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The acquisition of evidential markers in L1 Chinese: data from Taiwan Mandarin-speaking children[1]

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Abstract

This study examines several issues concerning the acquisition of evidential markers in Chinese with Taiwan Mandarin-speaking children, including evidential type, acquisition order, and age effect. A production task (i.e., picture-description task) and a comprehension task (i.e., multiple-choice task) were completed by forty children who were divided into two age groups, 3-year-olds and 5-year-olds. Twenty adult native speakers of Taiwan Mandarin were recruited as controls.

The results showed that direct evidential markers were comprehended and produced prior to indirect. For the order of acquisition, the child participants found visual markers and non-visual markers equally easy, while they understood reported markers better than inferring markers. Finally, age was identified as a crucial factor in children's acquisition of Chinese evidential markers. The 3-year-olds had some success with the use of direct evidential markers, but they still had difficulties with indirect evidential markers. The 5-year-olds significantly outperformed the 3-year-olds but they did not reach an adult-like level.

Keywords: evidentiality, evidential type, acquisition order, Taiwan Mandarin, L1

1. Introduction

"How do you know this?" is a frequently used phrase in our daily life requiring the source of information being communicated. The linguistic indication of the source of information for a given statement can be generally understood as evidentiality (e.g., Aikhenvald, 2004; Dendale & Tasmowski, 2001). Originally recognized by Boas (1947) in his work on Kwakiutl, a North American Indian language, the concept of evidentiality has been gradually developed in the theoretical domain and further applied to the experimental investigations.

In the early reports, in which the primary focus is on non-European languages, the basic characteristics found to qualify evidentiality include the obligatory encoding of the source of information and the realization through

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the inflectional morphemes such as verbal affixes or particles (e.g., Barnes, 1984). Examples from Tariana, an Arawak language spoken in northwest Amazonia, are shown in (1)[4].

(1) a. Juse ɨrida di-manika-**ka**.
José football 3sgnf-play-REC.P.VIS
'José has played football (we saw it).'
b. Juse ɨrida di-manika-**mahka**.
José football 3sgnf-play-REC.P.NONVIS
'José has played football (we heard it).'
c. Juse ɨrida di-manika-**nihka**.
José football 3sgnf-play-REC.P.INFR
'José has played football (we infer it from visual evidence).'
(Aikhenvald, 2004, p. 2)

The above examples are canonical illustrations of a morphological evidential system. As can be seen, evidentiality is overtly and obligatorily expressed through distinct grammatical markers, i.e., verb suffixes, whether the speaker sees, hears, or infers about the proposition expressed (i.e., José plays football). Thus, evidentiality is assigned a grammatical category, and the closed set of morpho-syntactic markers indicating information sources are referred to as 'evidentials,' which are defined as labels "for the verbal category which takes into account […] the alleged source of information about the narrated event" (Jakobson, 1957, p. 4). Alternative views have been taken to interpret the notion of evidentiality in a broader sense, considering evidentiality as not only specifying sources of information but encoding the speaker's epistemic justification towards an asserted proposition (Chafe, 1986; Mithun, 1986). In this perspective, evidentiality is not restricted to only cases of obligatory grammatical marking. Rather, it can be expressed by "any linguistic expression of attitudes toward knowledge" (Chafe, 1986, p. 271), through a variety of lexical forms and paraphrastic constructions. Examples from English, a language regarded as lacking grammaticalized evidentiality (Aikhenvald, 2004; Lazard, 2001), are shown in (2), where different verbs as in (2a) and (2b) or an adverb as in (2c) are adopted by the speaker to indicate that the claimed fact (i.e., Ali plays soccer). European languages have also been found to share a similar trait (cf. Wiemer, 2010), resorting to "strategies along the lexico-grammatical continuum" (Marín Arrese, Haßler & Carretero, 2017, p. 2) when expressing evidentiality.

(2) a. I **saw** Ali play soccer.
b. I **heard** from John that Ali played soccer.
c. Ali, **apparently**, played soccer.
(Ünal & Papafragou, 2020, p. 118)

Likewise, in Chinese, evidentiality has been claimed to be "mapped onto a heterogeneous set of lexical forms encompassing verbal and adverbial

[4] Abbreviations used in the examples: 3: third person; INFR: inferred; nf: non-feminine; NONVIS: non-visual; sg: singular; REC.P: recent past; VIS: visual.

markers" (Hsieh, 2008, p. 208). In other words, evidential meanings in Chinese are realized by lexical elements such as verbs and adverbs, as shown in (3).

(3) a. Ta **kandao** fenxishi hen jinzhang.
3sg see analyst very nervous
'He saw the analyst was very nervous.'
b. Gupiao **sihu** hui shangzhang.
stock seem will rise
'It seemed that the stock would rise.'
c. Gupiao **jushuo** hui shangzhang.
stock allegedly will rise
'Allegedly the stock would rise.'

(Hsieh, 2008, pp. 209-210)

As can be seen, Chinese displays a rich lexical repertoire of evidentiality. In (3a), the verb *kan* 'see' marks the evidence as being acquired through sensory perception. In (3b), the use of *sihu* 'seem' suggests that the speaker might either draw an inference based on visual observations or on deductive reasoning. In (3c), the use of *jushuo* 'allegedly' indicates the source of information communicated is not originated from the speaker but from hearsay.

In sum, previous studies all indicate that a secure understanding of evidentiality is a relatively late achievement for children. To see whether young learners of Mandarin Chinese follow the developmental patterns found in better-studied languages, and whether age is a dominant factor in the acquisition of Chinese evidentiality, the present study examined the production and comprehension of evidential markers with L1 learners of Mandarin Chinese.

1.1. Literature Review

1.1.1. Theory of cognitive development

According to Piaget's (1952) theory of cognitive development, children's intelligence changes as their age increases. They acquire their mother tongue and construct a mental model of the world. Piaget is interested in the way where children acquire concepts such as time, quantity, causality, and so on. He believes that children develop knowledge through their own exploration, rather than by working with others. Thus, he proposes that all children go through four stages: Stage 1 (sensorimotor): birth to 2 years; Stage 2 (preoperational): 2 to 7 years; Stage 3 (concrete operational): 7 to 11 years; Stage 4 (formal operational): ages 12 and up. The sequence of these stages is universal across cultures and follows the same invariant order, but not all at the same rate.

At the first stage, "the infant moves from a neonatal, reflex level of complete self-world un-differentiation to a relatively coherent organization of sensory-motor actions vis-a-vis his immediate environment" (Flavell, 1963,

p.86). They know the world through movements and sensations, learn about the world through basic actions, and realize that their actions can cause things to happen in the world around them. At the second stage, "the individual makes his first relatively unorganized and fumbling attempts to come to grips with the new and strange world of symbols" (Flavell, 1963, p. 86). They learn to use words and pictures to represent objects, struggle to see things from the perspective of others, and get better with language and thinking. At the third stage, "the child's conceptual organization of the surrounding environment slowly takes on stability and coherence by virtue of the formation of a series of cognitive structure called groupings" (Flavell, 1963, p. 86). They begin to think logically about concrete events, and use inductive logic or reasoning from specific information to a general principle. At the final stage, the adolescents show "the structures within which adults operate when they are at their cognitive best, i.e., when they are thinking logically and abstractly" (Flavell, 1963, p. 87). They begin to think abstractly and reason about hypothetical problems, and think more about moral, philosophical, ethical, social, and political issues that require theoretical and abstract reasoning.

