



Referential choice and informativeness in mother–child conversation: A focus on the mother

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ABSTRACT

This study explored Mandarin-speaking mothers' referential choice in relation to informativeness. The data consisted of two Mandarin-speaking mothers' natural conversation with their children, collected when the children were between the ages of 2;2 and 3;1. The subject and object arguments of the mothers' utterances were coded for the categories of referential forms and informativeness features. The referential forms included three categories: (1) null forms, (2) pronominal forms, and (3) nominal forms. The informativeness features included eight categories: (1) absence, (2) newness, (3) query, (4) contrast, (5) differentiation in context, (6) differentiation in discourse, (7) inanimacy, and (8) third person. The results showed that both mothers' referential choices were highly influenced by the eight informativeness features, and that their referential choices were made in accordance with discourse-pragmatic principles. Such referential strategies in maternal speech were observed from the time when the children were as young as 2;2 and throughout their development. In addition, analysis was conducted to compare the mothers' referential choice and the children's referential choice. Some similarities and differences were observed. The implications of the findings are discussed in relation to maternal language input and child language development.

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1. Introduction

Previous studies on adult grammar have shown that referential choice constitutes a key link between grammar and discourse in adult language. There is evidence suggesting that the selection of referential forms in adult speech is responsive to discourse-pragmatic factors (Chafe, 1976, 1994, 1996; Du Bois, 1985, 1987; Givón, 1983, 1984; Gundel et al., 1993; Kumpf, 1992). These studies have adopted a use-oriented perspective, and have suggested that the choices speakers make are the end results of the interaction of syntactic and pragmatic principles.

A number of potential determinants of adult referential choice have been identified that characterize typical situations of informativeness, which include the assumed knowledge of the hearer and the accessibility of the information in previous discourse (Ariel, 1990, 1996; Chafe, 1994; Du Bois, 1985, 1987; Givón, 1983; Gundel et al., 1993). It has been suggested that informative arguments (i.e., arguments whose referents are not highly salient and accessible) are more likely to be realized overtly than uninformative arguments (i.e., arguments with highly salient and accessible referents) (Greenfield and Smith, 1976). For example, arguments with newly introduced referents, which are considered to be informative arguments, are more likely to be realized overtly than arguments with previously established referents, which are considered to be uninformative arguments.

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In language acquisition research, however, explanations of children's referential choice have traditionally taken either grammatical- or performance-based approaches. From a grammatical perspective, it has been suggested that the child starts out with a grammar that is different from the adult's. That is, the child's early grammar permits argument ellipsis where the adult's grammar would not. Later, the child's grammar would change into one more appropriate to the adult language (Hyams, 1986; Hyams and Wexler, 1993; Radford, 1990). Another type of explanation is from a performance perspective (Bloom, 1993; Valian, 1991). The performance account assumes that the child has adult-like grammatical structures from the earliest stages of language learning but omits arguments as a result of immature or limited processing resources. That is, the child can only cope with producing utterances of limited length. As the child's processing capacity matures, argument omission gradually declines until it largely disappears.

Given the success of the discourse-pragmatic approach in explaining the choice of referring expressions in adult language, several studies have been conducted to investigate the adaptability of this approach to children's referential choice. A similar correlation between informativeness and argument realization has been observed in child language cross-linguistically in English (Greenfield and Smith, 1976; Guerriero et al., 2006), Italian (Serratrice, 2005), Spanish (Paradis and Navarro, 2003), Korean (Clancy, 1993), Japanese (Guerriero et al., 2006), Inuktitut (Allen, 2000), and Mandarin Chinese (Huang, 2011). These studies indicated that children, like adults, are sensitive to the dynamics of information flow in discourse, and that their referential choices reflect their effort to reduce the potential uncertainty of the listener regarding the referents that they are talking about.

However, children are exposed to child-directed speech, not adult conversation. An adequate understanding of children's experience of language will require systematic empirical investigations of the referential strategies used by adults in conversation with young children. In order to better explain children's referential patterns, we need to examine whether child-directed speech demonstrates similar patterns. However, little has been done to investigate the referential choice in adults' speech to children. Among the few studies touching upon referential choice in child-directed speech are Clancy (1993), Guerriero et al. (2006), Narasimhan et al. (2005), and Paradis and Navarro (2003). These studies have reported the importance of language input on children's referential strategies.

Guerriero et al. (2006) investigated referential choice in English-speaking and Japanese-speaking children and their mothers. The research investigated whether the children's and their mothers' referential choices were motivated by pragmatic features of discourse referents. In Study 1, the form and referential status of verb arguments were analyzed when the children were at 1;9 and 3;0. In Study 2, non-linguistic pragmatic correlates, such as pointing gestures and gaze directions, were also analyzed. The results showed that the children and their mothers often demonstrated a close similarity in their linguistic as well as non-linguistic referential patterns. The children who were exposed to consistent discourse-pragmatic referential patterns in their input tended to show these patterns earlier than those exposed to inconsistent patterns. The findings suggested that both the referential status of discourse referents and parental input can be used to predict children's referential choices across typologically different languages.

Paradis and Navarro (2003) studied subject realization in Spanish in a bilingual acquisition context by examining subject realization in the speech of a Spanish–English bilingual child (age 1;9–2;6) and two Spanish monolingual children (ages: 1;8–2;7 and 1;8–1;11). The study attempted to determine whether there was cross-linguistic interference and whether the source of the interference was due to child-internal cross-language contact or due to the nature of the language input. The results showed that the bilingual child produced more overt subjects than the monolingual children, and that the bilingual child's parents also used overt subjects more frequently than the monolinguals' parents. It was suggested that while the patterns of subject realization observed in the bilingual child's speech may be interpreted as due to cross-linguistic effects from English, the parental input may also have exerted an important influence.

Narasimhan et al. (2005) examined argument realization in Hindi caregiver-child discourse. Since argument omission is pervasive in adult Hindi, a question addressed in this study is whether this characteristic of argument omission can also be found in the input from Hindi-speaking caregivers. If so, a further question is whether or not children consequently make errors in verb transitivity. The results showed that caregivers' input to 3–4 year-olds exhibits massive argument ellipsis. However, children acquiring Hindi do not make transitivity errors in their own speech; nor do they omit arguments randomly. It was suggested that children acquiring Hindi rely on multiple cues to discover language structure, including syntactic cues in the input, verb morphology and nonlinguistic contexts of use.

As seen above, more studies and more systematic investigations are needed to examine referential choice in child-directed speech; studies concerning less-investigated languages are especially needed. This study thus attempts to address this need. Mandarin Chinese is characterized by the phenomenon that both subjects and objects can be grammatically null. In general, subject referents and object referents that are understood from context do not need to be specified. Mandarin Chinese appears to be a particularly interesting testing ground for the discourse-pragmatic account for referential choice in child-directed speech: Mandarin permits omitted arguments, and, unlike languages such as Hindi, Mandarin has no inflection, thus leaving no information trace at all. The present study is part of a larger project on referential strategies in Mandarin mother-child interaction. The analysis of Mandarin-speaking children's referential choice has been reported in Huang (2011), and the present study focused on the mothers. By examining both children's and mothers' referential choices using the same framework, we can obtain a more complete picture of how discourse-pragmatics influences the referential patterns in mother-child interaction and how mothers' child-directed speech may be related to children's referential choice.

In Huang (2011), the referential choices of Mandarin-speaking children were explored from a discourse-pragmatic perspective. The data consisted of the natural conversations of two Mandarin-speaking children with their mothers, collected

when the children were between the ages of 2;2 and 3;1. The subject and object arguments of the children's utterances were coded for the categories of referential forms and informativeness features. The referential forms included three categories: null forms, pronominal forms, and nominal forms. The informativeness features included eight categories: absence, newness, query, contrast, differentiation in context, differentiation in discourse, inanimacy, and third person (Allen, 2000). The results showed that the children tended to use nominal forms to refer to referents with informative values, and null forms or pronominal forms for referents with uninformative values. In other words, the children were sensitive to the eight informativeness features, and their referential choices were made in accordance with discourse-pragmatic principles. Such sensitivity was observed from the time when the children were as young as 2;2 and throughout their development.

The purpose of the present study is to investigate the referential choices of Mandarin-speaking mothers in order to determine the extent to which pragmatically-sensitive referential strategies are indeed a characteristic of the input given to children acquiring Mandarin. In addition, further analysis was conducted to compare the results of this study and the results reported in Huang (2011) in order to determine the similarities and differences between the children's and the mothers' referential choices.

