

Article

Agent-First Bias in Children's Sentence Comprehension: Evidence from Mandarin

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Abstract

The article investigates children's agent-first bias in sentence comprehension. Agent-first bias refers to the phenomenon in which children (or adults) tend to assign the agent role to the first noun phrase (NP) in a sentence. Previous studies suggest that children acquiring Indo-European languages like English exhibit the agent-first bias from early on, while children acquiring other languages may do so only during later stages of language development. However, little is understood about whether children acquiring Mandarin, a language with distinct typological features, also exhibit the agent-first bias. To fill this gap, we conducted two studies to examine children's thematic role assignment in Mandarin noun–verb (NV) constructions and *BEI*-passive constructions. In the corpus study, our analysis of the child-directed utterances showed that for NV constructions, the NPs appeared more often as agents than patients, while for *BEI*-passive constructions, the NPs consistently served as patients. In the experimental study, we examined how 3- to 5-year-old children comprehended the two constructions, using a picture selection task. The results were consistent with the corpus findings. More specifically, when comprehending NV constructions, children as young as age 3 exhibited the agent-first bias, and this bias was stronger in the older children and adults. By contrast, when comprehending *BEI*-passive constructions, the children tended to interpret the NPs as patients. Taken together, these findings indicate a developmental trajectory of the agent-first bias in Mandarin-speaking children. We discuss these findings in relation to typological features across languages as well as the potential influences of input information and the passive marker *BEI* on children's thematic role assignment.

Keywords: agent-first bias; passive structure; preschool children; Mandarin Chinese



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1. Introduction

In syntactic development, one of the primary tasks is to map sentence structures in the language onto real-world events. Consider the English active sentence (1a). The verb *chase* refers to an action involving two thematic roles, namely an agent (i.e., the initiator of the “chasing” action) and a patient (i.e., the recipient of the “chasing” action). In this sentence, the agent role is mapped onto the first noun phrase (NP) *the cat*, and the patient role the second NP *the dog*. By contrast, in the English passive sentence (1b), the NPs' thematic roles are reversed, so the agent role is mapped onto the second NP *the dog*, and the patient role the first NP *the cat*. The two sentences, despite sharing the same “noun–verb–noun (NVN)” sequence, differ in their thematic role assignment. Therefore, in order to correctly

understand these sentences, children acquiring English need to figure out not just the thematic roles involved in the action event, but also how the thematic roles are assigned to the NPs.

- (1) a. The cat chased the dog.
- b. The cat was chased by the dog.

It has been reported that children have a tendency to assign the agent role to the first NP in a sentence, which is dubbed as the *agent-first bias* (e.g., [Abbot-Smith et al., 2017](#); [Dittmar et al., 2008](#); [Gertner et al., 2006](#); [Jackendoff & Wittenberg, 2014](#); [Slobin & Bever, 1982](#)). This bias is often thought to emerge early during language development, and has been used to account for the findings that children have more difficulties in acquiring passive sentences than active sentences ([Abbot-Smith et al., 2017](#); [De Villiers & De Villiers, 1973](#); [Y. T. Huang & Hollister, 2019](#); [Kolak et al., 2025](#); [Shin & Deen, 2019](#)). For instance, during the comprehension process of the passive sentence (1b), the agent-first bias may lead children to initially misinterpret the first NP *the cat* as the agent. Later, the passive form of the verb *chase* reveals that *the cat* should instead be assigned the patient role, and thus a reanalysis is needed in order to obtain the correct interpretation of (1b). Since children have more limited capacity in sentence reanalysis than adults ([Choi & Trueswell, 2010](#); [Kidd et al., 2011](#); [Trueswell et al., 1999](#); [Weighall, 2008](#)), they might fail in revising the incorrect role assignment, resulting in comprehension errors in passive sentences.

While the agent-first bias provides important insights into the acquisition of syntactic structures, it has been suggested that most of the relevant research focused on children acquiring Indo-European languages such as English ([Shin, 2021](#); [Garcia & Kidd, 2020](#); [Kidd & Garcia, 2022](#)). Thus, it remains less clear whether this bias should be attributed to a cognitive heuristic (i.e., a default mapping between the first NP and the agent role) across languages, or is more of a language-specific phenomenon. Against this backdrop, the present study investigates the agent-first bias in Mandarin, a language with typologically distinct features. Specifically, although Mandarin is a “subject–verb–object (SVO)” language like English, its word order is relatively more flexible than English ([C. N. Li & Thompson, 1981](#); [P. Li et al., 1993](#); [Wolpert et al., 2024](#)); i.e., it allows argument scrambling (e.g., OSV and SOV word orders) and the omission of arguments ([Lee & Naigles, 2005](#); [Y.-S. Liu, 2016](#)). At the same time, unlike many languages with flexible word orders (e.g., Korean), Mandarin does not have case or voice markers to indicate the thematic roles of arguments. These typological features prompt us to ask how Mandarin-speaking children assign thematic roles in sentence comprehension. The findings promise to provide new insights into the nature of the agent-first bias reported in the existing literature.

1.1. Development of the Agent-First Bias Across Languages

Previous research has often suggested that the agent-first bias emerges early during language development (e.g., [Abbot-Smith et al., 2017](#); [Bever, 1970](#); [Dittmar et al., 2008, 2011](#); [Gertner et al., 2006](#); [Slobin & Bever, 1982](#)). [Bever \(1970\)](#) reported that English-speaking children were able to understand simple active sentences from the age of 2, but they could only correctly comprehend passive sentences after age 5. Similarly, using a preferential looking paradigm, [Abbot-Smith et al. \(2017\)](#) found that English-speaking 25-month-olds exhibited a bias to map the agent role onto the first NP in a sentence (see also [Dittmar et al., 2008](#) for German-speaking children). The early emergence of the agent-first bias is consistent with the proposal by [Jackendoff and Wittenberg \(2014\)](#) that children, even at the two-word stage, already establish a preference for agents to precede patients in linear order, and this preference does not rely on their syntactic knowledge.

An alternative explanation is related to children’s exposure to canonical word order in a language. Note that children’s performance on passive sentences in [Bever \(1970\)](#)

seemed to undergo a “U-shape” pattern: comprehension accuracy improved from age 2 to 3, but then temporarily dropped around age 4, before it went up again afterwards. Based on these findings, Bever (1970) proposed that children’s agent-first bias could be strengthened by their prior experience with the canonical word order in English. More specifically, as most English sentences have the canonical SVO word order that corresponds to an “agent–action–patient” thematic relation, children can extract such input regularities and adopt a strategy whereby they map the agent role onto the first NP in a sentence. At age 4, such a strategy may exert a significant impact on children’s comprehension performance, leading to more errors in passive sentences. The prominent role of canonical word order has been supported by subsequent studies. For instance, Slobin and Bever (1982) examined 2- to 4-year-old children’s comprehension of canonical and non-canonical sentences in four languages, using an act-out task. These languages vary in their canonical word orders, as well as in the reliability of canonical word orders in signaling the thematic roles in a sentence. Nonetheless, the results showed that the children of these languages had a similar response pattern: they performed better in sentences with canonical word order than those without, indicating that these children initially privileged canonicity in comprehension. The findings in Slobin and Bever (1982) align with a recent meta-analysis in Kolak et al. (2025) showing that across 21 languages, children displayed an overall advantage in comprehending canonical over noncanonical sentences.