All in all, intelligence is demonstrated through motor activity without using symbols at the stage of infancy, where object concepts are acquired. Language use becomes mature, memory and imagination gradually developed in early childhood, and egocentric thinking predominates. Operational thinking develops through logical and systematic manipulation of concrete objects, and egocentric thinking reduces when children move on to the stage of elementary and early adolescence. Finally, intelligence is shown through logical use of symbols related to abstract concepts at the formal operational stage.

1.1.2. Empirical studies on evidentiality

Turning to the experimental investigations, developmental studies have also addressed the acquisition of evidentiality cross-linguistically (Aksu-Koç, 1988; Koring & de Mulder, 2015; Ozturk & Papafragou, 2016; Ünal & Papafragou, 2016). Since being able to produce and understand a language is the hallmark of language acquisition, children's production and comprehension of evidentiality have been tested. Specifically, researchers have examined how and when children begin producing knowledge-qualifying expressions, i.e., evidential markers and constructions, and comprehending the semantics of different evidential devices.

A primacy for evidential production over evidential comprehension has been well documented in the literature, where languages with obligatory grammatical evidential systems have been most widely studied (Aksu-Koç, 1988; Ozturk & Papafragou, 2016; Ünal & Papafragou, 2016). The production of evidentiality seems to be an early accomplishment for children. While children are able to successfully produce direct evidential morphemes at

around the ages of 2 and 3 (Aksu-Koç, 1988; Papafragou, Li, Choi, & Han, 2007), they have been found to consistently fail at tasks accessing their evidential comprehension (Ozturk & Papafragou, 2016; Ünal & Papafragou, 2016).

Another consistent result revealed across evidential languages is an asymmetry favoring direct over indirect evidential markers (Aksu-Koç, 1988; Koring & de Mulder, 2015; Ozturk & Papafragou, 2016; Papafragou et al., 2007). A hierarchy seems to exist in the acquisition of evidentiality such that markers of direct evidence (i.e., directly perceived knowledge) are acquired prior to markers of indirect evidence (i.e., inferred or informed knowledge). Production data suggest that it is not until age 6 or 7 that children start to reliably produce the appropriate markers in indirect contexts (Aksu-Koç, 1988; Ozturk & Papafragou, 2016). Comprehension data otherwise reveal that children do not exhibit an adult-like knowledge of indirect evidential markers until after the age of 6 or 7, and may even have to wait until much later (Ozturk & Papafragou, 2016; Koring & de Mulder, 2015).

In this section, four most widely cited empirical studies on children's acquisition of evidentiality (i.e., Koring & de Mulder, 2015; Ozturk & Papafragou, 2016; Papafragou et al., 2007; Winans, Hyams, Rett, & Kalin, 2014) are reviewed in chronological order.

Papafragou et al. (2007) investigated the acquisition of grammaticalized evidentiality[5] and its relation to children's source reasoning to address how linguistic expressions and conceptual representations make contact during language learning. Focusing on the acquisition of evidential morphology in Korean, they conducted a series of experiments with native speakers of Korean aged 3 and 4 to examine their evidential production and evidential comprehension. Meanwhile, their conceptual understanding of information sources was also tested. A semantic task was designed to test children's comprehension of *-e* and *-tay*, in which the children were expected to attribute an utterance marked with either one of the two morphemes to the appropriate speaker. A pragmatic task was designed to test children's understanding of discourse functions of *-e* and *-tay*, in which the children had to compare two

[5] To better understand the test design, examples of declarative sentences in Korean ending with the evidential suffixes -e (direct evidence) and -tay (hearsay evidence) are provided in (i) and (ii), taken from Papafragou et al. (2007, p. 262):
(i) Toli-ka mantwu-lul mek-ess-e.
Toli-Nom dumpling-Acc eat-Past-Decl
'Toli ate dumplings.'
(ii) Toli-ka mantwu-lul mek-ess-tay.
Toli-Nom dumpling-Acc eat-Past-Decl
'(I heard that) Toli ate dumplings.'

evidentially marked utterances and tell the experimenter which one they tended to believe. On the other hand, their source monitoring abilities were also tested with similar test scenarios provided (looking/telling) but without the engagement of evidential morphology. Children were asked to report sources of their own findings and identify sources when monitoring of knowledge in others was involved. Results showed that Korean children ranging from 3 to 5 were able to explicitly report their sensory experiences using the direct evidential marker *-e*, but their ability to produce indirect evidential marker, the hearsay morpheme *-tay* in this case, had to wait until they were older to be more adult-like. By contrast, the comprehension of evidential morphemes seemed to pose more difficulties to the Korean children, as they still failed at different comprehension tasks by the age of 4. Papafragou et al. (2007) argued that the reason for the delay in comprehension may not be totally conceptual. Since the children successfully engaged in non-linguistic evidential reasoning, it was found that comprehension tasks may be more cognitively demanding and involve more use of metalinguistic knowledge.

Winans et al. (2014) conducted a felicity judgment task on English copy-raising constructions (henceforth CRCs)[6] with 4- to 6-year-old English native speakers and adult controls. A total of 42 children and 21 adult controls participated in the study. The adult results were consistent with the findings of Rett and Hyams (2014) in that raised sentences were much more frequently accepted with direct scenarios, while unraised sentences were acceptable in both direct and indirect contexts. By contrast, the results of the children's performance showed that they were equally likely to accept raised and unraised sentences regardless of the type of test scenarios provided. Most importantly, they were equally likely to consider a raised sentence with an indirect picture 'good' as with a direct picture. Although slight differences were found across the age groups, those differences were not statistically significant. Based on the findings, Winans et al. (2014) refuted the view that the comprehension results reflected children's actual knowledge of evidentiality. The children produced raised constructions and did so exclusively in direct situations, showing that they must be equipped with knowledge of evidential semantics and syntax. In addition, the children were able to explicitly reject raised sentences in indirect contexts with adult-like justifications when asked to provide explanations. Thus, the delay in comprehension was most likely due to methodological artifacts. To sum up, Winans et al. (2014) showed that

[6] Examples of copy-raising constructions (CRCs) in English are provided in (i), taken from Winans et al. (2014, p. 2):

(i) a. Ernie looks like he got sick.
b. It looks like Ernie got sick.

In English, a raised sentence such as (ia) is acceptable only when the speaker has direct perceptual access to the event, while an unraised sentence such as (iib) can be interpreted as the speaker acquiring the information from both direct and indirect sources.