2. Methods

2.1. Participants and data

The participants in this study were two Mandarin-speaking mothers and their children, who lived in the northern part of Taiwan. The two children, Lin and Jie (pseudonyms), were both girls. Both of the mothers, as well as the fathers, had received post-graduate education. The data used in this study consisted of eight hours of natural mother-child conversation video-recorded at the participants' homes, with four one-hour sessions with each dyad. Lin and her mother's data were recorded when the child was at the ages of 2;2, 2;6, 2;10 and 3;1, and Jie and her mother's data were recorded when the child was at the ages of 2;2, 2;7, 2;10 and 3;1. All of the data were collected in the living rooms of the two homes, and the two dyads were involved in similar activities during the data sessions, such as eating, reading books, and playing with toys. Other family members also occasionally participated in the interactions. The data collected were transcribed following the CHAT conventions and were analyzed using the CLAN program (MacWhinney, 2000).

2.2. Analytical framework

The analytical framework adopted in this study was based on Huang (2011), in which the framework was used to analyze the children's data. The mothers' speech and the children's speech were thus analyzed using the same framework. Every maternal utterance with an overt verb was identified for analysis. All subject and object arguments were coded for the categories of referential forms and informativeness features.

2.2.1. Referential forms

Following Clancy (1997), this study adopted a three-way classification of referential forms for analysis, which consisted of the categories of null forms, pronominal forms, and nominal forms. While most of previous studies have treated referential forms as binary, they differ in grouping pronominal forms with nominal forms or with null forms. In other words, some studies have an overt vs. null system, in which pronominal forms are grouped with nominal forms as opposed to null forms (e.g., Allen, 2000; Serratrice, 2005) while the others have a lexical vs. non-lexical system, in which pronominal forms are grouped with null forms as opposed to nominal forms (e.g., Du Bois, 1987; Guerriero et al., 2006). It has been suggested that such a difference in classification might have resulted in some of the differences in the results observed in these studies (Guerriero et al., 2006). In the present study, we adopted the three-way classification so as to avoid imposing a potential classification bias. In addition, by adopting this three-way classification, the analysis may reveal whether Mandarin pronominal forms are more similar to null forms or nominal forms in terms of their relationship with informativeness. The categories of referential forms used in this study are as follows; each category is illustrated with an example from the data of the present study.

(a) Null forms: Absence of overt form

Example 1: Lin #2 (2;2) ^a

*MOT:	— 吃	完 —	了	嗎?
	chī	wán	le	ma
	eat	finish	PRT	QST
	'(Have you) finished eating (the laver)?'			
*LIN:	還	沒		
	hái	méi		
	yet	NEG		
	'Not yet.'			

^a Each utterance in the examples is presented in a set of four lines: Line 1 shows the Chinese characters; Line 2, the Pinyin romanization; Line 3, a word-by-word gloss, and Line 4, a free translation. See the Appendix for the transcription conventions and the gloss abbreviations used in the examples.

In this example, the child was eating some laver. In the mother's question, the subject and the object were not specified because both were clear from the context. This example illustrates the use of null forms in the mothers' speech.

(b) Pronominal form: Including pronouns (e.g., *wǒ* 'I'), and demonstratives (e.g., *zhè* 'this')

Example 2: Jie #29 (2;10)

- *MOT: 那 你 要 先 去 洗 手。
 nà nǐ yào xiān qù xǐ shǒu
 then 2SG have-to first go wash hand
 'Then you have to go wash your hands first.'
- *MOT: 你 沒有 洗 手。
 nǐ méiyǒu xǐ shǒu
 2SG NEG wash hand
 'You didn't wash your hands.'
- *MOT: 我們 先 去 洗 手。
 wǒmen xiān qù xǐ shǒu
 1PL first go wash hand
 'Let's go wash our hands first.'

The mother was telling the child that she had to wash her hands before eating some chocolate. As seen in the example, the second person singular pronoun *nǐ* 'you' and the first person plural pronoun *wǒmen* 'we' were used in the mother's utterances.

(c) Nominal form: Including bare nouns (e.g., *māo* 'cat'), noun phrases (e.g., *hóngsè de huā* 'red flowers') and proper names (e.g., *Yí míng Shúshu* 'Uncle Yiming')

Example 3: Jie #14 (2;2)

- *JIE: 我 不 喜歡 <吃> [/] 吃 蘋果。
 wǒ bù xǐhuān <chī> [/] chī píngguǒ
 1SG NEG like eat eat apple
 'I don't like to eat apples.'
- *MOT: 你 為什麼 不 喜歡 吃 蘋果?
 nǐ wèishénme bù xǐhuān chī píngguǒ
 2SG why NEG like eat apple
 'Why don't you like to eat apples?'
- *MOT: 蘋果 很 甜 很 好吃 啊。
 píngguǒ hěn tián hěn hǎochī a
 apple very sweet very delicious PRT
 'Apples are very sweet and very delicious.'

In this example, the child and the mother were talking about the kinds of fruit that the child liked and disliked. As seen in the example, the referent *píngguǒ* 'apple' was referred to with a nominal form by both the child and the mother.

2.2.2. Informativeness features

Following Allen (2000), this study adopted a set of eight informativeness features, which have been shown to influence argument representations in many languages. These informativeness features determine how informative the speaker should be when referring to a referent. Each of the eight informativeness features has an informative value and an uninformative value. An informative value refers to the situation when the referent talked about is less certain (e.g., absent) and requires high informativeness in the linguistic form. In contrast, an uninformative value refers to the situation when the referent is more certain (e.g., present) and does not require high informativeness in the linguistic form. The eight informativeness features are named for the informative value of the features (e.g., absence), and can be divided into three groups: *knowledge features*, *confusion features*, and *search-space features*. In the paragraphs below, each informativeness feature is defined according to Allen (2000), and illustrated with an excerpt of the informative value from the data of the present study.

2.2.2.1. *Knowledge features*. Knowledge features concern the presence of the referent in the joint knowledge of the speaker and the hearer, whether that knowledge derives from the physical or mental context.

- (a) Absence: The feature ABSENCE characterizes a referent that is not present in the physical context of the conversation. Since the hearer does not have knowledge of the referent from the physical context of the discourse, the identity of the referent is much less certain than it would be were the referent present in the physical context.

Example 4: Jie #34 (3;1)

*MOT: 那 你 今天 有沒有 玩 沙子?
 nà nǐ jīntiān yǒuméiyǒu wán shāzǐ
 then 2SG today PRF:NEG:PRF play sand
 ‘Then did you play in the sand today?’

*JIE: 沒有.
 méiyǒu
 NEG
 ‘No.’

The mother was asking the child about what the child had done that day in the kindergarten. In her question in Line 1, the mother referred to the referent *shāzǐ* ‘sand’, which was not present in the physical context of the conversation.

(b) Newness: The feature NEWNESS characterizes a referent that has not been previously talked about in the conversation at hand. Since the hearer has no mental knowledge of a new referent, its identity is much less certain than it would be were the referent already given in discourse. An argument is considered to be new if the referent it denotes has not been mentioned in the preceding 20 utterances.

Example 5: Jie #24 (2;7)

*MOT: Jie 你 是不是 很 喜歡 吃 糖果?
 Jie nǐ shìbúshì hěn xǐ huān chī tángguǒ?
 (name) 2SG COP:NEG:COP very like eat candy
 ‘Jie, you like to eat candies very much, don’t you?’

*MOT: 對不對?
 duìbúduì
 right:NEG:right
 ‘Right?’

*MOT: 你 不 怕 牙齒 都 蛀光光?
 nǐ bú pà yáchǐ dōu zhùguāngguāng
 2SG NEG afraid teeth all decay
 ‘Aren’t you afraid that your teeth will all decay?’

*MOT: 我們 上次 有沒有 去 看 牙醫?
 wǒmen shàngcì yǒuméiyǒu qù kàn yáyī?
 1PL last-time PRF:NEG:PRF go see dentist
 ‘Did we go see the dentist last time?’

*JIE: 0 [=! nodding].

In this excerpt the mother asked the child whether the child liked to eat candies a lot and whether she was afraid of getting tooth decay due to eating too many candies. In Line 4, the mother then changed the topic, and asked the child about a past experience of going to see a dentist. The referent *yáyī* ‘dentist’ had not previously been referred to in the conversation, and so can be considered to be a newly-introduced referent.

(c) Query: The feature QUERY characterizes a referent that is the subject of a query or the response to it. Since the referent is either not yet identified or newly identified, the listener has little mental knowledge of this referent, and thus its identity is much less certain than it would be were the referent already given in discourse.