However, the claim that word order cues lead to early emergence of the agent-first bias has been challenged by studies from non-Indo-European languages. For example, Chan et al. (2009) examined the comprehension of “NVN” sentences in Cantonese-, German- and English-speaking children. Despite having the same “SVO” canonical word order, the three languages differ in the strength of word-order cues. More specifically, the word-order cue in Cantonese is not as strong as that in German and English, as Cantonese permits word-order variations and argument omission. The results showed that both the English- and German-speaking 2-year-olds tended to interpret the first NP as the agent, whereas the Cantonese-speaking children did so at age 3. The findings suggest that the development of the agent-first bias may be influenced by the informativeness of word-order cues.

More recent studies present evidence from languages with rich morphology (e.g., Garcia & Kidd, 2020; Özge et al., 2019; Shin, 2021). For instance, both Tagalog and Korean have relatively flexible word order and make use of morphological markers (i.e., voice markers on the verbs in Tagalog, and case markers on the nouns in Korean) to denote thematic roles. Garcia and Kidd (2020) tested Tagalog-speaking 3-, 5- and 7-year-old children using a structural priming task, and found only the 5- and 7-year-olds produced more agent-first than patient-first sentences, whereas the 3-year-olds had no preference toward either agent-first or patient-first sentences, indicating that children acquiring Tagalog exhibit the agent-first bias in language production only during later stages of language development. From a comprehension perspective, Shin (2021) used a series of picture selection tasks to investigate how Korean-speaking 3-to-6-year-old children and adults understood various types of transitive constructions. On an example trial, the participants were presented with one of the sentences in (2a)–(2d) which varied in two aspects: the number of arguments (one argument vs. two arguments) and case marking (presence vs. omission of case markers). The test sentence was accompanied by two pictures involving the same action but reversed thematic roles, one depicting the scene in which the dog kicked the cat, the other in which the cat kicked the dog. The participants’ task was to select the picture that matched the sentence they heard. The results showed that the presence of case markers (e.g., (2a) and (2b)) reliably led the Korean-speaking children to select the pictures consistent with agent-first interpretations (i.e., the dog kicked the cat). However, when the case markers were omitted, the younger 3-to-4-year-olds exhibited agent-first

interpretations only in two-argument sentences (e.g., (2c)), but not in one-argument sentences (e.g., (2d)). By contrast, the 5-to-6-year-olds and adults displayed weak agent-first bias in one-argument sentences without case marking, and adding a second argument in the sentence also increased their agent-first responses.

- (2) a. kangaci-ka koyangi-lul cha-yo. (two-argument, case-marked)
 dog-NOM¹ cat-ACC kick-SE
 'The dog kicked the cat.'
- b. kangaci-ka cha-yo. (one-argument, case-marked)
 dog-NOM kick-SE
 'The dog kicked (the cat).'
- c. kangaci koyangi cha-yo. (two-argument, no case marking)
 dog cat kick-SE
 'The dog kicked the cat' or 'the cat kicked the dog.'
- d. kangaci cha-yo. (one-argument, no case marking)
 dog kick-SE
 'The dog kicked (the cat)' or '(the cat) kicked the dog.'

The experiments reported in Shin (2021) provide crucial insights into the effect of adding a second argument in children's interpretations of the first NP. Note that previous studies often used transitive sentences with two arguments (e.g., (2a) and (2c)) as test stimuli. Yet Shin (2021) found that involving a second argument increased the likelihood of agent-first responses, because it served as an additional structural cue for children to infer the thematic role of the first NP. Using (2c) as an example, the appearance of a second NP, *koyangi* 'cat', made clear that (2c) has the "NNV" sequence, which is consistent with the "SOV" canonical word order in Korean. Since most Korean sentences with "SOV" word order also have "agent-patient-action" thematic relation, children could use the structural cue in (2c) to infer that the first NP *kangaci* 'dog' was the agent.

Based on these findings, a further question to ask is whether children can establish a direct mapping between the first NP and the agent role, without relying on the involvement of a second argument or morphological marking. The response patterns to the one-argument sentences in Shin (2021) seem to shed light on this question. When comprehending one-argument sentences without case marking (e.g., (2d)), only the 5-to-6-year-olds and adults, but NOT the 3-to-4-year-olds, exhibited the agent-first bias, suggesting that Korean-speaking children might gradually develop a comprehension heuristic that directly associates the first NP with the agent role. However, this comprehension heuristic might be relatively weak in Korean, as evidenced by the results that the older children and adults provided agent-first responses to sentences like (2d) only 60% and 67% of the time, respectively, whereas both groups did so to case-marked sentences like (2b) over 90% of the time. According to Shin (2021), the differences could be attributed to the fact that even though Korean allows the omission of case markers, there is a strong association between the nominative case marker and the agent role in the input regularities (see also Shin & Mun, 2023), so without the support of case marking cues, it is difficult for Korean-speaking children (and adults) to interpret the thematic role of *kangaci* 'dog' in (2d).

To sum up, previous studies reported mixed findings regarding children's agent-first bias. Such inconsistency may be associated with factors such as the typological differences in word order, morphological marking, argument realization and input regularities. To further understand the nature of the agent-first bias as well as the role of these factors, evidence from more languages is needed. The present study offers a Mandarin perspective by investigating whether Mandarin-speaking preschoolers exhibit the agent-first bias in language comprehension. Prior research has examined how children acquiring Mandarin assign thematic roles in both canonical and non-canonical structures, but much less is

known about whether their interpretations of the first NP are influenced by input regularities. In addition, in previous comprehension studies, the target structures often involved multiple cues (e.g., a second argument and/or a passive marker), and thus it is unclear how each of these cues contributes to children's understanding, and whether children establish a direct mapping between the first NP and the agent role in the absence of these cues. To address these gaps, the present study focuses on the comparison between Mandarin noun–verb (NV) and *BEI*-passive constructions. These structures offer ideal cases for testing children's agent-first bias in sentence comprehension, which we introduce in the following sections.