English-speaking children by the age of 6 were still insensitive to the relation between CRCs and the evidence types, and the developmental pattern observed in them was not so different from children acquiring languages with grammaticalized evidentiality.

Koring and de Mulder (2015) focused on the acquisition of evidentiality in Dutch, where evidential distinctions were not marked grammatically. In Dutch, a specific group of lexical items encode evidential meanings, and they do not contain an additional semantic property such as tense, aspect, or speaker certainty. The participants were 120 Dutch-speaking children aged 6 to 9 and 43 adult controls, who were asked to judge which of the two characters appearing in the picture would probably perform a certain action (the who-question) and provide reasons for their answers (the *why*-question). Both tasks contained three conditions: direct visual, hearsay, and inferential. Results showed that when answering the *why*-questions, the adults were more inclined to use inferential and hearsay evidence. By contrast, the children were more likely to rely on visual and hearsay evidence, and less likely to consult inferential access. Though they demonstrated an explicit understanding of the direct evidential verb, this was not the case for the indirect hearsay and inferential verbs. This developmental pattern is thus similar to that of children acquiring languages with grammaticalized evidential systems: the direct evidential maker is acquired prior to the indirect markers. Given that the Dutch direct evidential verb does not encode speaker certainty, Koring and de Mulder (2015) argued that an earlier acquisition of the direct evidential term cannot be mistakenly attributed to children's early understanding of speaker certainty.

Focusing on the acquisition of evidential morphology in Turkish, a language with grammaticalized evidentiality, Ozturk and Papafragou (2016) conducted a series of experiments with native speakers of Turkish[7] aged 5 to 7 to investigate the relation between linguistic and cognitive development. Results showed that the 5-year-olds were still unable to reliably differentiate the two evidential markers based on their discourse functions. By contrast,

[7] Turkish is a language with grammaticalized evidentiality, in which evidential meanings are encoded in its two past-tense morphemes *-di* (direct evidence) and *-miş* (indirect evidence). In addition, the indirect evidential morpheme *-miş* can be interpreted as the speaker acquiring information through either hearsay or inference. Examples of declarative sentences in Turkish ending with the two verb suffixes are provided in (i) and (ii), adapted from Ozturk and Papafragou (2016, p. 200):

(i) Çocuk oyun oyna-**di**.
child game play.PAST.direct
'The child played.'

(ii) Çocuk oyun oyna-**miş**.
child game play.PAST.indirect
'The child played.'

the children began to make progress at linking evidential markers to speaker reliability at age 6, and their performance improved significantly at age 7 and became almost adult-like. In addition, reliability effects from the Turkish source verbs were also acquired around the same age. These findings suggest that the children's understanding of the pragmatic properties of evidential morphology was similarly delayed. To conclude, the Turkish children by the age of 7 had not yet fully understood the Turkish evidential system. Together with the findings from the non-linguistics source monitoring tasks, Ozturk and Papafragou (2016) argued that the delay in the acquisition of evidentiality does not necessarily reflect children's cognitive immaturity. Instead, it might be the mapping between the existing source concepts and the corresponding linguistic forms that causes greater problems for the Turkish learners.

In sum, in these studies, children's production and comprehension of the evidential devices (i.e., morphemes, lexical verbs and syntactic constructions) were examined. It has been observed that children generally acquired direct evidential markers prior to indirect ones (Koring & de Mulder, 2015; Ozturk & Papafragou, 2016; Papafragou et al., 2007), indicating an earlier understanding of direct sources. In addition, together with the findings from Papafragou et al. (2007), Winans et al. (2014), and Ozturk and Papafragou (2016) showed that the production-comprehension asymmetry holds regardless of children's exposure languages. What can be found from the cross-linguistic empirical data is that children's acquisition of evidentiality is developed later in their childhood. Previous studies dealing with the acquisition of evidentiality have been primarily, if not solely, concerned with languages whose sources of information are obligatorily and morphologically encoded (cf. Aksu-Koç, 1988, Papafragou et al., 2007; Ozturk & Papafragou, 2016; Ünal & Papafragou, 2016). However, discussions of Chinese evidentiality seem to be somewhat vacant, not to mention the acquisition of evidentiality in Chinese, which has not been examined systematically and thus lacked robust empirical evidence.

To investigate whether the theoretical background and empirical findings can well account for Mandarin-speaking children's acquisition of evidentiality, we address the following research questions:

1) Are direct evidential markers acquired prior to indirect evidential markers in comprehension and production?
2) Within each type, what is the order of acquisition of subtypes, i.e., visual vs. non-visual within direct markers, and inferring vs. reported within indirect markers?

2. Methodology

2.1. Participants

Previous studies find that children spontaneously produce evidential morphemes (Aksu-Koç, 1988; Choi, 1995) and evidential constructions (Rett

& Hyams, 2014) at around the age of 2. Experimental studies otherwise show that children reach the same level of performance in their naturalistic speech about a year or two later (Aksu-Koç, 1988; Papafragou et al., 2007; Ünal & Papafragou, 2016). However, at what exact age children develop a full understanding of evidential systems remains open to dispute. As mentioned earlier, the comprehension of evidentiality, especially indirect evidential markers, poses such persistent difficulties for children that they may have to wait until after age 6 or 7, or even later, to properly handle the full range of evidential meanings (Koring & de Mulder, 2015; Ozturk & Papafragou, 2016). Studies on children's conceptual understanding of sources of knowledge also present a similar age-of-development (cf. Matsui & Fitneva, 2009). Thus, the present study recruited children ranging from 3 to 5 to see whether children at age 3 begin to develop the idea of evidentiality and whether age 5 is the breakthrough for evidential expressions in Mandarin Chinese. Information about the participants is given in Table 1.

Table 1
Summary of the background information of the participant

Group		Age	Range (years; months)	Number
Child	G1	3-year-olds	3;0-3;11(mean = 3;4)	20
	G2	5-year-olds	5;0-5;11(mean = 5;6)	20
Adult	G3	25-year-olds	22;0-26;11(mean = 25;7)	20

Each of the child group consisted of 20 participants recruited from preschools located in a northern city serving middle- to upper-class families. All of them are native speakers of Mandarin Chinese and free of language disorders of any kind. Additionally, 20 adult native speakers of Mandarin Chinese were recruited as controls. Most of them were graduate students and undergraduate students from a public university.

2.2. Materials and methods

Children's acquisition of evidentiality has been examined through observational and experimental methods with different manifestations. Observational studies generally investigate the emergence of evidential markers in children's speech, adopting a longitudinal format in which a handful of children's daily conversations are recorded over a period of time and analyzed: Aksu-Koç (1988) on Turkish, Choi (1995) on Korean, and Matsui, Yamamoto and McCagg (2006) on Japanese. Despite providing researchers with invaluable opportunities to observe language behaviors in naturalistic settings, observational methods have important limitations. Specifically, while the collection of spontaneous speech data requires a considerable amount of time, it is difficult to generalize the results to a larger population due to the small subject pool (Blume & Lust, 2017). Since the

present study aims to address the issues of evidentiality systematically, a longitudinally conducted study might not be able to serve the purpose. Because of this inadequacy, experimental means were adopted to elicit production of the target linguistic materials and to test comprehension in a controlled environment cross-sectionally.