Example 6: Lin #22 (3;1)

*MOT: 這 裡面 是 什麼 [% pointing at a box] ?
 zhè lǐ miàn shì shénme
 this inside COP what
 ‘What is inside?’

*MOT: 哇 -: 有 小 蛋糕 耶!
 wa -: yǒu xiǎo dāngāo ye
 wow there:be small cake PRT
 ‘Wow, there is a small cake.’

In this example the mother pointed at a box, and asked the child what was inside it. As the mother opened the box, she provided the answer to her own question.

2.2.2.2. *Confusion features.* Confusion features concern the resolution of potential confusion about the identity of a referent when various potential referents are present either explicitly or implicitly in the discourse or the physical context.

(d) Contrast: The feature CONTRAST characterizes a referent the speaker is explicitly contrasting with other potential referents in the discourse or in the shared physical or mental context, usually through tone of voice, gesture, or other contextual means.

Example 7: Jie #24 (2;7)

*MOT: 要 用 湯匙.
yào yòng tāngchí
have-to use spoon
'(You) have to use the spoon.'
*MOT: 不 可以 用 手.
bù kěyǐ yòng shǒu
NEG can use hand
'Don't use your hand.'

The mother and the child were having dinner. The mother noticed that the child was trying to eat with her hand. The mother thus told the child to use a spoon, a referent the mother explicitly contrasted with the child's hand.

(e) Differentiation in context: The feature DIFFERENTIATION IN CONTEXT characterizes a referent that is one of two or more referents in the immediate physical context that could fit the verb semantics and the identifying elements of the argument in question. Since there is more than one potential referent in the physical context fitting the characteristics of the argument, there is potential uncertainty on the part of the hearer in identifying the target referent.

Example 8: Jie #29 (2;10)

*MOT: 那 你 要 照 誰?
nà nǐ yào zhào shéi
then 2SG want take-a-picture whom
'Then whom do you want to take a picture of?'
*MOT: 照 J. 姐姐.
zhào J. jiějie
take-a-picture (name) elder-sister
'(Do you want to) take a picture of Big Sister J.?'
*MOT: 還是 要 照 Y. 哥哥?
háishì yào zhào Y. gēge
or want take-a-picture (name) elder-brother
'Or (do you) want to take a picture of Big Brother Y.?'

In this example, there were two potential referents in the immediate physical context, i.e., *J. jiějie* 'Big Sister J.' and *Y. gēge* 'Big Brother Y.'. As seen in the mother's utterances, the mother differentiated the two potential referents in order to identify the target referent.

(f) Differentiation in discourse: The feature DIFFERENTIATION IN DISCOURSE characterizes a referent that is one of two or more referents already established in the discourse (i.e., in the five preceding utterances, following *Givón, 1983*) that could fit the verb semantics and identifying elements of the argument in question. Since there is more than one potential referent in the discourse context fitting the characteristics of the argument, there is potential uncertainty on the part of the hearer in identifying the target referent.

Example 9: Jie #34 (3;1)

*MOT: 喔 -: 那 你 昨天 有 把 香蕉 吃光光 嗎?
o nà nǐ zuótiān yǒu bǎ xiāngjiāo chīguāngguāng ma
PRT then 2SG yesterday PRF BA banana eat up QST
'Then did you eat up the banana yesterday?'
*MOT: 那 你 今天 有 把 蘋果 吃光光 嗎?
nà nǐ jīntiān yǒu bǎ píngguǒ chīguāngguāng ma
then 2SG today PRF BA apple eat up QST
'Then did you eat up the apple today?'
*JIE: 嗯 -: 有 哇.
mm yǒu wa
PRT yes PRT
'Yes, I did.'

Prior to this excerpt, the child had mentioned a variety of types of fruit that she had had at school. The referents of the different kinds of fruit had thus been established in the preceding discourse, constituting the potential referents in the fol-

lowing discourse. As seen in the mother's questions, the mother needed to differentiate the intended referents, *xiāngjiāo* 'banana' in Line 1 and *píngguǒ* 'apple' in Line 2, from the other potential referents in the discourse context.

2.2.2.3. *Search-space features.* Search-space features concern differences in the relative size of the search space one must consider to find the referent in question.

- (g) *Inanimacy:* The feature INANIMACY characterizes referents that are not animate. In typical mother-child discourse, the number of animate entities is relatively limited (e.g., child, mother, father, sibling, dog) compared to the vast number of inanimate entities (e.g., table, cup, toy, juice, television, plant, clothes). Thus, the search space for animate referents is relatively small, while the search space for inanimate referents is relatively much larger.

Example 10: Lin #22 (3;1)

*MOT:	你	的	那	個	蛋糕	呢?
	nǐ	de	nà	ge	dàngāo	ne
	2SG	GEN	that	CL	cake	QST
	'Where is your cake?'					
*LIN:	吃	完	啦.			
	chī	wán	la			
	eat	finish	PRT			
	'(I've) finished it.'					
*MOT:	吃	完	了.			
	chī	wán	le			
	eat	finish	PRT			
	'(You've) finished it.'					

Prior to this excerpt, the child was eating a piece of cake. As seen in the mother's question in Line 1, the intended referent *dàngāo* 'cake' was an inanimate referent.

- (h) *Third person:* The feature THIRD PERSON characterizes a referent that is not first or second person. In typical mother-child discourse, the number of first and second person entities is relatively limited compared to the vast number of potential third person entities. Thus, the search space for first and second person referents is relatively small, but the search space for third person referents is relatively much larger.

Example 11: Jie #34 (3;1)

*MOT:	Jie	你	今天	在	學校.
	Jie	nǐ	jīntiān	zài	xuéxiào
	(name)	2SG	today	at	school
	'Jie, when you were at school today,'				
*MOT:	老師	有沒有	教	你	唱歌?
	lǎoshī	yǒuméiyǒu	jiāo	nǐ	chàngē
	teacher	PRF:NEG:PRF	teach	2SG	sing
	'Did the teacher teach you how to sing?'				
*JIE:	有.				
	yǒu				
	yes				
	'Yes.'				

In this example, the mother and the child were talking about what had happened at school that day. In the mother's question, she referred to *lǎoshī* 'teacher', which was a third-person referent.

As mentioned above, each informativeness feature has two values: an informative value and an uninformative value. The informative and uninformative values for each of the features (in alphabetical order) are summarized in Table 1.

The data were coded by a trained research assistant, who was a native speaker of Mandarin and a graduate student of linguistics. In addition, one and half hours of data from each mother were randomly selected and were independently coded by another trained research assistant, who was also a native speaker of Mandarin and a graduate student of linguistics. Cohen's Kappa was used to determine the inter-rater reliability. The reliability for the coding of referential forms was 90%, and the reliability for the coding of informativeness features was 92%.

2.3. The children's data

For the part of the analysis that aimed to compare the mothers' and the children's referential choices, the children's data and the results presented in Huang (2011) were used for analysis.

Table 1
Informativeness features (adopted from Allen, 2000, p. 490).

Pragmatic features	Informative value	Uninformative value
Absence	Referent absent from physical context	Referent present in physical context
Contrast	Contrast emphasized between potential referents	No contrast emphasized between potential referents
Differentiation in context	Two or more potential referents in physical context	Only one potential referent in physical context
Differentiation in discourse	Two or more potential referents in preceding discourse	Only one potential referent in preceding discourse
Inanimacy	Inanimate referent	Animate referent
Newness	Referent new to discourse	Referent not new to discourse
Query	Referent subject of or answer to query	Referent not subject of or answer to query
Third person	Third person referent	First or second person referent

Table 2
Numbers of referential forms.

	Lin's mother		Jie's mother	
	No.	%	No.	%
Null	1333	21.81	1980	25.09
Pronominal	2830	46.29	3287	41.66
Nominal	1950	31.90	2624	33.25
Total	6113	100.00	7891	100.00

Table 3
Numbers of informative and uninformative arguments with respect to each informative feature.