1.2. Mandarin NV and BEI-Passive Constructions

Mandarin has several important typological features related to the investigations on the agent-first bias. First, the canonical word order in Mandarin is SVO, but other word orders, such as OSV and SOV, are also permitted² (C. N. Li & Thompson, 1981; P. Li et al., 1993; Wolpert et al., 2024). Second, like Korean, Mandarin also allows the omission of arguments (e.g., subject and object), and one-argument structures containing a transitive verb (e.g., (3a)) are frequently observed in child-directed utterances (Lee & Naigles, 2005; Y.-S. Liu, 2016). In addition, Mandarin is impoverished in inflectional morphology, with no case markers available to signal the thematic roles of NPs. To explicitly signal that the first NP is the patient, Mandarin makes use of a free morpheme, *BEI* (e.g., (3b)–(3c)), which is often considered a passive marker (Y. T. Huang et al., 2013; P. Li et al., 1993; P. Zhou & Ma, 2018).

- (3)
- | | | | | | |
|----|---|--------------|--------------|--------------|------|
| a. | Xiaoma | zhuang-shang | le. | | |
| | pony | bump-into | PERF | | |
| | 'The pony bumped into (someone)' or '(someone) bumped into the pony.' | | | | |
| b. | Xiaoma | BEI | zhuang-shang | le. | |
| | pony | BEI | bump-into | PERF | |
| | 'The pony was bumped into.' | | | | |
| c. | Xiaoma | BEI | xiaogou | zhuang-shang | le. |
| | pony | BEI | puppy | bump-into | PERF |
| | 'The pony was bumped into by the puppy.' | | | | |

These typological features make Mandarin NV constructions ideally suited for examining children's agent-first bias. Consider the example (3a). In this sentence, *zhuang-shang* 'bump into' denotes a transitive action involving two thematic roles, and *le* is a perfective morpheme in Mandarin to denote the completion of the action. Similar to the Korean NV structure (2d), this sentence has an omitted argument and is ambiguous, as the NP *xiaoma* 'pony' can be assigned either the agent or the patient role. If *xiaoma* 'pony' is interpreted as the agent, then (3a) means that the pony bumped into someone. If *xiaoma* 'pony' is interpreted as the patient, then (3a) means that someone bumped into the pony. In the latter case, NV constructions are often called "patient–subject constructions" (He, 2019; Pan & Han, 2005). It is worth pointing out that the ambiguity of Mandarin NV constructions is not restricted to verb compounds (e.g., *zhuang-shang* 'bump into' in (3a)). Such ambiguity has also been noted with simplex (monosyllabic) verbs (e.g., Erbaugh, 1992; He, 2019), as in (4). Crucially, in Mandarin NV constructions, there are no additional cues (e.g., morphological markers, a second argument) to disambiguate the thematic role of the NP *xiaoma* 'pony'. Thus, children's performance on (3a) can serve as evidence to show whether children establish a direct mapping between the first NP and the agent role.

- (4) Yu chi le.
 fish eat PERF
 ‘The fish ate (something)’ or ‘(someone) ate the fish.’

What is more interesting about Mandarin NV constructions like (3a) is their relations with passive constructions containing *BEI* (henceforth, *BEI*-passive constructions), as in (3b) and (3c). As previously introduced, *BEI* is a passive marker in Mandarin. Yet, it is worth pointing out that the presence of *BEI* is not obligatory in Mandarin passives, as NV constructions like (3a) are also commonly used by Mandarin speakers as passive structures (e.g., C. N. Li & Thompson, 1981; Pan & Han, 2005; Y. Zhang & Peng, 2025). Nonetheless, it has been reported that *BEI* is a reliable cue to indicate that the first NP (e.g., *xiaoma* ‘pony’ in (3b)) should be mapped onto the patient role (P. Li et al., 1993; Wolpert et al., 2024). In addition, *BEI*-passive constructions can be further sorted into long and short passives. Long passives like (3c) occur with an explicit agent, whereas short passives like (3b) have only one argument, without the appearance of the agent NP. In syntactic theories, the generation of *BEI*-passives is often thought to involve syntactic movement of the patient NP from the object position to the subject position (e.g., C. T. J. Huang, 1999).

In the present study, we focus on the comparison between Mandarin NV constructions (e.g., (3a)) and short *BEI*-passive constructions like (3b), because the two constructions form a minimal pair. As (3a) and (3b) illustrate, the only difference between these sentences is the (non)existence of *BEI*, which explicitly marks the first NP *xiaoma* ‘pony’ as the patient role. Such minimal distinction allows us to directly observe how the passive marker *BEI* influences children’s thematic role assignment. In the next section, we review empirical evidence on children’s acquisition of Mandarin NV and *BEI*-passive constructions.

1.3. Previous Acquisition Studies in Mandarin

Previous production studies reported that children acquiring Mandarin first produce NV constructions as passives prior to the emergence of *BEI*-passive constructions (e.g., Y. Zhang & Peng, 2025; Y. Zhang & Zhao, 2025; G. Zhou et al., 1992). For instance, Y. Zhang and Zhao (2025) analyzed the naturalistic production data of three Mandarin-speaking children and found that NV constructions emerge at around 18 months. Among all the NV constructions during the two-word stage, the NPs were assigned the agent and the patient role 15% and 10.7% of the time, respectively, which indicates that NV constructions are used both as active and passive structures by infants. By contrast, *BEI*-passive constructions emerge later in children’s spontaneous production, usually between age 2 and 3 (e.g., Deng et al., 2018; M. Liu et al., 2024; G. Zhou et al., 1992).

In terms of children’s comprehension, prior research has often shown a processing disadvantage in Mandarin non-canonical (e.g., OSV, SOV) structures as compared to canonical SVO structures (e.g., Hao et al., 2025; Ji et al., 2023; Zhu et al., 2022). However, such a disadvantage can be reduced when non-canonical structures involve additional cues (e.g., Hao et al., 2025; Hu et al., 2018; Zhu & Gavarró, 2025). For instance, P. Zhou and Ma (2018) found that 3-year-olds were able to use the passive marker *BEI* to correctly assign the thematic roles during online sentence processing. Hao et al. (2025) examined the comprehension of Mandarin non-canonical structures in children from age 5 to 10 and found that the presence of the passive marker *BEI* significantly increased children’s performance in patient-initial OSV sentences, suggesting that *BEI* facilitates children’s thematic role assignment.

In addition, previous research has also demonstrated an asymmetry between short and long *BEI*-passives, with short passives generally easier to understand than long passives. Y. T. Huang et al. (2013), for instance, investigated 5-year-old Mandarin-speaking children’s online processing of long passive constructions (e.g., (3c)) and found that the 5-year-

olds often misinterpreted the first NP as the agent, suggesting that children of this age still struggle to comprehend passives when there are two NP arguments in the sentence. Consistent with these results, M. Liu et al. (2024) found that children as young as 3 were able to understand short *BEI*-passives, but the 6-year-olds still had difficulties with long *BEI*-passives. To account for the delayed comprehension of long passives, M. Liu et al. (2024) proposed that, in Mandarin long *BEI*-passives, the presence of the agent (e.g., *xiaogou* ‘puppy’ in (3c)) “intervenes” in the movement of the patient NP (e.g., *xiaoma* ‘pony’ in (3c)) from the object to the subject position (Friedmann et al., 2009; Rizzi, 2018). By contrast, in Mandarin short passives (e.g., (3b)), the agent is not present, so no intervention effect occurs, making it easier for children to comprehend short passives³.