Previous experimental studies have used different approaches to elicit evidential production and evaluate evidential comprehension. For production, the event-description method requires the participants to describe the test scenarios using the appropriate evidential markers (Aksu-Koç, 1988; Ünal & Papafragou, 2016). The correction and the re-telling methods involve the change of the evidential markers in the participants' speech (Papafragou et al., 2007). The fill-in-the-blank method is adopted when the evidential markers are expected at the end of the sentences in the target language (Ozturk & Papafragou, 2016). For comprehension, the most commonly adopted method is the sentence-to-speaker matching task, or its variation the sentence-to-situation matching task, in which the participants are expected to attribute the utterances marked with evidential markers to the appropriate speaker or situation (Aksu-Koç, 1988; Ünal & Papafragou, 2016). Other comprehension tests involve speaker judgement, where the participants are asked to judge an evidentially encoded utterance as 'good' or 'silly' based on the presented test scenario (Papafragou et al., 2007; Winans et al., 2014).

Unlike languages with grammaticalized evidentiality, Chinese generally lacks evidential suffixes or particles. Instead, evidentiality is "mapped onto a heterogeneous set of lexical forms encompassing verbal and adverbial markers" (Hsieh, 2008, p. 208). In other words, evidential meanings in Chinese are manifested in a wide range of lexical forms.

Willett (1988) noted that "the primary evidential parameter expressed in natural language is that of direct evidence versus indirect evidence" (ibid.: 57). Subsequent studies have also found that the distinction between direct and indirect evidence counts as the most basic and fundamental distinction (cf. Davis, Potts & Speas, 2007; Faller, 2002). Thus, following previous work, we categorize evidence types into Direct and Indirect, and further divide them into subtypes.

Type 1. Direct Evidence

Direct evidence generally refers to information derived from a type of sensory observation (Aikhenvald, 2004; Willett, 1988). Two types of evidence are included: Visual and Non-visual.

Type 1-1 Visual

Visual evidence refers to knowledge acquired through seeing. It is necessary to single out visual sense in that visually perceived information is often ranked higher than information obtained through other sensory means

in language-specific and cross-linguistic hierarchies (cf. Aikhenvald, 2004; Barnes, 1984), which reflects its primary importance. In Chinese, the most prominent verb of perception *kan* 'see' denotes visual perception, as shown in (4), where the speaker was physically present in the event to witness the whole process.

(4) Wo kandao ta ganggang jingguo na dong fangzi.
1sg see 3sg just walk past that CL house
'I saw her just walk past that house.'

Type 1-2 Non-visual

Non-visual evidence refers to information acquired through hearing, the second most prominent sensory modality, but can be typically extended to other forms of sensory perception. In Chinese, a language lacking grammatically-coded evidentiality, auditory perception is characterized by the verb *ting* 'hear', as shown in (5), which signifies the fact that the speaker arrived at the knowledge (i.e., the dog barked) through auditory perception in the case where the event took place in the vicinity of the speaker, within earshot.

(5) Wo tingdao gou zai jiao.
I hear dog ASP bark
'I hear that the dog is barking.'

Type 2. Indirect Evidence

Indirect evidence is further distinguished into two types: Inferring and Reported. Inferring is marked when the result of an event is inferentially constructed but not directly perceived, while Reported is marked when information about an event is acquired via verbal communication.

Type 2-1 Inferring

Epistemic modal expressions, such as an auxiliary verb like *yinggai* 'should'[8] as in (6) or an adverb like *yiding* 'must' as in (7), display the value of inferential evidentiality.

(6) [The light in the professor's office is on]
Laoshi yinggai hai zai bangongshi.
professor should still in office
'The teacher should still be in the office.'

[8] Since the deontic reading of *yinggai* 'should' is beyond the scope of the current study, it is not included in the discussion. Here the focus is on the use of *yinggai* in the sense of 'supposedly'.

(7) [*Xiaoming* did not come to work today]
Ta keneng shengbing le.
3sg might sick ASP
'He might be sick.'

In (6), the use of *yinggai* 'should' indicates that the speaker made an inference based on his or her observation of the available clues (i.e., the office light is on). By contrast, in (7), the use of *keneng* 'might' indicates that the speaker cannot be certain whether the individual in question was actually sick (e.g., the speaker did not receive any note or phone call from *Xiaoming*).

Type 2-2 Reported

Reported markers signal knowledge acquired from verbal reports. In Chinese, reported speech is generally realized by the verb of saying *shuo* 'say'. The most canonical use of *shuo* 'say' is shown in (8).

(8) Fenxishi shuo gupiao hui shangzhang.
analyst say stock will rise
'The analyst said that the stock would rise.'
(Hsieh, 2008, p. 208)

The verb *shuo* 'say' in (8) takes the preceding third-person subject (i.e., *fenxishi* 'analyst') as the source of information regarding the stock price. The information communicated is thus not originating from the current speaker. Instead, it is provided by someone else who is overtly referred to in the context. In cases where the attribution of the reported information is unknown, *shuo* 'say' can extend its paradigm of usage by taking the perception verb *ting* 'hear' as its matrix verb to signal hearsay statements, as shown in (9), where *shuo* 'say' serves as a complementizer[9].

(9) Wo ting shuo ta haoxiang yao qu du dianying le.
1sg hear say 3sg seem want go study films ASP
'I heard that he seemed to go to study films.'
(Wang, Katz & Chen, 2003, p. 458)

Thus, two tasks were designed: one for production (i.e., a picture-description task) and the other for comprehension (i.e., a multiple-choice task). The classification and distribution of the test items used in each task are shown in Table 2.

[9] Some may consider *ting shuo* 'hear-say' a serial verb, in which *shuo* is a verb, rather than a complementizer.

Table 2
The structure of the task design

Type		Example	The picture-description task	The multiple-choice task
T1 Direct Evidence	T1-1 Visual	*kan* 'see'	Q3, Q7, Q11, Q15	Q3, Q7, Q11, Q15
	T1-2 Non-Visual	*ting* 'heard'	Q1, Q5, Q9, Q13	Q1, Q5, Q9, Q13
T2 Indirect Evidence	T2-1 Inferring	*yinggai* 'should,' *keneng* 'might'	Q4, Q8, Q12, Q16	Q4, Q8, Q12, Q16
	T2-1 Reported	*shou* 'say'	Q2, Q6, Q10, Q14	Q2, Q6, Q10, Q14
Total			16	16

As shown in Table 2, a total of sixteen items were included in each task. Sixteen different test scenarios were made with one test item included in each scenario.