Pragmatic features	Informative		Uninformative	
	No.	%	No.	%
<i>Lin's mother</i>				
Absence	547	8.95	5566	91.05
Newness	714	11.68	5399	88.32
Query	575	9.41	5538	90.59
Contrast	107	1.75	6006	98.25
Differentiation in context	814	13.32	5299	86.68
Differentiation in discourse	852	13.94	5261	86.06
Inanimacy	2480	40.57	3633	59.43
Third person	3588	58.69	2525	41.31
<i>Jie's mother</i>				
Absence	770	9.76	7121	90.24
Newness	676	8.57	7215	91.43
Query	767	9.72	7124	90.28
Contrast	152	1.93	7739	98.07
Differentiation in context	787	9.97	7104	90.03
Differentiation in discourse	1080	13.69	6811	86.31
Inanimacy	3909	49.54	3982	50.46
Third person	5045	63.93	2846	36.07

3. Results

Table 2 demonstrates the numbers of referential forms in the two mothers' speech. As seen in the table, the total number of referential forms in Lin's mother's data was 6113 and the number in Jie's mother's data was 7891. The proportions of the three referential forms ranged from about 21% to 46% in Lin's mother's data and from about 25% to 41% in Jie's mother's data.

3.1. Informativeness features

The mothers' data were analyzed in relation to informativeness. Table 3 shows the numbers of informative and uninformative arguments with respect to each informativeness feature in the data for Lin's mother and for Jie's mother. Both mothers used many more uninformative arguments (ranging from 86.06% to 98.25% in the data for Lin's mother, and from 86.31% to 98.07% in the data for Jie's mother) than informative arguments (ranging from 1.75% to 13.94% in the data for Lin's mother, and from 1.93% to 13.69% in the data for Jie's mother) for each informativeness feature, except for the features of Inanimacy and Third person. For the feature of Inanimacy, the proportions of informative arguments and uninformative arguments differed less notably. As seen in the table, the data for Lin's mother showed that 40.57% of her arguments were informative (i.e.,

Table 4

Distributions of referential forms with respect to each informativeness feature in the mothers' speech.

Feature	Subject	Forms	Informative		Uninformative		χ^2	Post Hoc	
			No.	%	No.	%			
Absence	Lin's M	Null	64	11.70	1269	22.80	380.28***	I<U	
		Pronominal	106	19.38	2724	48.94		I<U	
		Nominal	377	68.92	1573	28.26		I>U	
	Jie's M	Null	119	15.46	1861	26.13		429.22***	I<U
		Pronominal	139	18.05	3148	44.21			I<U
		Nominal	512	66.49	2112	29.66			I>U
Newness	Lin's M	Null	2	0.28	1331	24.65	472.56***	I<U	
		Pronominal	248	34.73	2582	47.83		I<U	
		Nominal	464	64.99	1486	27.52		I>U	
	Jie's M	Null	3	0.44	1977	27.40		675.02***	I<U
		Pronominal	151	22.34	3136	43.47			I<U
		Nominal	522	77.22	2102	29.13			I>U
Query	Lin's M	Null	7	1.21	1326	23.94	265.03***	I<U	
		Pronominal	439	76.36	2391	43.18		I>U	
		Nominal	129	22.43	1821	32.88		I<U	
	Jie's M	Null	9	1.17	1971	27.67		276.95***	I<U
		Pronominal	470	61.28	2817	39.54			I>U
		Nominal	288	37.55	2336	32.79			I>U
Contrast	Lin's M	Null	1	0.93	1332	22.17	36.02***	I<U	
		Pronominal	50	46.73	2780	46.29		n.s.	
		Nominal	56	52.34	1894	31.54		I>U	
	Jie's M	Null	3	1.97	1977	25.55		78.61***	I<U
		Pronominal	52	34.21	3235	41.80			n.s.
		Nominal	97	63.82	2527	32.65			I>U
DIC	Lin's M	Null	39	4.79	1294	24.42	956.15***	I<U	
		Pronominal	133	16.34	2697	50.90		I<U	
		Nominal	642	78.87	1308	24.68		I>U	
	Jie's M	Null	8	1.01	1972	27.76		1419.76***	I<U
		Pronominal	45	5.72	3242	45.64			I<U
		Nominal	734	93.27	1890	26.60			I>U
DID	Lin's M	Null	44	5.16	1289	24.50	1012.22***	I<U	
		Pronominal	135	15.85	2695	51.23		I<U	
		Nominal	673	78.99	1277	24.27		I>U	
	Jie's M	Null	7	0.65	1973	28.97		1892.96***	I<U
		Pronominal	89	8.24	3198	46.95			I<U
		Nominal	984	91.11	1640	24.08			I>U
Inanimacy	Lin's M	Null	372	15.00	961	26.45	469.93***	I<U	
		Pronominal	933	37.62	1897	52.22		I<U	
		Nominal	1175	47.38	775	21.33		I>U	
	Jie's M	Null	891	22.79	1089	27.35		452.24***	I<U
		Pronominal	1282	32.80	2005	50.35			I<U
		Nominal	1736	44.41	888	22.30			I>U
3rd person	Lin's M	Null	505	14.07	828	32.79	1520.6***	I<U	
		Pronominal	1242	34.62	1588	62.89		I<U	
		Nominal	1841	51.31	109	4.32		I>U	
	Jie's M	Null	1106	21.92	874	30.71		1018.18***	I<U
		Pronominal	1627	32.25	1660	58.33			I<U
		Nominal	2312	45.83	312	10.96			I>U

DIC: differentiation in context; DID: differentiation in discourse; n.s.: not significant.

*** $p < .001$.

inanimate) and that 59.43% of them were uninformative (i.e., animate), and the data for Jie's mother showed that 49.54% of her arguments were informative and 50.46% uninformative. As for the feature of Third person, the data for both mothers showed a reversal in the pattern of the distribution. That is, the mothers expressed more informative (i.e., third person) arguments than uninformative (i.e., first/second person) arguments. As shown in the table, the percentages of informative vs. uninformative arguments were 58.69% vs. 41.31% in the data for Lin's mother and 63.93% vs. 36.07% in the data for Jie's mother.

3.2. Referential choice and informativeness

Further analysis was conducted to examine the relationship between the mothers' use of referential forms and informativeness. Table 4 demonstrates the analyses with respect to the eight informativeness features.

The first part of Table 4 shows the distributions of referential forms with respect to the feature of Absence in the data for Lin's mother and for Jie's mother. The referential forms in the data were examined in terms of the informative value and the

Table 5

Percentages of referential forms with respect to each informativeness feature in each data session in Lin's mother's speech.

		Informative			Uninformative			χ^2
		Null	Pro.	Nominal	Null	Pro.	Nominal	
Absence	2;2	11.54	21.79	66.67	22.71	51.15	26.15	109.43***
	2;6	11.28	16.54	72.18	20.87	47.40	31.74	92.07***
	2;10	13.04	10.14	76.81	25.93	46.38	27.69	74.16***
Newness	3;1	11.64	22.75	65.61	24.01	51.98	24.01	128.10***
	2;2	0.00	42.27	57.73	24.67	49.04	26.29	105.01***
	2;6	0.39	36.86	62.75	22.78	46.71	30.51	130.07***
	2;10	0.00	31.09	68.91	28.19	45.68	26.13	101.65***
Query	3;1	0.68	23.97	75.34	25.07	50.55	24.38	160.82***
	2;2	0.00	88.41	11.59	24.14	43.44	32.42	122.20***
	2;6	1.23	69.96	28.81	22.55	42.79	34.66	86.04***
	2;10	3.17	84.13	12.70	26.46	41.63	31.91	44.24***
Contrast	3;1	1.90	67.62	30.48	23.99	45.11	30.90	31.44***
	2;2	0.00	52.38	47.62	22.19	48.08	29.74	13.80**
	2;6	0.00	52.63	47.37	20.49	45.57	33.94	n.s.
	2;10	6.25	43.75	50.00	25.40	44.09	30.51	-
DIC	3;1	0.00	36.67	63.33	22.56	47.45	29.99	18.01***
	2;2	1.28	21.79	76.92	23.85	51.15	25.00	183.39***
	2;6	7.19	13.03	79.78	23.43	53.35	23.22	512.84***
	2;10	1.67	11.67	86.67	28.01	48.09	23.89	198.32***
DID	3;1	3.23	29.03	67.74	23.62	48.77	27.61	67.84***
	2;2	1.55	22.16	76.29	24.45	51.91	23.64	228.14***
	2;6	8.10	10.95	80.95	23.02	53.28	23.70	504.03***
	2;10	0.86	20.69	78.45	28.00	46.87	25.13	142.22***
Inanimacy	3;1	4.92	18.03	77.05	24.00	50.63	25.37	137.00***
	2;2	13.54	40.16	46.30	27.15	53.76	19.08	138.57***
	2;6	13.31	38.85	47.84	24.95	50.11	24.95	138.14***
	2;10	21.14	30.68	48.18	27.80	53.15	19.05	107.07***
3rd person	3;1	14.55	38.25	47.19	27.33	53.60	19.07	106.27***
	2;2	13.84	37.66	48.50	33.23	64.03	2.74	376.49***
	2;6	13.17	34.21	52.62	31.39	63.34	5.27	558.08***
	2;10	17.57	31.08	51.35	34.07	59.52	6.41	256.57***
	3;1	13.19	34.36	52.45	33.54	64.04	2.42	333.78***

DIC: differentiation in context; DID: differentiation in discourse; n.s.: not significant; -: not applicable.