In brief, prior research shows that Mandarin-speaking children use NV constructions both as actives and passives in production. However, few studies have examined how children comprehend NV constructions. Note that most previous research focused on structures that involve two NP arguments (e.g., OSV, SVO sentences). As the presence of a second argument might lead children to interpret the first NP as the agent (Shin, 2021), it remains to be investigated whether children exhibit the agent-first bias in NV constructions where only one argument is present, and to what extent children’s interpretations reflect distributional regularities in linguistic input. In addition, previous studies suggest that the passive marker *BEI* plays an important role in children’s comprehension, but much less is known about whether children’s interpretations of NV constructions are associated with their knowledge of *BEI* as a cue to patienthood. Specifically, if children recognize *BEI* as a strong cue to patient-first interpretation, the question we ask is whether its absence in NV constructions might reduce the likelihood of children interpreting the NP as a patient, thereby leading them to assign the agent role.

Based on the research gaps discussed above, the current research has three goals. First, we examine whether children assign the agent role to the first NP when comprehending ambiguous NV constructions. Second, we ask whether their interpretations of NV constructions are related to their knowledge of the passive marker *BEI*. Third, we investigate whether children’s thematic role assignment in NV and *BEI*-passive constructions is consistent with distributional regularities in their linguistic input.

To achieve these goals, we conducted two studies: Study I was a corpus study in which we looked at the thematic roles of NPs in NV and *BEI*-passive constructions in the child-directed speech (CDS), thereby providing evidence about the distribution of agent and patient roles in children’s linguistic input. Study II, an experimental study, investigated children’s comprehension of NV and *BEI*-passive constructions, using a similar picture selection task as in Shin (2021). This study allowed us to examine whether children exhibit the agent-first bias when comprehending NV constructions and whether their interpretations of NV constructions are related to their understanding of *BEI* as a cue to patienthood. Overall, by combining corpus and experimental evidence within Mandarin, the current research contributes to our knowledge of the roles of typological features and input regularities in the development of the agent-first bias. In doing so, the findings help refine existing accounts of how this bias emerges in children.

2. Study I: Corpus Study

2.1. Method

We searched all the Mandarin corpora recorded in Mainland China available in the Child Language Data Exchange System (CHILDES, MacWhinney, 2000). Ten corpora were then analyzed, as they contain linguistic input data as well as word-class annotations for each utterance. These corpora are *AcadLang* (J. Zhou et al., 2014), *BJCMC* (Mai et al., 2024), *Erbaugh* (Erbaugh, 1992), *LiReading* (L. Li, 2020), *Tong* (Deng & Yip, 2018), *Zhou2*

(X. Y. Li & Zhou, 2004), Zhou3 (L. Zhang & Zhou, 2009), ZhouAssessment (Y. Zhang et al., 2024), ZhouDinner (H. Li & Zhou, 2015), and ZhouNarratives (L. Li & Zhou, 2011). The ten corpora cover a broad range of contexts, including naturalistic adult–child interactions, semi-structured book-reading and play sessions, and elicited language-production tasks. The relevant information of each corpus is presented in Table 1.

Table 1. Mandarin corpora searched in Study I.

Corpus	Age Range	Number of Children	Data Type
AcadLang	4–6	15	Elicited
BJCMC	3;0–6;9	48	Naturalistic
Erbaugh	2;0–3;9	4	Naturalistic
LiReading	4–6	214	Semi-structured
Tong	1;7–3;4	1	Naturalistic
Zhou2	3;0–6;0	140	Semi-structured
Zhou3	1;8–5;5	1	Naturalistic
ZhouAssessment	3;0–6;0	334	Semi-structured
ZhouDinner	5–6	72	Naturalistic
ZhouNarratives	3–6	200	Elicited

The target constructions were Mandarin NV constructions (e.g., (3a)) and short *BEI*-passive constructions that contain an NP argument (e.g., (3b)). To extract these constructions from the corpora, we first used R scripts to eliminate non-target structures on the basis of word-class annotations, and then manually identified all the NV and short *BEI*-passive constructions from the remaining child-directed utterances.

Next, two independent coders were instructed to code the thematic roles of the NPs in the target constructions. For the purposes of the study, the thematic role of each NP was coded as “agent”, “patient” or “others⁴”. Any disagreement between the two coders was resolved by consulting a third independent coder. Overall, the two coders agreed on 88.95% of the utterances, and the inter-coder reliability as measured by Cohen’s Kappa (Cohen, 1960) was 0.83, indicating a high degree of agreement.

2.2. Results and Discussion

A total of 4696 target constructions in the CDS were identified from the corpora. Table 2 summarizes the distribution of the target constructions. As shown in the table, the majority of child-directed utterances were NV constructions (4657 utterances), while there were only 39 short *BEI*-passive constructions with an NP argument. The infrequent emergence of *BEI*-passive constructions in the linguistic input is consistent with the corpus findings in previous studies (e.g., M. Liu et al., 2024; G. Zhou et al., 1992).

Table 2. Distribution of thematic roles of the NPs in Mandarin NV and short *BEI*-passive constructions in the CDS (proportion in parentheses).

Construction	Agent	Patient	Others	Total
NV	1784 (38.31%)	1102 (23.66%)	1771 (38.03%)	4657 (100%)
Short <i>BEI</i> -passive	0 (0.00%)	39 (100%)	0 (0.00%)	39 (100%)

In terms of thematic roles, for NV constructions, the NPs served as multiple thematic roles, including agents (1784 utterances) and patients (1102 utterances), and they were assigned the agent role more often than the patient role. By contrast, for short *BEI*-passive constructions, the NPs served as the patient role in all of the child-directed utterances.

The findings showed that Mandarin NV constructions appeared more frequently than short *BEI*-passives in the linguistic input. Also, the NPs could serve as either agents

or patients in NV constructions, while all the NPs were patients in short *BEI*-passives. Importantly, for NV constructions, agent-first utterances were more frequent than patient-first utterances. Therefore, if input information is related to children's comprehension, children might prefer agent-first interpretations of NV constructions, and patient-first interpretations of short *BEI*-passive constructions. We examine this prediction in Study II.

