Children's Acquisition of the Felicity Condition of Mandarin *dou*

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1. Introduction

Mandarin *dou*, a multi-functional particle, has received significant attention in the literature (see Feng and Pan 2023 for an overview). Among its various uses, two are particularly well discussed: *Dou* can express quantification, similar to English *all*/*both*, as in (1-a). It can also express scalarity, similar to English *even*, as in (1-b). Stress can sometimes help to disambiguate these readings, especially when *dou* associates with definite expressions. When the particle itself is stressed, a quantificational reading typically arises, as in (1-a). On the other hand, for the scalar use, *dou*'s associate is stressed, as in (1-b). The present study focuses specifically on the quantificational use of *dou*.

(1) a. Tamen DOU lai-le. (uppercase indicating stress)
They DOU come-ASP
'They ALL came.'

b. (Lian) TAmen dou lai-le.
LIAN they DOU came-ASP
'Even THEY came.'

There exists a large number of analyses regarding the syntax and semantics of *dou*. Setting aside some of their differences and focusing on the particle's core semantic effect, many researchers treat *dou* as a distributive universal quantifier (e.g., Jiang 1998; Lee 1986; Lin 1998; Pan 2006). Theoretical views along this line bring with them several semantic consequences. For the purpose of this study, we describe two of them in an informal, descriptive manner.

The first consequence is often referred to as the "plurality requirement" (e.g., Lee 1986), which states that the associate of *dou*, either overt or covert, must be

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non-atomic. This requirement explains the infelicity of (2), since *dou*'s associate, John, denotes an atomic individual.

(2) #Yuehan DOU qu-le Beijing.
John dou go-ASP Beijing

Another consequence is known as the "distributivity requirement" (e.g., Lin 1998), namely that if a sentence without *dou* allows both collective and distributive readings, adding *dou* blocks the collective reading. This is illustrated in (3). (3-a) allows both a distributive reading (each of them drew a picture, though the availability of this reading is subject to cross-speaker variation) and a collective reading (they drew one picture together). In contrast, (3-b) only allows the distributive reading.

(3) a. Zhangsan he Lisi hua-le yi-fu hua.
Zhangsan and Lisi draw-ASP one-CL picture
'Zhangsan and Lisi drew a picture.' (✓?distributive, ✓collective)
b. Zhangsan he Lisi DOU hua-le yi-fu hua.
Zhangsan and Lisi DOU draw-ASP one-CL picture
'Zhangsan and Lisi each drew a picture.' (✓distributive, *collective)

This line of analysis predicts that a sentence like (4), in which the predicate is inherently distributive, should be semantically equivalent to its *dou*-less counterpart. That is, both sentences should mean that Zhangsan smiled and Lisi smiled.

(4) Zhangsan he Lisi DOU xiao-le.
Zhangsan and Lisi DOU smile-ASP
'Both Zhangsan and Lisi smiled.'

Nevertheless, recent work has reported a subtle difference between the two sentences, specifically, a difference in their felicity conditions (Liu, 2023). Intuitively, they seem to answer different questions. Consider (5). In (5-a), in response to the question "Who among Zhangsan and Lisi smiled?", if both of them indeed smiled, the answer with *dou* is felicitous, whereas the answer without *dou* sounds odd. By contrast, in (5-b), where the question asks "Who among Zhangsan, Lisi, and Wangwu smiled?" but only Zhangsan and Lisi did, the answer with *dou* tends to be dispreferred.

(5) a. Question: Who among Zhangsan and Lisi smiled?
Answer: Zhangsan he Lisi #(DOU) xiao-le.
'#(Both) Zhangsan and Lisi smiled.'
b. Question: Who among Zhangsan, Lisi and Wangwu smiled?
Answer: Zhangsan he Lisi (?DOU) xiao-le.
'(?Both) Zhangsan and Lisi smiled.'

This observation has motivated an analysis that treat *dou* as a QUD-sensitive presupposition trigger (Liu, 2018, 2021, 2023) (to be elaborated in Section 5). Meanwhile, this pattern raises an acquisition puzzle: when and how do children acquire this QUD-related felicity condition associated with *dou*? In the present study, we try to address this question by examining 4- to 8-year-old children's knowledge regarding the felicity conditions of quantificational *dou*.

2. Previous acquisition studies on quantificational *dou*

Compared to the rich theoretical literature on *dou*, children's acquisition of this particle remains relatively under-explored. Spontaneous production data indicate that children begin using *dou* around age 2 (Erbaugh, 1982; Hsieh, 2008; Kong et al., 2004; Lee, 2012; Zhang et al., 2010), with the quantificational use emerging earlier than other uses (Deng & Zhang, 2025).

Previous comprehension studies report that by preschool age, children can interpret *dou*'s quantificational use in an adult-like manner. Using picture-selection and act-out tasks, Lee (1986) found that over 90% of the 4-year-olds showed adult-like comprehension of sentences like (6) and (7). Lee therefore concluded that by around age four, children acquiring Mandarin know that *dou* can denote universal quantification.