** $p < .01$.*** $p < .001$.

uninformative value of Absence: informative arguments refer to absent referents while uninformative arguments refer to present referents. As seen in the results, the distributions of referential forms for absent referents and for present referents revealed very different patterns of use. When referring to absent referents, the mothers used a high rate of nominal forms (68.92% in the data for Lin's mother, 66.49% in the data for Jie's mother); when referring to present referents, the percentage of nominal forms became much lower (28.26% in the data for Lin's mother, 29.66% in the data for Jie's mother). In contrast, both mothers used null forms and pronominal forms to refer to present referents more frequently than they used these forms to refer to absent referents. Chi-square analyses showed that the referential choices for absent referents and present referents were significantly different in the data for both mothers ($\chi^2(2) = 380.28$, $p < .001$ in the data for Lin's mother; $\chi^2(2) = 429.22$, $p < .001$ in the data for Jie's mother), suggesting that the mothers were influenced by the feature of Absence in their referential choices.

In order to understand which form(s) used by the mothers contributed to the significant differences in the Chi-square analyses, Post-Hoc multiple comparison tests were conducted (Marascuilo and McSweeney, 1977). The results showed that (1) a significantly lower percentage of null forms were used for absent referents than for present referents in the data for both mothers (11.70% < 22.80% in the data for Lin's mother, and 15.46% < 26.13% in the data for Jie's mother), (2) a significantly lower percentage of pronominal forms were used for absent referents than for present referents in the data for both mothers (19.38% < 48.94% in the data for Lin's mother, and 18.05% < 44.21% in the data for Jie's mother), and (3) a significantly higher percentage of nominal forms were used for absent referents than for present referents in the data for both mothers (68.92% > 28.26% in the data for Lin's mother, and 66.49% > 29.66% in the data for Jie's mother). Thus, the mothers' use of all the three types of referential forms contributed to the significant differences observed in the Chi-square analyses.

Similar distribution patterns and statistical results were also observed in the analyses concerning the other seven informativeness features. As seen in the table, the Chi-square analyses of all these features also reached statistical significance. The results indicated that the referential choices of both mothers were also highly influenced by the seven informativeness features examined. Furthermore, the Post-Hoc multiple comparison tests for the Chi-square analyses (Marascuilo and McSweeney, 1977) showed that the data for both mothers revealed rather consistent patterns in the use of referential forms.

Table 6

Percentages of referential forms with respect to each informativeness feature in each data session in Jie's mother's speech.

		Informative			Uninformative			χ^2
		Null	Pro.	Nominal	Null	Pro.	Nominal	
Absence	2;2	22.39	13.43	64.18	27.01	39.36	33.62	56.27***
	2;7	27.22	21.89	50.89	26.61	49.67	23.72	69.16***
	2;10	2.78	18.06	79.17	24.84	42.73	32.43	68.16***
Newness	3;1	10.38	17.97	71.65	25.92	45.47	28.61	251.42***
	2;2	0.00	30.07	69.93	28.83	38.30	32.87	101.40***
	2;7	0.56	25.99	73.45	29.20	49.40	21.41	236.25***
Query	2;10	0.00	23.46	76.54	26.32	43.54	30.14	149.52***
	3;1	1.09	11.41	87.50	25.06	42.94	32.01	222.02***
	2;2	1.93	72.20	25.87	30.23	32.80	36.97	169.24***
Contrast	2;7	0.00	63.33	36.67	29.30	45.74	24.96	72.09***
	2;10	0.59	41.42	57.99	26.37	41.78	31.85	73.02***
	3;1	1.89	62.26	35.85	24.66	38.11	37.23	54.63***
DIC	2;2	2.63	18.42	78.95	27.16	38.06	34.78	32.67***
	2;7	2.17	58.70	39.13	27.24	47.06	25.70	14.99***
	2;10	4.55	50.00	45.45	24.20	41.64	34.15	n.s.
DID	3;1	0.00	15.22	84.78	23.38	40.62	36.00	46.81***
	2;2	0.41	3.72	95.87	30.17	42.16	27.67	434.29***
	2;7	1.04	10.94	88.02	29.39	51.19	19.42	425.67***
DID	2;10	0.00	4.43	95.57	26.99	46.46	26.55	381.38***
	3;1	3.33	4.00	92.67	24.43	42.96	32.61	214.40***
	2;2	0.64	4.82	94.53	31.29	43.46	25.25	554.68***
Inanimacy	2;7	0.55	18.78	80.66	29.26	50.17	20.57	313.64***
	2;10	0.00	7.27	92.73	27.28	46.51	26.21	380.69***
	3;1	1.09	6.52	92.39	27.76	47.60	24.63	591.27***
3rd person	2;2	23.07	36.83	40.10	30.14	38.51	31.35	21.34***
	2;7	27.33	36.53	36.14	25.99	58.34	15.67	131.01***
	2;10	18.25	28.19	53.56	29.94	55.93	14.12	314.54***
3rd person	3;1	22.12	29.08	48.81	23.52	50.24	26.23	124.61***
	2;2	21.85	33.72	44.43	36.10	45.37	18.54	140.78***
	2;7	25.52	39.43	35.04	29.01	63.51	7.48	184.57***
3rd person	2;10	19.58	27.06	53.36	30.11	62.33	7.56	420.71***
	3;1	20.14	27.38	52.48	27.59	62.21	10.21	373.29***

DIC: differentiation in context; DID: differentiation in discourse; n.s.: not significant.

*** $p < .001$.

For the seven informativeness features analyzed, except for the features of Query and Contrast, we observed that (1) a significantly lower percentage of null forms were used for referents with informative values than for referents with uninformative values, (2) a significantly lower percentage of pronominal forms were used for referents with informative values than for referents with uninformative values, and (3) a significantly higher percentage of nominal forms were used for referents with informative values than for referents with uninformative values. That is, when the mothers referred to a referent with an informative value (i.e., a referent which was less certain), they tended to use a nominal form to provide the required high informativeness. In contrast, when they referred to a referent with an uninformative value (i.e., a referent which was more certain), a null form or a pronominal form would usually be used. Thus, for these features, the mothers used null forms and pronominal forms in a similar way, which was distinct from the way in which they used nominal forms.

However, the results for the features of Query and Contrast revealed slightly different pictures. The Post-Hoc multiple comparison tests demonstrated that there were different patterns for Query and Contrast regarding the use of pronominal forms. In contrast with the results for the other features, those for Query exhibited a significantly higher percentage of pronominal forms for referents with informative value (i.e., query) than for referents with uninformative value (i.e., non-query). In the results for Contrast, on the other hand, there were no significant differences in the mothers' use of pronominal forms for the informative value (i.e., contrastive) and for the uninformative value (i.e., non-contrastive). In the results for Query, we also noticed that pronominal forms were the most frequently used forms for the informative value (76.36% in the data for Lin's mother and 61.28% in the data for Jie's mother), a phenomenon not observed in the analyses of the other features; for all of the other features, the most frequently used forms for the informative values were nominal forms. In fact, given such a high percentage of pronominal forms for queried referents in Lin's mother's speech, the percentage of nominal forms for queried referents was even lower than that for non-queried referents. Further analysis of the features of Query and Contrast is presented in Section 3.3.

The mother-child data in this study were collected for a period of one year (from 2;2 to 3;1). In order to examine whether the mothers' referential strategies were influenced by informativeness throughout this period, further analysis was conducted to examine the mothers' referential choices in the different data sessions. The results are presented in Tables 5 and 6.

Table 7

Distributions of referential forms with respect to each informativeness feature in the children's speech (adapted from Huang, 2011).