3. Study II: Experimental Study

3.1. Participants

The child participants were 90 Mandarin-speaking monolingual children, including 30 three-year-olds (age range 36–47 months, mean 42.5 months, 18 boys and 12 girls), 30 four-year-olds (age range 49–59 months, mean 53.9 months, 16 boys and 14 girls) and 30 five-year-olds (age range 61–71 months, mean 65.5 months, 18 boys and 12 girls). They were all recruited from a kindergarten in Jiangsu, China. Thirteen additional children were also tested but were excluded from the final analyses, due to (a) not attending both experimental sessions ($n = 10$), or (b) failure in understanding the task instructions ($n = 3$). In addition, 30 Mandarin-speaking adults (age range 18–29 years, mean 21.7 years, 19 men and 11 women) were recruited as controls. They were all students from a university in Zhejiang, China. None of the participants had any reported history of speech, hearing or language disorders.

3.2. Materials and Design

A total of 6 test items were created, each containing a visual image and two sentences, one Mandarin NV construction and one *BEI*-passive construction, thus creating 12 test sentences. The number of test items per condition was decided following recent comprehension studies on children of similar age groups (e.g., Kolak et al., 2025; M. Liu et al., 2024; Shin, 2021). The two constructions were identical except for the (non)existence of the passive marker *BEI*. Mandarin NV constructions like (5a) were ambiguous, as the NP could be interpreted as either the agent or the patient of the action. By contrast, *BEI*-passive constructions like (5b) were unambiguous, and the NP preceding the passive marker *BEI* could only be assigned the patient role. For instance, in (5a) the NP *xiaomao* 'kitten' could be interpreted either as the agent or the patient of the action *ji-zhong* 'hit', whereas in (5b) the same NP *xiaomao* 'kitten' could only be plausibly interpreted as the patient.

- (5) a. Xiaomao ji-zhong le.
 kitten hit PERF
 'The kitten hit (someone)' or '(someone) hit the kitten.'
- b. Xiaomao BEI ji-zhong le.
 kitten BEI hit PERF
 'The kitten was hit.'

All the nouns and verbs used in the test sentences were disyllabic, in order to ensure consistency in word length across test items. Also, a perfective marker *le* was added in each sentence, indicating that the action involved in the sentence (e.g., *ji-zhong* 'hit' in (5)) had completed. Each test item corresponded to one of the six transitive action verb compounds: *chao-guo* 'overtake', *dang-zhu* 'block', *zhuang-shang* 'bump into', *ji-zhong* 'hit', *za-dao* 'smash', *ya-dao* 'pin down'. We selected these verb compounds for two reasons. First, they do not exhibit an apparent bias towards either agent-first or patient-first interpretations. Second, compared with simplex verbs, verb compounds often encode richer event information (e.g., the result of the action), which may facilitate children's mapping between the spoken sentence and the event depicted in the picture. In fact, previous research suggests that the use of verb compounds can reduce children's comprehension difficulties in passive

constructions (M. Liu, 2023). The nouns were all animal characters. To rule out the possibility that the children used animacy contrast between the two characters as a cue in identifying the thematic roles, we followed the design in Shin (2021) and used two animate characters in all the test pictures.

To ensure that the children were familiar with the words used in the test sentences, we performed a pre-test before the main experiment (see *Procedure* for details) and the results showed that all the nouns and verbs used in the test sentences could be correctly identified by the child participants in the study. In addition, to verify whether the NPs in NV constructions could be naturally interpreted both as agents and patients, we conducted a survey on 20 Mandarin-speaking adults who did not participate in the main experiment (age range: 20–29 years, mean age: 22.9 years, 11 men and 9 women). In the survey, we asked the native speakers to judge whether they could accept the agent and patient interpretations of the NP in each test sentence. The results showed that the Mandarin-speaking adults accepted the agent interpretations 88.3% of the time, and the patient interpretations 81.7% of the time. A paired T-test found no significant difference ($p = 0.184$) between the acceptance rate of the two interpretations, suggesting that the NPs in the test sentences could be assigned either the agent or the patient role.

Each visual image consisted of two pictures, both depicting the same event involving the same animal characters, but the characters' thematic roles were reversed in the two pictures. Thus, in one picture the NP in the test sentence (e.g., *xiaomao* 'kitten' in (5)) was assigned the agent role, but in the other picture the patient role. To describe an example visual image (see Figure 1) corresponding to sentences (5a)–(5b): it contains two pictures, the one in the left panel depicting the event in which the kitten hit the puppy (i.e., the kitten was the agent), the one in the right panel depicting the event in which the puppy hit the kitten (i.e., the kitten was the patient). For the ambiguous NV construction (5a), if the NP *xiaomao* 'kitten' was interpreted as the agent, the picture in the left panel should be selected. Alternatively, if the same NP was interpreted as the patient, the picture in the right panel should be selected.

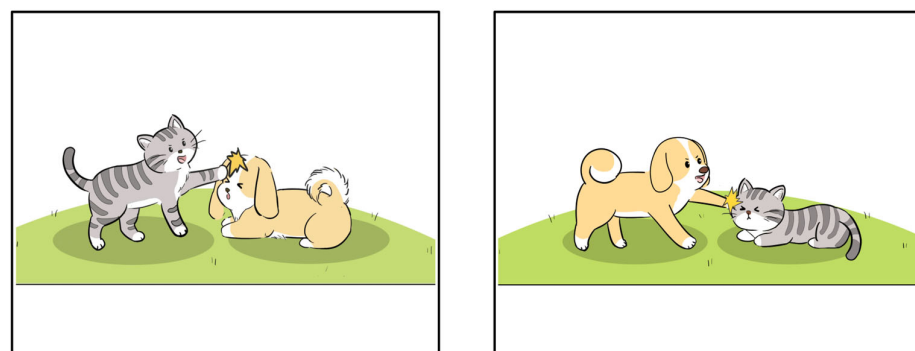


Figure 1. Example visual image used in the study.

Two experimental lists were created to counterbalance the positions of the two pictures, and the participants were randomly assigned to one of the lists. Within each list, on half of the trials the pictures in which the NP in the test sentence (e.g., *xiaomao* 'kitten' in (5)) was the agent appeared in the left panel, and on the other half in the right panel. Also, the direction of the action was controlled so that in each visual image the agent characters in the two pictures were located in the same place. For example, in Figure 1, the characters on the left were agents in both pictures. Across different test items, the agent characters appeared in various places (e.g., in the visual image depicting the "pinning down" action, the agent characters in both pictures appeared on the top). This maneuver ensured that the participants could not use the direction of the action as a clue.

We conducted another norming study to ensure that both characters could plausibly serve as the agent or the patient of the action depicted in the picture. The norming study involved 20 Mandarin-speaking adults (age range: 22–26 years, mean age: 23.3 years, 10 men and 10 women) who did not participate in the experiment. They were asked to rate the plausibility of the events depicted in the test pictures, using a 5-point Likert scale, with 5 representing *the most plausible* and 1 representing *the least plausible*. The results showed that in all the test items, both the agent events (mean score = 4.24, SD = 1.05) and the patient events (mean score = 4.28, SD = 0.94) received high plausibility ratings, and the results of a paired T-test showed that there was no significant difference between the plausibility scores of these pairs ($p = 0.721$).