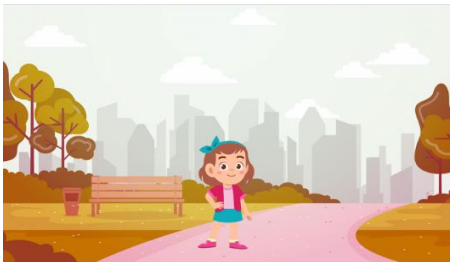
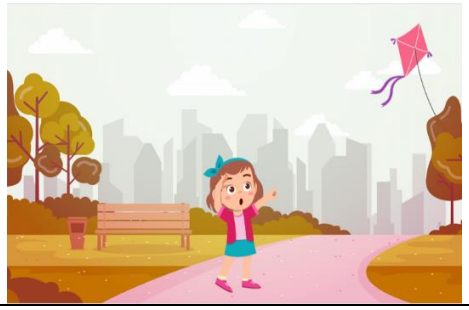
2.3. Picture-description task

In the task, the participants are provided with visual stimuli such as a single picture depicting an event, such as "Cookie Theft" by Goodglass, Kaplan and Weintraub (2001) or a set of pictures narrating one story (e.g., "Frog Story")(Mayer,1969), and they are asked to report what they see. The semi-structured contexts guiding the participants to use a given form allow the researchers to collect relevant linguistic data in a fairly natural setting (Blume & Lust, 2017). Since picture-descripting does not involve cognitively more complex processes such as reading or writing, it is appropriate for testing young children.

In the current study, four kinds of conditions were designed: Direct Visual, Direct Non-visual, Indirect Inferring, and Indirect Reported. In the Direct Visual condition, the participants first saw a picture describing the test scenario, and later saw a picture containing the key object (e.g., a kite). In the Direct Non-visual condition, the participants first saw a picture depicting the test scenario, and later heard the key object (e.g., the sound of cattle mooing, instead of an image of cattle, was presented to them) and saw the character's reaction to the sound in the second picture. In the Indirect Inferring condition, two pictures were presented: one showing the beginning of an event, the other the end state of the event. Finally, in the Indirect Reported condition, two pictures were also presented in which two characters were having a discussion about something. All the conversations were pre-recorded and played during

the test. Table 3 presents an example of the scenario for the Direct Visual condition.

Table 3
An example of the picture-description task[10]

The participants saw:	The participants heard:
Scene 1 	*Xiaonuhai de mama yao ta qu paotui.* 'The little girl was asked to run some errands for her mom.'
Scene 2 	*Qu xuexiao de lushang, fazhan le yijian shi. Ta yao he mama fenxiang zhejian shi!* 'On her way to school, something happened. She wanted to share this event with her mom!' *Ni jiaode, xiaonuhai hui he mama shuo sheme ne?* 'What do you think the little girl might say to her mother?'

2.4. Multiple-choice task

Previous studies on the acquisition of evidentiality have typically employed matching tasks, where the participants are expected to attribute the sentences marked with evidentials to the speaker possessing the appropriate access to the information (Ozturk & Papafragou, 2016; Papafragou et al., 2007) or to the appropriate situation (Ünal & Papafragou, 2016). The matching between sentences and pictures (or videos, characters, etc.) is especially common amongst acquisition studies investigating later-acquired constructions, for its simplicity allows researchers to collect unambiguous responses with few missing data (Ambridge & Rowland, 2013).

In the current study, the comprehension test was presented in the form of a multiple-choice task, where the participants were required to choose one description appropriate for the test scenarios. All the test items were adopted from the picture-description task and presented with two options, as shown in Table 4, which follows the same storyline as the previous example of the picture-description task (i.e., the little girl saw a kite).

[10] All pictures used in the experiment were retrieved from https://www.freepik.com with licenses as a subscribed (paid) user.

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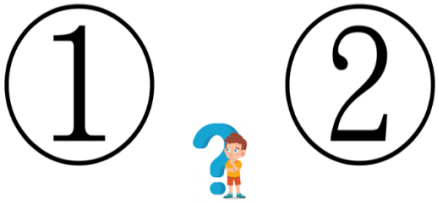
Table 4
An example of the multiple-choice task

The participants saw:	The participants heard:
Scene 1 	*Houlai, xiaonuhai he mama shuo, "wo kandao you yige fengzheng diaozai shushang!"* 'Later, the little girl said to her mom, "I saw a kite falling on the tree!"'
Scene 2 	*Xiaonuhai zheju hua shi sheme yisi?* 'What does the little girl's utterance mean?' *(1) Ta ziji faxian zai shushang you fengzheng.* 'She found a kite on the tree by herself.' *(2) Ta ting bieren shuo shushang you fengzheng.* 'She was told that there was a kite on the tree.'

2.5. Procedure

Since the participants were mainly young children, a consent form was given to their parents prior to the study. After the consent forms were collected, the participating children were asked to do the tasks individually in an unoccupied classroom. In each trial, they went through the production task (i.e., the picture-description task) followed by the comprehension task (i.e., the multiple-choice task). Test scenarios were randomized and presented to them on a laptop computer screen. All of their responses were audio-recorded during the 20-minute experiment section, later transcribed and analyzed statistically.

2.6. Scoring

In the picture-description task, the participants' responses were evaluated according to whether or not their responses contained key lexical items appropriate for the test conditions. In direct contexts (i.e., Direct Visual and Direct Non-visual), the participants' responses should contain keywords indicating the involvement of visual or auditory perception (e.g., *kan* 'see', *ting* 'heard'). As for indirect contexts, in the Indirect Inferring condition, the participants' responses should include keywords showing the process of inferential reasoning (e.g., *keneng* 'might', *yinggai* 'should'). In the Indirect Reported condition, the participants' responses should contain keywords or phrases indicating the source of information (e.g., X *shuo* 'X say'). If the

participants had fulfilled the above mentioned criteria, they were given one point. Irrelevant responses or no response at all were not given any point. In terms of the multiple-choice task, since the participants were presented with only two alternative answers, once the participants had chosen the correct answer, they were given one point. All the collected data were processed by R[11] for statistical computing as soon as the tasks were completed.

3. Results

The first research question addressed in the study concerns Mandarin-speaking children's difficulties in acquiring direct and indirect evidential markers. Specifically, the present study investigates whether direct evidential markers are acquired earlier than indirect evidential markers.

As shown in Table 5, a two-way ANOVA with the participants' overall correct responses as the dependent variable and Evidence Type (Direct, Indirect) and Age Group (G1, G2, G3) as factors revealed a main effect of Evidence Type ($F(1, 1914) = 432.04$, $p < .001$), a main effect of Age Group ($F(2, 1914) = 282.25$, $p < .001$), and a significant interaction between the two factors ($F(2, 1914) = 81.76$, $p < .001$).