Feature	Subject	Forms	Informative		Uninformative		χ^2	Post Hoc	
			N	%	N	%			
Absence	Lin	Null	37	15.04	316	29.26	175.49***	I<U	
		Pronominal	26	10.57	446	41.30		I<U	
		Nominal	183	74.39	318	29.44		I>U	
	Jie	Null	51	23.61	777	36.21		147.13***	I<U
		Pronominal	31	14.35	856	39.89			I<U
		Nominal	134	62.04	513	23.90			I>U
Newness	Lin	Null	10	3.01	343	34.51	281.81***		I<U
		Pronominal	72	21.69	400	40.24			I<U
		Nominal	250	75.30	251	25.25			I>U
	Jie	Null	7	1.75	821	41.85		294.73***	I<U
		Pronominal	171	42.75	716	36.49			n.s.
		Nominal	222	55.50	425	21.66			I>U
Query	Lin	Null	4	2.20	349	30.51	128.24***		I<U
		Pronominal	36	19.78	436	38.11			I<U
		Nominal	142	78.02	359	31.38			I>U
	Jie	Null	3	0.83	825	41.25		350.44***	I<U
		Pronominal	128	35.36	759	37.95			n.s.
		Nominal	231	63.81	416	20.80			I>U
Contrast	Lin	Null	2	11.11	351	26.83	n.s.		
		Pronominal	10	55.56	462	35.32			
		Nominal	6	33.33	495	37.84			
	Jie	Null	0	0.00	828	35.71		44.69***	I<U
		Pronominal	13	30.23	874	37.69			n.s.
		Nominal	30	69.77	617	26.61			I>U
DIC	Lin	Null	2	1.42	351	29.62	136.77***		I<U
		Pronominal	23	16.31	449	37.89			I<U
		Nominal	116	82.27	385	32.49			I>U
	Jie	Null	1	0.66	827	37.42		285.57***	I<U
		Pronominal	20	13.16	867	39.23			I<U
		Nominal	131	86.18	516	23.35			I>U
DID	Lin	Null	13	4.06	340	33.80	312.39***		I<U
		Pronominal	54	16.88	418	41.55			I<U
		Nominal	253	79.06	248	24.65			I>U
	Jie	Null	2	0.94	826	38.42		363.43***	I<U
		Pronominal	35	16.51	852	39.63			I<U
		Nominal	175	82.55	472	21.95			I>U
Inanimacy	Lin	Null	118	21.73	235	30.01	112.58***		I<U
		Pronominal	129	23.76	343	43.81			I<U
		Nominal	296	54.51	205	26.18			I>U
	Jie	Null	369	29.76	459	40.91		116.38***	I<U
		Pronominal	415	33.47	472	42.07			I<U
		Nominal	456	36.77	191	17.02			I>U
3rd person	Lin	Null	162	20.43	191	35.83	404.07***		I<U
		Pronominal	160	20.18	312	58.54			I<U
		Nominal	471	59.39	30	5.63			I>U
	Jie	Null	508	31.17	320	43.72		322.84***	I<U
		Pronominal	497	30.49	390	53.28			I<U
		Nominal	625	38.34	22	3.01			I>U

DIC: differentiation in context; DID: differentiation in discourse; n.s.: not significant.

*** $p < .001$.

Table 5 presents Lin's mother's referential choices in relation to the eight informativeness features in each data session. The results of the Chi-square analyses showed that Lin's mother's referential choices for informative referents and for uninformative referents differed significantly in almost all of the data sessions for the eight informativeness features, except for one session concerning the feature of Contrast¹. The results thus revealed that Lin's mother used pragmatic strategies for referential choice from the time when Lin was as young as 2;2.

Similar distribution patterns and statistical results were also observed in the data for Jie's mother. As seen in Table 6, the results of the Chi-square analyses reached significant differences in all of the data sessions, except for one session concerning Contrast. The results suggested that these informativeness features were powerful variables influencing the mother's referential choice from the time when Jie was as young as 2;2.

¹ The session of 2;10 cannot be analyzed statistically because of the limited occurrences of contrastive arguments.

3.3. Comparison between the mothers' and the children's data

Further analysis was conducted to compare the mothers' and the children's data. Table 3 has revealed that the mothers' data contained many more uninformative arguments than informative arguments for each informativeness feature, except for the features of Inanimacy and Third person. Interestingly, the distribution patterns exhibited in the children's speech were strikingly similar to those observed in the mothers' speech. The children's speech also contained many more uninformative arguments (ranging from 74.96% to 98.64% in Lin's data, and from 83.07% to 98.18% in Jie's data) than informative arguments (ranging from 1.36% to 25.04% in Lin's data, and from 1.82% to 16.93% in Jie's data) for all of the informativeness features except for Inanimacy and Third person. For the feature of Inanimacy, the proportions of informative arguments and uninformative arguments also differed less notably in the children's data: Lin's data showed a percentage of 40.95% for informative (i.e., inanimate) arguments and 59.05% for uninformative (i.e., animate) arguments, and Jie's data showed 52.50% for informative arguments and 47.50% for uninformative arguments. As for the feature of Third person, the reversed pattern was also observed. Both children, like their mothers, also expressed more informative (i.e., third person) arguments than uninformative (i.e., first/second person) arguments. The percentages of informative vs. uninformative arguments were 59.80% vs. 40.20% in Lin's data, and 69.01% vs. 30.99% in Jie's data.

In Table 4, the results show that the mothers' referential choices were highly influenced by the eight informativeness features examined. In Huang (2011), the children's referential choices were also examined in relation to the eight informativeness features. The results showed that the children revealed very similar patterns of referential choices as their mothers. As seen in Table 7, which is adapted from Huang (2011), the referential choices of both children were also highly influenced by the informativeness features; they also tended to use nominal forms for referents with informative values, and null or pronominal forms for referents with uninformative values.

Table 4 also shows that no significant differences were found between the mothers' use of pronominal forms for contrastive referents and for non-contrastive referents. Interestingly, this phenomenon was also observed in the children's data. As seen in Table 7, the children also appeared not to use pronominal forms to differentiate contrastive referents from non-contrastive referents. However, Huang (2011) revealed that when the children used pronominal forms for contrastive referents, these pronominal forms were usually accompanied by the use of non-linguistic strategies, such as deictic gesture (e.g., pointing, touching, reaching), or eye gaze, to indicate the intended referents. In other words, the children in fact were sensitive to the lower specificity and informativeness of pronominal forms and the need to supplement pronominal forms with non-linguistic information, as seen in the following example.

Example 12: Jie #24 (2;7)

*RES:	Jie	糖果	比較	重要	還是	玩具	比較	重要?	
	Jié	tángguǒ	bǐjiào	zhòngyào	háishì	wánjù	bǐjiào	zhòngyào?	
	Jie	candy	more	important	or	toy	more	important	
	'Jie, is the candy or the toy more important to you?'								
*RES:	兩	個	只	能	選	一	個	你	要
	liǎng	ge	zhī	néng	xuǎn	yí	ge	nǐ	yào
	two	CL	only	can	choose	one	CL	you	want
	選	哪	一	個?					
	xuǎn	nǎ	yí	ge?					
	choose	which	one	CL					
	'If you can choose only one of the two, which one do you want to choose?'								
*JIE:	這	個	[% looking at the candy]. ←						
	zhè	ge							
	this	CL							
	'This.'								
*RES:	她	要	這	個	[% pointing at the candy].				
	tā	yào	zhè	ge					
	she	want	this	CL					
	'She wants this.'								
*RES:	她	要	糖果	[=! laughing].					
	tā	yào	tángguǒ						
	she	want	candy						
	'She wants the candy.'								

(Huang, 2011, p. 2071)

In this example, Jie was holding a lollipop in one hand. She was trying in vain to open a toy box with the other hand. The mother suggested that Jie put down the lollipop so that it would be easier for her to open the toy box, but Jie shook her head and kept licking the lollipop. In Line 1, the researcher then asked Jie which one was more important to her, the candy or the toy. As seen in her answer, Jie used a pronominal form *zhè ge* 'this' with eye gaze to indicate that the candy was the intended referent (Huang, 2011).

Similarly, when the mothers used pronominal forms for contrastive referents, they also employed some non-linguistic strategies.

Example 13: Jie #24 (2;7)

- *MOT: 不 是。
bú shì
NEG COP
'No.'
- *MOT: 要 穿 這 一 個 才 是 [% pointing at a pair of shoes].
yào chuān zhè yí ge cái shì
should put-on this one CL just COP
'(You) should put this on (the doll).'
- *MOT: 只有 這 一 雙 才 適合 [% pointing at a pair of shoes].
zhīyǒu zhè yì shuāng cái shìhé
only this one pair just suitable
'Only this pair is suitable.'

In this example, the child was playing with a Barbie doll. She was trying to put a pair of shoes on the doll. The mother used a pronominal form *zhè yí ge* 'this' and *zhè yì shuāng* 'this pair' with the gesture of pointing at another pair of shoes to indicate to the child her intended referent.