Also, in order to directly compare children's performance on Mandarin NV and BEI-passive constructions, the two types of sentences were presented to each child participant using the same item, but in different experimental sessions. For instance, the NV construction (5a) was tested in the first session, and the BEI-passive construction (5b) in the second session. Except for the passive marker BEI, the visual and spoken stimuli in the two experimental sessions were identical for (5a) and (5b).

In addition, six filler items were added in each experimental session, each containing a visual image and a filler sentence. The images used in the filler items did not appear in the test items. On half of the filler trials, the spoken sentence matched the picture in the left panel of the visual image, while on the other half, it matched the picture in the right panel. The filler sentences were all simple transitive sentences. An example filler sentence is provided in (6), which is a simple transitive sentence with both arguments omitted. On this filler trial, the matched picture illustrated the “bumping” action, while the mismatched picture a different action. In each experimental session, the test and filler items were presented in random order, following previous studies (e.g., Shin, 2021; Zhu et al., 2022).

- (6) zhuang-shang le.
 bump-into PERF
 ‘(Someone) bumped into (someone else).’

3.3. Production of the Test Stimuli

The test and filler sentences were recorded by a female Mandarin native speaker. The recording took place in a sound-attenuated recording booth. When produced, the sentences were divided into three segments: NP (segment 1), passive marker BEI (segment 2) and verb phrase (VP) (segment 3). The speaker was asked to produce these segments one by one in a child-directed manner. To ensure the consistency of each segment across the test sentences, the original recorded sentences were later edited in Praat: for each segment, only one sample in the recording was selected and then used for both NV and BEI-passive constructions. For instance, the same audio samples of the NP *xiaomao* ‘kitten’ and VP *ji-zhong le* ‘hit’ were used in (5a) and (5b). The only difference between the two sentences was that in (5b) we inserted an audio sample of BEI between the NP and the VP.

In addition, to control for the potential effects of prosodic cues on children's comprehension of ambiguous NV structures, between each segment we added a 200 ms pause, which was consistent across all the test sentences. The length of the pause was decided so as to also ensure naturalness of the spoken sentence. All the edited spoken sentences were reported as intelligible and natural by the adult participants.

3.4. Procedure

The participants were tested using a picture selection task, which was performed via *Psychopy* (version 2021.2.3; Peirce et al., 2019). They were told that they were going to

see some pictures alongside a puppet. On each trial, the puppet was going to describe one of the pictures appearing on the screen, and the participant's task was to point to the picture that matched the puppet's description. The experimenter recorded the participants' selection by pressing the pre-defined key on the keyboard.

The experiment was administered in two separate experimental sessions. In the first session, the participants were presented with Mandarin NV constructions, and in the second session they were presented with *BEI*-passive constructions. The two sessions were separated by approximately two weeks. Note that, as the passive marker *BEI* has been reported to be a strong cue in thematic role assignment in the literature, to prevent potential carry-over effects of this cue on children's interpretations of ambiguous NV constructions, NV constructions were presented before *BEI*-passive constructions (see Weighall & Altmann, 2011 for a similar design). The child participants attended both experimental sessions, but the adult participants only attended the first experimental session on Mandarin NV constructions, because the adults were expected to exhibit ceiling accuracy on *BEI*-passive constructions.

Before the first experimental session, we had an introduction session to familiarize the participants with the experimental procedure. The introduction session was followed by a pre-test in which the participants were asked to identify the characters and actions involved in the experiment. These characters and actions corresponded to the nouns and verbs in the test sentences and were presented by using pictures from the filler items. All the child participants were able to correctly identify the characters and actions in the pre-test and proceeded to the experimental session. The introduction session and the pre-test took about 8 min.

Each experimental session began with two practice trials, followed by 12 experimental trials (six test and six filler trials). On each practice trial, the participants were presented with two pictures, each depicting an animal character, and they were asked to point to the character that the puppet had described. The duration of each experimental session was around 6 min.

3.5. Results and Discussion

The dependent variable was the proportion of test trials in which the participants interpreted the NP (e.g., *xiaomao* 'kitten' in (5)) as the agent (henceforth, agent response). All the participants provided correct responses to at least five out of six filler sentences as in (6), so their data were all included in the final analysis. For each participant, we first calculated the number of agent responses, and then computed the proportion of agent responses. Figure 2 shows the average proportions of agent responses to NV and *BEI*-passive constructions by age. As shown in the figure, the child participants of all age groups tended to provide agent responses to NV constructions (3-year-olds: 63.33%; 4-year-olds: 71.67%; 5-year-olds: 78.89%). Similarly, the adult controls also provided a large number of agent responses to NV constructions (95.00%). By contrast, the child participants provided fewer agent responses to *BEI*-passive constructions (3-year-olds: 28.89%; 4-year-olds: 20.00%; 5-year-olds: 7.22%).

To compare the participants' agent responses to each sentence type with the chance level, we conducted one sample T-test, with the chance level value set at 0.5. The results showed that all the age groups, including the adults, provided agent responses to NV constructions significantly more often than chance ($ps < 0.001$). By contrast, when responding to *BEI*-passive constructions, children's agent responses were significantly below the chance level ($ps < 0.001$).

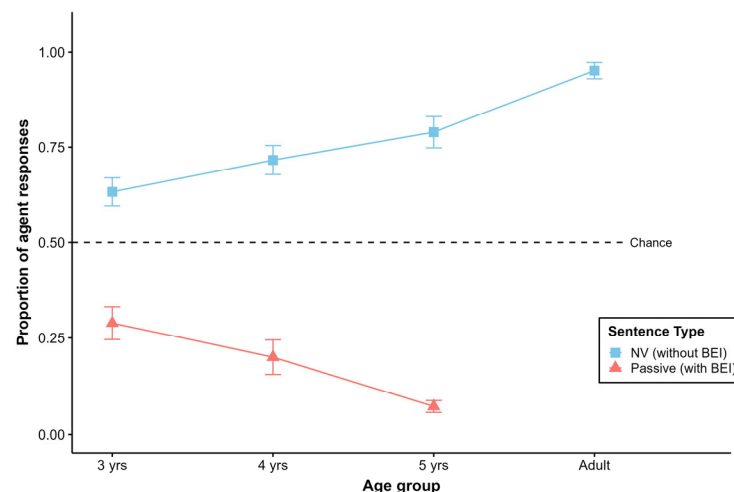


Figure 2. Mean proportions of agent responses to NV and *BEI*-passive constructions by age group. Error bars represent standard errors.