Table 5
Two-way ANOVA on Evidence Type and Age Group

	df	*SS*	*MS*	*F*	*p*
Evidence Type	1	49.09	49.09	432.04	<.001
Age Group	2	64.14	32.07	282.25	<.001
Evidence Type*Age Group	2	18.58	9.29	81.76	<.001
Residuals	1914	217.47	0.11		

The participants' overall performance in direct and indirect contexts is shown in Figure 1, which shows the results obtained from both the production or the comprehension tasks, with error bars depicting standard errors. As we can see, all age groups performed better on direct evidential markers than on indirect evidential markers (G1: M = 0.78 > 0.28, G2: M = 0.98 > 0.57, G3: M = 1.00 > 0.95), and the differences were apparent in G1 and G2.

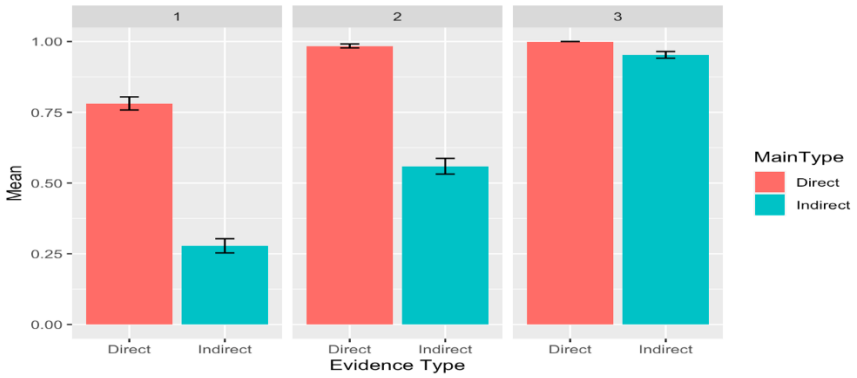


Figure 1. Overall performance on direct and indirect evidential markers

[11] R is a free, open source software program for statistical analysis.

Results of multiple one-way ANOVAs showed that the differences between direct and indirect evidential markers were statistically significant in each of the age groups, G1 ($F(1, 638) = 217.3$, $p < .001$), G2 ($F(1, 638) = 203.1$, $p < .001$) and G3 ($F(1, 638) = 15.69$, $p < .001$).

Regarding the between-group comparisons, a one-way ANOVA comparing the correct responses of direct evidential markers among the three age groups revealed a significant difference ($F(2, 957) = 74.32$, $p < .001$). Results of post hoc comparisons using the Tukey's test showed that both G2 ($p < .001$) and G3 ($p < .001$) performed significantly better than G1. However, the performance of G2 was not significantly different from that of G3 ($p = 0.613$).

Another one-way ANOVA was conducted to examine the effect of indirect evidence on the participants' performance. A significant difference was found among the three age groups' correct responses of indirect evidential markers ($F(2, 957) = 223.6$, $p < .001$). Post hoc comparisons using Tukey's test revealed that G3 ($p < .001$) and G2 ($p < .001$) significantly outperformed G1. In addition, G3 performed significantly better than G2 ($p < .001$). That is, there was a developmental pattern in which the adults obtained the highest mean score, followed by the 5-year-olds and the 3-year-olds.

As shown in Figure 1, the data revealed an asymmetry between direct and indirect evidential markers in each of the three age groups, with direct evidential markers being acquired earlier than indirect markers as a whole. Between-group comparisons revealed the children's earlier success with direct evidential markers, as the 3-year-olds performed differently from chance, and the 5-year-olds demonstrated an almost adult-like competence. However, the children apparently had difficulties handling indirect evidential markers. Their performance on indirect items was significantly lower than on direct items. In addition, the children's correct responses in indirect contexts increased with their age, indicating a developmental pattern in which children became better at producing and comprehending indirect evidential markers as they grew older. Yet even for the 5-year-olds, their performance was still far from adult-like.

The present study further examines the acquisition of the subtypes of direct evidential markers and indirect evidential markers. The second research question concerns the order of acquisition within each of the evidential classes.

As shown in Table 6, under the condition of direct evidence, a two-way ANOVA with the participants' correct responses as the dependent variable, and Direct Subtype (Visual, Non-visual) as well as Age Group (G1, G2, G3) as factors revealed no main effect of Direct Subtype ($F(1, 954) = 2.372$, $p = 0.124$), a main effect of Age Group ($F(2, 954) = 74.393$, $p < .001$), and a non-significant interaction between Direct Subtype and Age Group ($F(2, 954) = 0.791$, $p = 0.454$).

Table 6
Two-way ANOVA on direct subtype and age group

	df	*SS*	*MS*	*F*	*p*
Direct Subtype	1	0.15	0.15	2.372	0.124
Age Group	2	9.41	4.704	74.393	<.001
Direct Subtype*Age Group	2	0.10	0.050	0.791	0.454
Residuals	954	60.32	0.063		

The participants' overall performance in visual and non-visual contexts is shown in Figure 2, with error bars depicting standard errors. As depicted in the figure, except for G3, whose performance was already at ceiling, both G1 and G2 performed slightly better on visual markers than non-visual markers (G1: M = 0.81 > 0.76, G2: M = 0.99 > 0.97). However, this difference was not statistically significant.

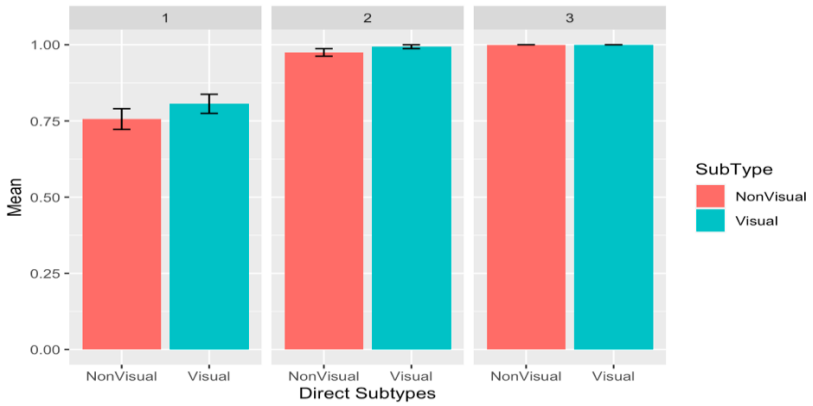


Figure 2. Overall performance on visual and non-visual markers

For the subtypes of indirect evidential markers, a two-way ANOVA with the participants' correct responses as the dependent variable and Indirect Subtype (Inferring, Reported) as well as Age Group (G1, G2, G3) as factors was conducted. As shown in Table 7, the analysis revealed a significant main effect of Indirect Subtype ($F(1, 954) = 24.443$, $p < .001$), a significant main effect of Age Group ($F(2, 954) = 231.146$, $p < .001$), and a significant interaction between Indirect Subtype and Age Group ($F(2, 954) = 5.465$, $p < .01$).