In addition to the similarities shown above, some differences were observed between the mothers' and the children's referential patterns for the feature of Query. In the mothers' speech, we observed that the mothers used very high frequencies of pronominal forms for arguments with queried referents, significantly higher than the frequencies for arguments with non-queried referents. This phenomenon was not observed in the children's data. As seen in Figs. 1 and 2, while the mothers resorted to pronominal forms more frequently for queried referents than for non-queried referents, the children's data revealed the opposite pattern. We observed that higher percentages of pronominal forms were used for non-queried referents than for queried referents in the children's data.

Further analysis of the mothers' speech revealed that such phenomenon reflected the frequent use of naming questions in the mothers' data. In a naming question, the mother asked the child to name a person, a story character, or an object in the situational here-and-now. These questions were not information-seeking questions since the mothers already knew the answers. When asking these naming questions, the mothers usually resorted to pronominal forms,

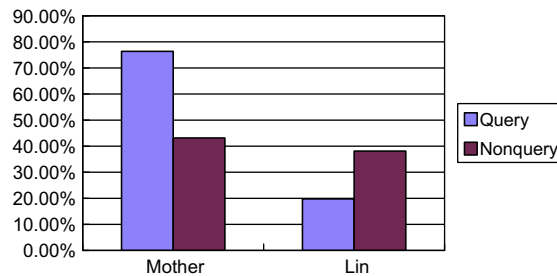


Fig. 1. Percentages of pronominal forms with respect to Query in Lin's and the mother's speech.

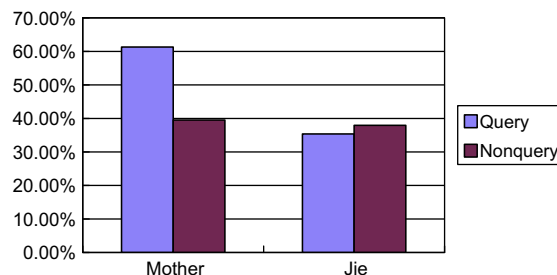


Fig. 2. Percentages of pronominal forms with respect to Query in Jie's and the mother's speech.

including demonstratives and personal pronouns. In addition, these naming questions were often accompanied by the use of non-linguistic strategies, as was also the case in the mothers' use of pronominal forms for contrastive referents. Consider the following examples,

Example 14: Jie #14 (2;2)

*MOT: 啊 這 是 誰 [% pointing at a picture in the book]? ←
 a zhè shì shéi
 PRT this COP who
 'Who is this?'
 *JIE: 這 是 奇奇.
 zhè shì qíqí
 this COP (name)
 'This is Qiqi.'

In Example 14, the mother and the child were reading a story book. The mother was pointing at a picture of a boy in the book, and asked the child who he was. As seen in the example, the mother's question involved a demonstrative *zhè* 'this' and an interrogative *shéi* 'who', which is a typical structure of a naming question.

In addition to demonstratives, personal pronouns were also frequently used by the mothers to initiate naming questions, as seen in Example 15.

Example 15: Lin #2 (2;2)

*MOT: 它 是 誰 -: [% pointing at the book] ? ←
 tā shì shéi -:
 3SG COP who
 'Who is it?'
 *LIN: 這 個 是 毛毛蟲.
 zhè ge shì máomáochóng
 this CL COP caterpillar
 'This is a caterpillar.'
 *MOT: 嗯 -: .
 mm -:
 PRT
 'Yes.'

In this example, the mother and the child were also reading a story book. The mother was pointing at a picture of a caterpillar in the book, and asked the child about it. A personal pronoun *tā* 'it' and an interrogative *shéi* 'who' were used in the mother's question.

The high frequency of occurrence of naming questions in the mothers' speech was also due to the fact that naming questions often occurred in a sequence. That is, the mothers often asked more than one naming question in an interactional sequence, as shown in Example 16.

Example 16: Jie #24 (2;7)

*MOT: 這 是 什麼 [% touching one part of a lantern designed in the form of a pig] ? ←
 zhè shì shénme
 this COP what
 'What is this?'
 *JIE: 屁股.
 pìgǔ
 buttocks
 'The buttocks.'
 *MOT: 屁股.
 pìgǔ
 buttocks
 'The buttocks.'
 *MOT: 那 這 是 什麼 [% touching another part of the lantern] ? ←
 nà zhè shì shénme
 then this COP what
 'Then, what is this?'

- *JIE: 嗯 +...
mm +...
PRT
'Hmm...'
- *MOT: 尾巴 呀.
yībā ya
tail PRT
'The tail.'
- *JIE: 尾巴.
yībā
tail
'The tail.'

In Example 16, the mother and the child were playing with a pig-shaped lantern. As seen in the example, the mother asked two questions about the lantern in Line 1 and Line 4. Both of the questions involved the use of a demonstrative *zhè* 'this' and an interrogative *shénme* 'what', and the use of the non-linguistic strategy of touching the lantern.

The mothers' frequent use of naming questions appeared to be related to a characteristic of maternal speech, i.e., the use of ostension (Jaswal and Markman, 2001). Through ostension, the mothers helped the children learn names by explicitly labeling objects while pointing or showing the objects, as shown in the following examples.

Example 17: Lin #6 (2;6)

- *MOT: 這 是 沙 -: 灘 -: [% pointing at a picture in the book].
zhè shì shā -: tān -:
this COP beach
'This is a beach.'
- *LIN: 沙 -: 灘 -: .
shā -: tān -:
Beach
'A beach.'

In Example 17, Lin and the mother were reading a story book, and they were talking about a picture in the book. The mother's utterance initiated the point-and-label routine of ostension. As seen in the mother's utterance, each syllable of the label *shātān* 'beach' was lengthened. Similarly, when the child repeated the label *shātān* in the next turn, each syllable of the label was also lengthened. This exchange is a typical example of ostension, reflecting the instruction/learning motivation of the interaction.

Example 18: Jie #14 (2;2)

- *MOT: 這 是 紅色 [% touching the red part of the cloth].
zhè shì hóngsè
this COP red
'This is red'
- *JIE: 這 是 紅色.
zhè shì hóngsè
this COP red
'This is red'
- *MOT: 對.
Dùi
Right
'Right.'

In Example 18, the mother was identifying and naming the red color in a piece of colorful cloth. The mother employed an ostensive definition to help the child learn the concept and the name of the color 'red'. As seen in the example, after the child's repetition in the next turn, the mother gave a confirmation *dùi* 'right' to acknowledge the correct response of the child.

It appeared that the mothers not only produced statements with ostensive definitions in the routines of ostension, but also frequently used naming questions to engage the children in naming games, as shown above in Examples 14, 15, and 16. The purpose for the use of these naming questions appeared to be to initiate interaction with the children on the one hand, and to check the children's understanding of the names on the other.

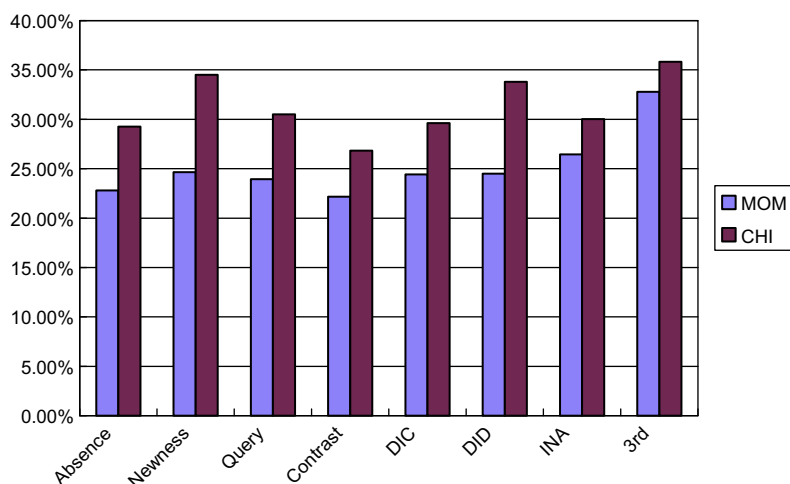


Fig. 3. Percentages of null forms in Lin's and the mother's uninformative arguments.