In addition, in order to statistically analyze the response patterns for NV constructions between the age groups, we applied generalized linear mixed models (GLMMs) and the fitting process was performed via the *glmer* function from the package *lme4* (v1.1-34.1) (Bates et al., 2015) in R software environment (version 4.3.1, R Core Team, 2023). For each model, we included both *participant* and *item* as random effects, and started from the model that included the maximal random-effects structure (Baayen et al., 2008; Barr et al., 2013). Then, we followed the suggestions in Bates et al. (2018) and reduced the random structure's complexity stepwise from the original model, until the model converged to a non-singular fit. Post hoc comparisons were conducted by using pairwise T-tests with Bonferroni correction, via the *emmeans* package (Lenth, 2017). The final model⁵ treated *group* (i.e., 3-, 4-, and 5-year-olds and adults) as the fixed effect, with random intercepts for both participants and items.

The model results showed that *group* was a reliable predictor. More specifically, the adults provided agent responses to NV constructions significantly more often than the 3-year-olds ($\beta = 2.61$, $SE = 0.43$, $z = 6.13$, $p < 0.001$) and the 4-year-olds ($\beta = 2.18$, $SE = 0.43$, $z = 5.11$, $p < 0.001$), as well as the 5-year-olds ($\beta = 1.73$, $SE = 0.43$, $z = 4.02$, $p < 0.001$). Also, the 5-year-olds had a significantly higher proportion of agent responses than the 3-year-olds ($\beta = 0.88$, $SE = 0.31$, $z = 2.86$, $p = 0.025$).

In addition, in order to examine whether children's performance in *BEI*-passive trials predicted their agent responses in NV trials, we adopted additional GLMMs, and their random-effects structures were decided in the same manner as the previous model. We compared the model fit between two models using the *anova* function in the *stats* package: Model 1 included the children's age (in month) as the sole fixed predictor, while Model 2 included both age and agent responses in *BEI*-passive trials as the fixed predictors. The results showed that Model 2 had a significantly better fit than Model 1 ($\chi^2(1) = 8.92$, $p = 0.003$), so Model 2 was adopted as the final model. The results of Model 2 are summarized in Table 3. As the table illustrates, the main effect of *age* was significant ($\beta = 0.03$, $SE = 0.01$, $z = 2.78$, $p = 0.005$), indicating that children tended to provide more agent responses to NV constructions as they grew older. Importantly, the model also revealed a significant main effect of *BEI*-passive ($\beta = -0.84$, $SE = 0.28$, $z = -2.99$, $p = 0.003$) after the effects of age were controlled for. The value in the estimate column suggests a negative association between the two constructions. More specifically, the fewer agent responses the children had to *BEI*-passive constructions, the more agent responses they had to NV constructions.

Table 3. Fixed effects from the best-fitting generalized linear mixed model of agent responses to NV constructions in children.

Effect	Estimate	SE	Z Value	p Value
Intercept	−0.622	0.708	−0.879	0.379
Age (in month)	0.034	0.012	2.780	0.005 **
<i>BEI</i> -passive	−0.844	0.282	−2.992	0.003 **

Formula in R: agent_response ~ month + *BEI*-passive + (1 | participant) + (1 | item); ** $p < 0.01$.

To sum up, the results of the experimental study showed that the 3-to-5-year-olds tended to assign the agent role to the NPs in ambiguous NV constructions, with the 5-year-olds providing significantly more agent responses than the 3-year-olds. By contrast, they preferred to interpret the NPs in *BEI*-passive constructions as patients. These findings were consistent with the distribution patterns in the CDS showing that NPs appeared more frequently as agents in NV constructions, and as patients in *BEI*-passive constructions. Also, children's performance on ambiguous NV constructions could be predicted by their performance on *BEI*-passive constructions. We discuss this point in details in the General Discussion.

4. General Discussion

In the article, we sought to investigate whether Mandarin-speaking preschoolers exhibit the agent-first bias in sentence comprehension. To address this question, we conducted two studies to investigate children's understanding of Mandarin NV and short *BEI*-passive constructions. In the corpus study, we examined the thematic roles of NPs in input data and found that for NV constructions, the NPs appeared more often as agents than patients in child-directed utterances, while for short *BEI*-passive constructions, the NPs consistently served as the patient role. In the experimental study, we adopted a picture selection task and found that children as young as 3 already had a tendency to assign the agent role to the NPs in ambiguous NV constructions in comprehension, and the 5-year-olds exhibited a stronger agent-first bias than the 3-year-olds. By contrast, when the passive marker *BEI* was present, all the 3-to-5-year-olds tended to assign the patient role to the NPs in *BEI*-passive constructions. In addition, we found that children's response patterns to *BEI*-passive constructions significantly predicted their performance on ambiguous NV constructions, after the effects of age were controlled for.

First, the findings indicate a clear developmental trajectory of the agent-first bias in Mandarin-speaking children. Previous studies suggest that children acquiring Korean and Tagalog do not always map the agent role onto the first NP in a sentence by default. For instance, Shin (2021) examined Korean-speaking children's comprehension of ambiguous NV constructions and found that the 3-to-4-year-old Korean-speaking children did not establish the mapping between the first NP and the agent role in ambiguous NV constructions. In the present study, we tested the 3-to-5-year-old children using similar NV constructions in Mandarin and the results showed that, unlike the Korean-speaking children in Shin (2021), the Mandarin-speaking 3-year-olds provided agent-first responses around 63% of the time, which was significantly above the chance level, and the proportions of agent-first responses gradually rose as children grew older. Nonetheless, it should be noted that the 5-year-olds in our study still displayed a weaker tendency than the adults to interpret the first NP as the agent, indicating that the development of the agent-first bias in Mandarin-speaking children may still be characterized as a gradual and long-term process. This also stands in contrast with prior findings showing that children acquiring English exhibited a strong agent-first bias from early on (e.g., Abbot-Smith et al., 2017; Bever, 1970; Gertner et al., 2006).

The mixed patterns across languages (e.g., Mandarin, Korean and English) might be associated with typological differences. As discussed, in case-marking languages like Korean, case markers play a crucial role in assigning thematic roles, and thus children acquiring Korean may rely heavily on case-marking cues to interpret the first NP in a sentence (Shin, 2021; Shin & Mun, 2023). By contrast, Mandarin is a language without case marking, so compared to Korean-speaking children, Mandarin-speaking children may establish a direct mapping between the agent role and the first NP more rapidly. Also, there are typological differences between English and Mandarin. Specifically, although both English and Mandarin have the SVO canonical word order, Mandarin permits relatively more flexible word orders, so NV constructions are ambiguous between agent-first and patient-first interpretations in Mandarin, but not in English. Therefore, it is more evident for English-speaking children to assign the agent role to the first NP when comprehending NV constructions.

