ship' in mind and switches them depending on who they are communicating with (mother, father or nanny). This reflects the ability of LISTENING. Another noticeable finding is that when it comes to utterances, the participant seems to favour the Philippine English pronunciation for 'ship', namely, SHEEP. This inspires us to draw the conclusion that a multidialectal-environment infant, in her/his second half-year of life, can discriminate different versions of pronunciation of lexicons. A particular utterance, however, is favoured, i.e. infants choose one pronunciation. This raises another issue: What affects the choice? This study deduces that the pronunciation that the infant is first exposed to probably becomes the first choice in utterances. Moreover, there is also an association between 'motherese' language input and the infant's uttering development; the degree of attachment between infants and guardians may have a role to play. Most importantly, it is the quality, not the quantity, of language input that affects infant's choice when it comes to utterances.

CONCLUSION

This study produced data from Chinese infants who live in single-dialect and multi-dialect families, in an effort to uncover how language input affects an infant's language development at the pre-linguistic stage. We recruited families from Eastern China, Central China and Western China. Two ranges of experiments were carried out, i.e. with participants at the age of seven months old and participants at the age of 11 months old. The findings reveal that there is a positive association between multi-language input and infants' phonetic ability. Infants at six to eight months of age are capable of distinguishing phonetic units between dialect and standard language. This phonetic discrimination skill, however, begins to weaken at 9-12 months of age, as confirmed by data from infants living in single-dialect families. This might support the idea that the trajectory of language development from 8 to 10 months is significantly influenced by the language input. However, no data suggests that one pronunciation is significantly favoured over another. This is confirmed by tests with 11-month-old infants who live in bi-dialectal and tri-dialectal families. Infants raised in

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multi-dialect families seem to keep two or three pronunciations of words in mind and switch them depending on who they are communicating with. To our surprise, these versions of pronunciations exist in an infant's brain and are not mixed up with each other. Infants' abilities to discriminate between one familiar dialect and another familiar dialect provides evidence to support the hypothesis that infants are sensitive to environmental language input after the age of eight months. Moreover, there is also an association between 'motherese' language input and infant phonetic ability development. The conclusion that emerges from the results is that it is the quality, not the quantity, of language input that affects infant phonetic development at the pre-linguistic stage.

Furthermore, as six to eight months of age is considered the critical period in phonetic learning, it would therefore be useful to continue to assess infants' ability to recognise different consonants and vowels at the same time at 16, 24 months and 36 months of age.

It would also be worthwhile to consider whether the results of this study hold for infants from multi-language families where each language involves significant phonetic distinctions, e.g. Chinese and Japanese. It seems that there is much work to do in the study on the critical period of language development. Nevertheless, this study of the association between multidialectal language input and infants' pre-linguistic language development may provide a sound base for further research.

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