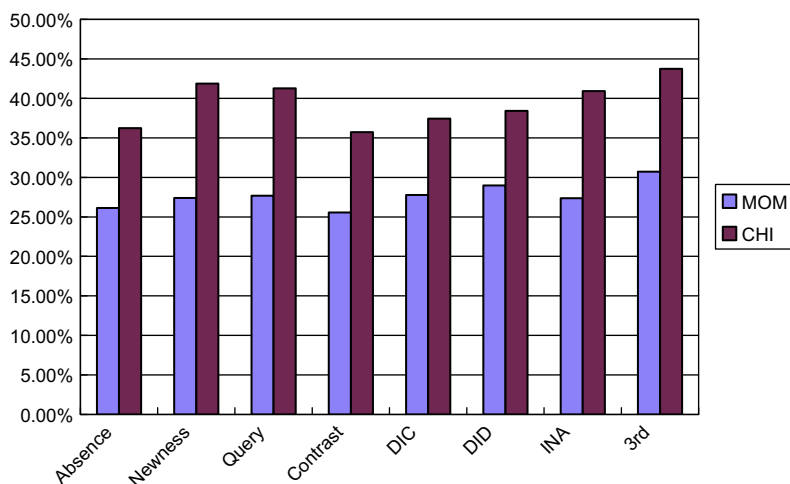


Fig. 4. Percentages of null forms in Jie's and the mother's uninformative arguments.

As mentioned above, both the mothers and the children tended to employ nominal forms for informative arguments, and null forms or pronominal forms for uninformative arguments. While null forms were a major referential device for uninformative arguments in both the mothers' and the children's data, further analysis revealed that the children tended to rely on null forms more frequently than the mothers when expressing uninformative arguments.

Figs. 3 and 4 present the percentages of null forms in the mothers' and the children's uninformative arguments. In both of the mother-child dyads, the children resorted to null forms more frequently than the mothers for the uninformative arguments. The percentages of null forms ranged from 26.83% to 35.83% in Lin's uninformative arguments, and from 22.17% to 32.79% in the mother's. In addition, the percentages ranged from 35.71% to 43.72% in Jie's uninformative arguments, and from 25.55% to 30.71% in the mother's. Statistical analyses revealed that in Lin and the mother's data, except for the features of Inanimacy and Third person, Lin used null forms significantly more frequently than the mother to represent uninformative arguments. In Jie and the mother's data, an even more consistent pattern was observed: Jie resorted to null forms significantly more frequently than the mother to represent uninformative arguments for all of the eight features.

4. Discussion and conclusion

The analysis of maternal speech is important in interpreting acquisition data since children are exposed to child-directed speech rather than adult conversation. It is thus essential to examine the speech of mothers, who are usually the primary

caregivers. This study has attempted to investigate whether Mandarin-speaking mothers' referential choices reflect discourse pragmatics, and whether mothers' referential patterns are similar to their children's. The results indicated that the referential choices of both of the mothers in this study were highly influenced by the eight informativeness features, and that their referential choices were made in accordance with discourse-pragmatic principles. The results are thus consistent with those of previous studies which showed that referential strategies in maternal speech are affected by pragmatic factors (Guerriero et al., 2006; Narasimhan et al., 2005).

In child-directed speech literature, it has been suggested that the complexity of the speech addressed to children is determined largely by cues from the children themselves (Bohannon and Marquis, 1977). When children fail to comprehend a parental utterance, the statement is usually simplified and repeated in order to facilitate communication. In other words, the process of language acquisition might be considered as being a set of self-paced lessons. Our results demonstrated that discourse-pragmatic principles were reflected in the mothers' referential strategies from the first sessions of the data collection, i.e., from the time when the children were as young as 2;2, and throughout their later development. The results thus appeared to suggest that the children already exhibited sensitivity to the relationship between referential forms and informativeness in language input when they were as young as 2;2. In addition, similar referential patterns were also observed in the speech produced by the two children, indicating that the children's referential patterns may be rooted in their mothers' similar use (Guerriero et al., 2006).

The mothers' and the children's data also showed similar patterns in the distributions of informative and uninformative arguments. Both the mothers and the children used many more uninformative arguments than informative arguments for each informativeness feature, except for the features of Inanimacy and Third person. Both the Inanimacy feature and the Third person feature are search-space features, as mentioned in the Methods section. The relatively higher percentages of informative arguments for these two features, in comparison with the other features, may be related to the nature of typical mother-child discourse. In typical mother-child discourse, the number of animate entities is relatively limited (e.g., child, mother, father, sibling, dog) compared to the vast number of inanimate entities (e.g., table, cup, toy, juice, television, plant, clothes). The mother and the child may be inclined to talk about the various objects in the here-and-now setting, resulting in more frequent occurrences of arguments with inanimate referents. Similarly, in typical mother-child discourse, the number of first and second person entities is relatively limited (e.g., child, mother) compared to the vast number of potential third person entities (e.g., dog, table, cup, toy, juice, television), thus resulting in more frequent occurrences of arguments with third-person referents.

In addition to the similarities observed between the mothers' and the children's use of referential strategies, finer-grained analyses also revealed differences. These differences appeared to reflect the particular natures of maternal speech and children's speech. For example, the mothers, but not the children, used very high frequencies of pronominal forms for arguments with queried referents, significantly higher than the frequencies for arguments with non-queried referents. As seen in the analysis, the high frequency of pronominal forms used for queried referents may result from the frequent use of naming questions in the mothers' data. The frequent use of naming questions appears to be a characteristic of maternal speech. It has been pointed out that mothers often help children ages 2 and older learn nouns through incidental learning such as through ostension (i.e., when objects are labeled explicitly) (Jaswal and Markman, 2001). In addition, mothers also give children many opportunities to practice producing object labels themselves by engaging them in naming games (Ninio and Bruner, 1978). In these interactions, the mother points to and names specific objects for the child and then helps the child say the names. As seen in the analysis, by resorting to naming questions, the mothers not only initiated interaction with the children but also tested the children's knowledge of the names. The mothers' naming questions were characterized by the use of pronominal forms because the nominal forms were precisely the answers the mothers expected the children to provide in their responses. The mothers often expressed confirmation or encouragement following the children's correct naming, and gave correction or instruction if the children had difficulties providing the appropriate names.

Another interesting difference between the referential choices of the mothers and the children was the more frequent use of null forms for uninformative arguments in the children's data. While both the mothers and the children tended to resort to null forms and pronominal forms, as opposed to nominal forms, for uninformative arguments, the children relied on null forms more heavily than the mothers. The results may indicate that the discourse-pragmatic account is perhaps complementary to the performance account in explaining the children's referential choice. The performance account (Bloom, 1993; Valian, 1991) assumes that the child omits arguments as a result of immature or limited processing resources. That is, the child can only cope with the production of utterances of limited length. Thus, the results may suggest that when either null forms or pronominal forms were appropriate for referring to uninformative arguments, the children tended to rely on null forms more frequently than the mothers due to processing constraints.

This study has provided evidence for the discourse-pragmatic account for maternal referential choice. From the perspectives of children's pragmatic development and cognitive development, maternal referential choice reflects mothers' awareness of children's sensitivity to the dynamics of information flow and the ability to understand other people's perspectives. It is crucial for children to acquire such ability in order to become communicatively competent speakers. Since discourse-pragmatic principles were reflected in the mothers' referential strategies from the time when the children were as young as 2;2, this may imply that the use of such strategies occurred in maternal input even earlier than the age of 2;2. Some of the previous studies have revealed that maternal speech reflects discourse pragmatics when the children are at even earlier ages. For example, Guerriero et al.'s (2006) English-speaking and Japanese-speaking children were at the ages of 1;9 at the first data sessions. These children's mothers appeared to use different referential forms in a pragmatically-sensitive way

from the onset of the data collection. Further studies of Mandarin maternal input to children younger than 2;2 are needed in order to better understand when such pragmatic strategies occur in maternal input in the course of Mandarin-speaking children's language acquisition. In addition, it appears that maternal referential choice functions as important language input for language-learning children. As shown in the analyses, the children, like their mothers, also demonstrated the use of pragmatic principles in their referential choices. Thus, the findings reported in this study may have important implications for the study of grammatical development, suggesting that the acquisition of grammar may be related to the referential strategies used by mothers in conversation with young children (Clancy, 1997).

Appendix A. Transcription conventions and gloss abbreviations

Transcription conventions

+...	Trailing off
-:	Previous word lengthened
[/]	Retracing without correction
[% text]	Comments on main line
[=! Text]	Paralinguistics, prosodics

Gloss abbreviations

1PL	First person plural
1SG	First person singular
2SG	Second person singular
3SG	Third person singular
BA	The morpheme BA
CL	Classifier
COP	Copula
GEN	Genitive
NEG	Negative
PRF	Perfective aspect
PRT	Discourse particle
QST	Question particle

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