Another factor that might potentially contribute to the observed cross-linguistic differences is input information. According to the Korean input data reported in Shin (2021), when case markers were not present, the majority of NPs in Korean NV constructions appeared to be patients. By contrast, in our corpus study on Mandarin input data, we found that the NPs in Mandarin NV constructions appeared more frequently as agents (1784 agent vs. 1102 patient instances). The distribution patterns aligned with the results in the comprehension task, which were that children acquiring Mandarin tended to exhibit the agent-first bias at an earlier age than those acquiring Korean, suggesting that the linguistic input children received from the environment might also affect their interpretations of ambiguous NV constructions.

Overall, the comparisons across children acquiring different languages have important implications for understanding the nature of the agent-first bias. Early research on Indo-European languages reported that the agent-first bias emerges early. These findings seemed to be consistent with the proposal that children adopt a uniform strategy to interpret the first NP as the agent from early on (Jackendoff & Wittenberg, 2014), but recent evidence from non-Indo-European languages has called such a proposal into question. In the current study, we found that the developmental trajectory of the agent-first bias in Mandarin-speaking children was distinct from those reported in previous studies. The findings challenge the view that there is a default and uniform mapping between the agent role and the first NP in children's sentence comprehension. Instead, the findings suggest that children's exhibition of the agent-first bias might be more related to language-specific properties, such as typological features (e.g., the informativeness of word order and morphological cues) and input distribution. To further examine this possibility, more cross-linguistic research is required to better understand how the agent-first bias is developed in children.

In addition, the results of the experimental study indicate the role of the passive marker *BEI* in children's thematic role assignment. Previous studies reported that *BEI* is a reliable cue for indicating that the first NP should be mapped onto the patient role for adults (P. Li et al., 1993; Wolpert et al., 2024), and children can use *BEI* to correctly understand one-argument passive sentences (i.e., short *BEI*-passives) from the age of 3 (M. Liu et al., 2024; P. Zhou et al., 2017; P. Zhou & Ma, 2018). The results of the present study align with these findings, showing that the 3-year-olds tended to assign the correct patient role to the NP when the passive marker *BEI* was present. More importantly, our study also showed that if the children provided more patient-first responses to *BEI*-passive constructions, they would also provide more agent-first responses to ambiguous NV constructions. One possible interpretation is that increasing knowledge of the passive marker *BEI* might help Mandarin-speaking children establish a stronger contrast between explicitly patient-marked passive and unmarked NV constructions. As children become more sensitive to *BEI* as a cue to

patienthood, they might become more likely to interpret an initial NP in an unmarked NV construction as the agent. However, given the correlational nature of the current data, this interpretation should be noted with caution.

We also wish to acknowledge a few limitations of the study. First, in the present study we only manipulated the (non)existence of the passive marker in Mandarin, while controlling for the potential effects of other cues, such as verb type, animacy and discourse contexts. In order to better understand how the agent-first bias develops in Mandarin-speaking children, future research is needed to directly manipulate these cues. In particular, all the verbs used in the experimental study were verb compounds, and thus it remains to be explored whether the findings can be generalized to NV constructions containing simplex verbs. Second, the study showed that the 3-year-olds already exhibited a weak tendency to interpret the first NP in NV constructions as the agent, and this tendency gradually became stronger during language development. Therefore, a further question to ask is whether Mandarin-speaking children under 3 also display the agent-first bias. Future studies can examine this question by recruiting younger children and using more infant-friendly experimental paradigms such as the preferential looking paradigm. Finally, in the experimental study, although the number of test items in each condition followed that of previous studies on similar age groups, it is possible the design did not have sufficient statistical power. Similarly, the limited number of short *BEI*-passive constructions identified in the corpus study might not provide a precise estimate of the distribution of thematic roles in this structure. We therefore acknowledge that these findings should be verified in future research.

5. Conclusions

To conclude, the present study suggests that when comprehending ambiguous NV constructions, Mandarin-speaking preschoolers display the agent-first bias, and this comprehension bias becomes stronger as children grow older. Children's performance is consistent with the input patterns that NPs appear more often as agents in NV constructions, which indicates the possibility that input distribution influences children's agent-first bias in sentence comprehension. In addition, the results of the experimental study also showed that children's performance on *BEI*-passive constructions was a significant predictor of their performance on NV constructions, even after the effects of age were controlled for. These findings indicate the role of the passive marker *BEI* in children's thematic role assignment.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of the School of International Studies, Zhejiang University (protocol code SIS2023-04 and date of approval 30 October 2023).

Informed Consent Statement: Written informed consent was obtained from each adult participant and each child participant's parent.

Data Availability Statement: The test materials, data and analysis codes of the experiment are available in Open Science Framework via the link: <https://osf.io/vyj3h/>, accessed on 3 September 2026.

Conflicts of Interest: The authors declare no conflict of interest.

Notes

- ¹ The abbreviations used in the examples are as follows: ACC = accusative case marker; BEI = Mandarin passive marker; NOM = nominative case marker; PERF = perfective aspectual marker; SE = sentence ender.
- ² OSV word order often appears in Mandarin topicalized sentences (e.g., [Hu et al., 2018](#)), as in (I), and SOV word order is frequently observed in sentences containing the morphological marker *BA* (e.g., [P. Li et al., 1993](#)), which indicates that the NP following this marker is the patient, as in (II).

(I)	Xiaomao	wo	zhuazhu	le.	
	cat	I	catch	PERF	
	'I caught the cat.'				
(II)	Xiaogou	BA	xiaomao	zhuazhu	le.
	dog	BA	cat	catch	PERF
	'The dog caught the cat.'				
- ³ According to [M. Liu et al. \(2024\)](#), the intervention-based account can also explain why Mandarin short *BEI*-passives are acquired earlier than passives in many other languages like English. On this account, even though the agent NP is phonologically null in both Mandarin and English short passives, it is syntactically projected in English (e.g., [Baker et al., 1989](#)), so the covert agent NP might still lead to intervention effects for English-speaking children. By contrast, in Mandarin short *BEI*-passives, the agent NP is not syntactically projected (e.g., [C. T. J. Huang, 1999](#)), so no intervention effects occur.
- ⁴ Typical roles in “others” category include: *Theme* (an entity that undergoes motion or change of location, as in (III)), *Experiencer* (an entity that experiences a psychological or affective state, as in (IV)), and *Instrument* (an entity used to carry out an action, as in (V)).

(III)	Laohu	lai	le	
	tiger	come	PERF	
	'The tiger came.'			
(IV)	Maomi	hen	xiangshou	
	cat	very	enjoy	
	'The cat really enjoyed it.'			
(V)	Jiandao	jian		
	scissors	cut		
	'(It is) cut with scissors.'			
- ⁵ Formula in R: agent_response ~ group + (1 | participant) + (1 | item).

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