Table 7
Two-way ANOVA on indirect subtype and age group

	df	*SS*	*MS*	*F*	*p*
Indirect Subtype	1	3.88	3.88	24.443	<.001
Age Group	2	73.31	36.65	231.146	<.001
Indirect Subtype*Age Group	2	1.73	0.87	5.465	<.01
Residuals	954	151.28	0.16		

The participants' overall performance in inferring contexts and reported contexts is shown in Figure 3, with error bars depicting standard errors. As shown in Figure 3, all the age groups performed better on reported markers

as opposed to inferring markers (G1: M = 0.33 > 0.23, G2: M = 0.69 > 0.45, G3: M = 0.98 > 0.93), and the differences were particularly apparent in G2.

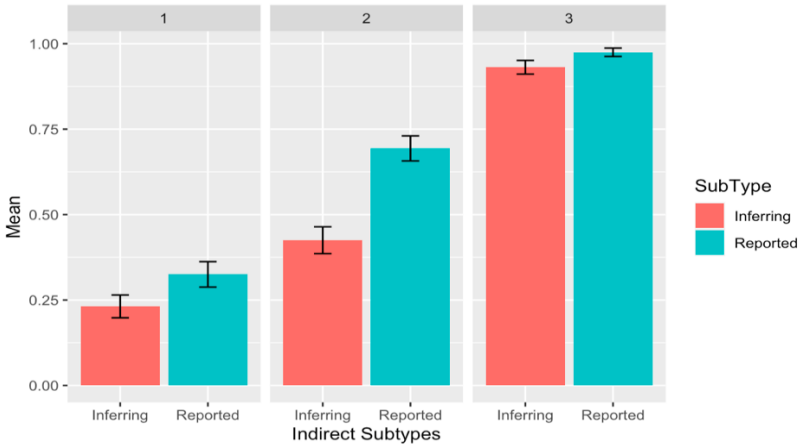


Figure 3. Overall performance on inferring and reported markers

Results of multiple one-way ANOVAs showed that the differences between inferring and reported markers were found to be statistically significant in G2 ($F(1, 318) = 20.54$, $p < .001$), but not in G1 ($p = 0.0616$) and G3 ($p = 0.0645$). Thus, for our 5-year-olds, inferring markers were more difficult than reported markers, while for our 3-year-olds, the subtypes of indirect evidential markers were equally challenging.

Regarding the between-group comparisons, a one-way ANOVA revealed that there was a significant difference in the correct responses for inferring markers among the three age groups ($F(2, 477) = 125$, $p < .001$). Tukey's test for multiple comparisons showed that G3 performed significantly better than G2 ($p < .001$) and G1 ($p < .001$) and that G2 scored significantly higher than G1 ($p < .001$).

Another one-way ANOVA was conducted for the reported condition and revealed a significant difference among the three age groups' correct responses of reported markers ($F(2, 477) = 111.1$, $p < .001$). Tukey's test for multiple comparisons found a similar pattern where G3 significantly exceeded G2 ($p < .001$) and G1 ($p < .001$), and G2 significantly outperformed G1 ($p < .001$).

4. Discussion

4.1. Acquisition of Direct and Indirect Evidential Markers

Such findings are consistent with previous empirical studies, which have identified a developmental primacy for direct over indirect evidential markers (Aksu-Koç, 1988; Ozturk & Papafragou, 2016; Papafragou et al., 2007). The pattern found for children acquiring Mandarin is thus similar to that of children acquiring languages with grammaticalized evidential systems. In addition, some of the previous work testing children's source monitoring abilities also revealed a direct-indirect asymmetry between information sources (Ozturk & Papafragou, 2016; Papafragou et al., 2007). For instance, Ozturk and Papafragou (2016) found that Turkish-speaking children aged 5 to 7 produced and comprehended the direct evidential morpheme better, and at the same time achieved much higher accuracy in identifying perception as

a source of knowledge in source monitoring tasks where evidential morphology was not involved.

The direct-indirect asymmetry observed in the current study and in previous work appears to suggest that children's difficulties with evidential markers stem from, at least in part, the difficulty of mastering the relevant concepts. In other words, conceptual development of the underlying source concepts may be a limiting factor in children's acquisition of linguistic evidentiality. Specifically, children's failures in acquiring indirect evidential markers are likely due to the conceptual complexity of indirect sources. It has been previously argued that children are more attentive to "concrete, referential and objective characteristics of situations" than to "subjectively relevant distinctions such as the speaker's attitude to the proposition asserted" (Aksu-Koç, 1988, p. 195). Thus, it appears that children's lack of sensitivity to evidential distinctions poses problems for the acquisition of evidential markers.

In the current study, the children's earlier understanding of direct evidential markers suggests that perception may well be the most salient type of information source that the children begin to gain awareness of. Conversely, children's inability to handle indirect evidential markers suggests that it is cognitively more demanding to identify and reason about indirect sources such as verbal reports or inferences. The findings of developmental studies seem to support this explanation: while children as young as 3 realized seeing leads to knowledge (Pillow, 1989; Pratt & Bryant, 1990), their understanding of how knowledge can be obtained by inference and verbal communication develops relatively late (Sodian & Wimmer, 1987; Wimmer, Hogrefe & Perner, 1988). As the children grew older, their performance on indirect items improved, suggesting that the children may not only gain better attentional and memory resources, but become cognitively more mature and ready to deal with different types of information sources. This shows that the participants were at the third stage of Piaget's theory, where children use reasoning from specific information to a general principle.

Alternatively, even if the underlying source concepts become available to children, it is still possible that mapping the linguistic forms onto the conceptual representations already in mind poses challenges to children (cf. Clark, 1993). This hypothesis has been confirmed in data from Turkish and Korean samples, as children who had difficulties with evidential morphology performed better at the corresponding source monitoring tasks (Ozturk & Papafragou, 2016; Papafragou et al., 2007). As previous studies show, evidential relations are subtle and do not necessarily have observable referents in the world. Moreover, this language-to-concept mapping might be further complicated by the fact that evidential markers in Chinese sometimes encode additional semantic properties, such as the speaker's commitment to the asserted proposition. As such, the complexity of evidential concepts may not by itself account for the delay in the acquisition of evidential markers.

Taken together, Mandarin-speaking children by the age of 5 have not yet equipped with the knowledge to deal with the full aspects of evidentiality. Both conceptual and mapping factors might contribute to the children's acquisition of evidential markers; nonetheless, whether and how the acquisition of evidential markers in Chinese is constrained by cognitive prerequisites or

delayed by mapping complexities require further research.

4.2. Acquisition Order of the Subtypes

The second question to be tackled concerns the acquisition order of the subtypes of direct evidential markers. Direct evidence refers to information derived from the speaker's perceptual experiences, which, in the current study, has been further distinguished into two types: Visual and Non-visual. In the case of Chinese, perception verbs denoting sight and sound, such as kan 'see' and ting 'hear', are what the speakers have at their disposal for signaling evidential meanings of direct perception. It has been found that typologically, sight-related perception verbs were ranked above all the other verbs of sense modalities in terms of frequency of usage (Viberg, 1983). Moreover, visual evidence is often ranked the highest in the evidential scale (Faller, 2002). Since these findings suggest that vision enjoys greater prominence, the current study assumed that visual markers would be acquired prior to non-visual markers.

Developmental studies on children's conceptual development of information sources seem to support this assertion: it has been found that children began to grasp the connection between seeing and knowing at around the ages of 3 and 4 (Pillow, 1989; Pratt & Bryant, 1990). By contrast, children do not come to the realization that other perceptual modalities, such as hearing or touching, also lead to knowledge of the world until the age of 4 (O'Neill & Chong, 2001). With visual access being understood early as an information source, it is reasonable to assume that when being evaluated their abilities of producing and comprehending evidential items, Mandarin-speaking children will perform better in contexts involving visual perception.

However, as discussed previously, neither child group scored significantly higher on the visual condition than on the non-visual condition, unlike our prediction. Despite this result, it was observed that young learners of Mandarin, especially the 3-year-olds, sometimes overextended the direct marker *kan* 'see' to cases of auditorily acquired information, or falsely believed that they saw something that they only heard. Cases where children overestimated knowledge gained from seeing have also been found in previous research (Robinson et al., 1997). The distinction between visual evidence and non-visual evidence was not a factor affecting Mandarin-speaking children's acquisition of direct evidential markers. However, the errors the children made suggest that vision might be the type of perceptual access that the children most frequently resort to while making linguistic judgments.

Turning to indirect evidential markers, we further examined the acquisition order of the two indirect subtypes: Inferring and Reported. The results showed that for the 3-year-olds, inferring markers and reported markers were just as challenging. No significant difference was found between the performance of the two types. For the 5-year-olds, reported markers were more easily acquired than inferring markers, as much higher accuracy was elicited in reported contexts than in inferring contexts. It was also observed that the 5-year-olds tended to mistakenly attribute inferentially acquired knowledge to direct perception. Between-group comparisons revealed that although the 5-year-olds significantly outperformed the 3-year-olds in both of

the indirect conditions, their performance was still far from adult-like.

Such results are in accordance with the previous research on the acquisition of evidentiality, where Turkish-speaking children aged 6 and 7 were able to produce the indirect evidential marker reliably for its hearsay interpretation but not for its inference interpretation (Ozturk & Papafragou, 2016). Moreover, studies on children's conceptual development of information sources provide evidence for the crucial role of conceptual limitations: while children understood verbal report leads to knowledge at around the age of 4 or 5, they failed to successfully identify inference as a source of knowledge until the age of 6 (Sodian & Wimmer, 1987; Wimmer, Hogrefe & Perner, 1988). The realization of subtle distinctions among a variety of inferences, such as differences between deduction and mere guessing, came even much later in the childhood (Pillow et al., 2000).

Alternatively, the delay in the acquisition of evidentiality might not be purely conceptual: discovering the correspondence between the underlying source concepts and evidential markers may cause problems for children (Ozturk & Papafragou, 2016). Specifically, while reported makers in Chinese largely consisted of lexical items related to the act of saying, markers used to communicate inferential evidentiality are semantically and functionally complex in the sense that they carry different degrees of speaker commitment. Moreover, the fact that there was no transparent cue in the world guiding young learners of Mandarin towards the meanings of inferring markers, such as *yiding* 'must', *yinggai* 'should' or *keneng* 'might', further contributes to the children's mapping difficulties.

Additionally, since the children always saw pictures presented on the computer screen, an element of seeing was thus always present. Just as in many real-life instances, it is rare that one acquires knowledge without a certain degree of perception involved. However, this might pose further challenges, especially in the Indirect Inferring condition, where inferences were perceptual-based and the children were expected to infer what had happened based on observable cues. It has been found that children have difficulty discriminating between different sources of knowledge when the sources are highly similar (Lindsay, Johnson, & Kwon, 1991), which may also account for the children's constant misattributions of inferentially acquired information. On the whole, Mandarin-speaking children's performance on both of the subtypes of indirect evidential markers was still nonadult-like by the age of 5, especially for inferring markers.

5. Conclusion

Previous studies dealing with the acquisition of evidentiality have been primarily, if not solely, concerned with languages whose sources of information are obligatorily and morphologically encoded (cf. Aksu-Koç, 1988; Ozturk & Papafragou, 2016, Papafragou et al., 2007; Ünal & Papafragou, 2016). However, discussions of Chinese evidentiality seem to be somewhat vacant, not to mention the acquisition of evidentiality in Chinese, which has not been examined systematically and thus lacked robust empirical evidence. Although Aikhenvald (2004, p. 6) finds that "studies of lexical strategies referring to information source [are] premature and

tangential for the analysis of grammatical expression of information source," the present study argues against this view and believes that our understanding of evidentiality is incomplete without considering evidential meanings being manifested lexically. Thus, the present study aims to dive into Mandarin-speaking children's understanding of evidential markers in Chinese in order to contribute empirical findings along with analytical insights which have implications not just for Chinese, but for the nature of the developmental trajectory in the domain of evidentiality.

The present study examined the acquisition of evidentiality in Mandarin Chinese under a variety of issues, including different evidential types, the order of acquisition, and age effect. It was aimed to see whether patterns found for children acquiring languages with grammaticalized evidential systems, such as direct evidential markers being acquired earlier than indirect ones and evidential comprehension taking precedence over evidential production, could also be observed in Mandarin-speaking children's course of acquiring evidentiality.

The major findings are presented as follows. First, it was found that the acquisition of evidential markers in Chinese was indeed characterized by an asymmetry between direct and indirect evidential markers, with direct ones being acquired earlier than indirect ones. Second, concerning the acquisition order within each of the evidential class, no difference between the visual and non-visual markers appears to exist. Reported markers were found to be more easily processed compared to inferring ones, especially for the 5-year-olds. Finally, age was identified as a crucial factor contributing to the children's acquisition of evidentiality, as the children's ability to handle different aspects of evidential markers, especially indirect ones, improved with age. Mandarin-speaking children by the age of 5 have not yet fully acquired evidential markers in Chinese, and these results add to a growing literature demonstrating children's successes and failures in the acquisition of evidentiality across different languages.

Each study has its limitations and the present research is no exception. First, we found that even the oldest children recruited in the current study (i.e., the 5-year-olds) still exhibited nonadult-like knowledge regarding production and comprehension of indirect evidential markers. Thus, future research may recruit participants above the age of 5 to draw more detailed comparisons and trace the full developmental trajectory of evidentiality. Second, the main source of difficulty in the acquisition of evidentiality, i.e., whether and how the acquisition of Chinese evidential markers is constrained by cognitive prerequisites or delayed by mapping complexities, has not been examined thoroughly and systematically. Hence, experiments should be conducted to better evaluate the role of conceptual and mapping factors in

this domain. Finally, cross-linguistic comparisons between Mandarin, where evidentiality is expressed through lexical means, and other languages that mark evidential distinctions grammatically, may be further investigated to determine whether there are similar developmental patterns and to search for language-specific effects.

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