(6) Xiongmao DOU shuijiao le.
panda DOU sleep ASP
'The pandas have all fallen asleep.' (Lee 1986, p.264, ex.(ii))

(7) Mei-ke tang dou na chulai.
every-CL candy DOU take out
'Take every candy out.' (Lee 1986, p.264, ex.(i))

Subsequent studies have examined children's comprehension of sentences where *dou* interacts with other expressions. For example, Yang et al. (2022); Zhou (2015); Zhou and Crain (2011) tested children's understanding of sentences like (8), where *dou* combines with a wh-expression and yield a non-interrogative universal reading. The results of these studies showed that children as young as three correctly interpret such wh-*dou* sentences as universal statements.

(8) Xiaoyang shenme dou fang zai xiangzi-li le.
Lamb what DOU put in box-loc ASP
'Little Lamb packed everything in the box.'
(Yang et al. 2022, p. 304, ex.(19))

An et al. (2020) investigated children's comprehension of sentences like (9), where a disjunction is in the scope of *dou* and yields a conjunctive interpretation. The authors found that children as young as four interpreted such sentences in an adult-like manner.

(9) Jiaozi huozhe shousi, gongfuxiongmao DOU hui zuo.
dumpling or sushi KungFuPanda DOU can make
'Kung Fu Panda can make dumplings **and** sushi.'(An et al. 2020, p.6, ex.(35))

These prior studies have primarily focused on children's knowledge of *dou*'s semantic effect, namely its ability to denote universal quantification and to license free choice interpretations when combined with wh-expressions or disjunctions. To our knowledge, however, no research has examined children's knowledge of the discourse/pragmatic dimension of this particle, specifically the QUD-related felicity condition discussed in Section 1 that govern its presence or absence. The present study aims to fill this gap.

3. Experiment

3.1. Participants

We tested 138 Mandarin-acquiring children between the ages of 4;02 and 8;11 (M = 6; 06, SD = 1.34 years, 69 girls), including 24 four-year-olds, 30 five-year-olds, 31 six-year-olds, 31 seven-year-olds, and 22 eight-year-olds. In addition, 68 native-speaking adults participated as controls. The adult control group consisted of parents of a subset of the participating children. An additional five participants (two adults and three children) were tested but excluded from the data analysis due to low accuracy on filler items, based on exclusion criteria detailed below. Both adult and child participants were recruited online and were tested in the lab.

3.2. Methodology

We implemented a Felicity Judgment Task in which participants watched a series of illustrated short stories. After each story, participants received a question, followed by responses from two speakers (a boy and a girl). Their task was to determine who answered better. An example trial is shown in (10).

(10) *Story:* Today, Sheep, Deer, Bear, Cat, and Dog were reading books in the classroom. Sheep did not find the book he had chosen interesting and began to feel sleepy, but he persisted and finished reading it. Deer also didn't find his book interesting and yawned several times, but he tried hard to stay awake. Bear really enjoyed her book and read it with great interest. Cat thought his book was too difficult and soon felt dizzy; he eventually fell asleep while reading. Dog noticed that Cat had fallen asleep, so he began to rest and gradually relaxed, falling asleep alongside Cat.

Question: We know that five animals were reading books in the classroom. Who among them fell asleep?

Boy: Xiaomao he xiaogou DOU shuizhao-le.
little.cat and little.dog DOU fall.asleep-ASP
'Cat and Dog both fell asleep.'

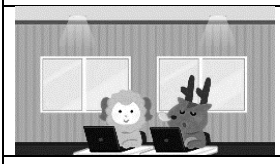
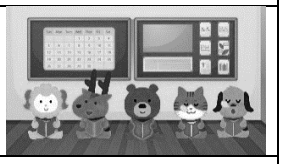
Girl: Xiaomao he xiaogou shuizhao-le.
little.cat and little.dog fall.asleep-ASP
'Cat and Dog fell asleep.'

Experimenter: Who answered better?

3.3. Design and materials

We tested three conditions: 1/2, 2/2 and 2/5, as illustrated in Table 1. In these labels, the denominator indicates the total number of animal characters in the story, and the numerator indicates how many of them performed the target action. Across all three conditions, the post-story question had the same form: *tamen-zhong shui ... le* 'Who among them [performed the action]?'. The boy's and girl's answers were nearly identical, differing only in the presence of *dou*. Additionally, to rule out the scalar interpretation of *dou* as in (1-b), the particle in the relevant responses was always stressed.

Table 1: Example stimuli

1/2	2/2	2/5
		
Tamen-zhong shui shuizhao-le? 'Who among them fell asleep?'		
Deer (#DOU) fell asleep.	fell asleep.	ell asleep.

Note that the 1/2 condition differs from the other two conditions in that the boy's and girl's responses involved a singular subject rather than a conjunction. This condition was designed to test *dou*'s plurality requirement, illustrated in example (2). The 2/2 and 2/5 conditions were modeled after example (5), and were intended to examine whether children know the QUD-related felicity condition governing the presence or absence of *dou*.

For each condition, we tested four trials featuring four predicates: *shui-zhao* 'fall asleep', *shuai-dao* 'fall (down)', *zuo-xia* 'sit down', and *chu-qu* 'go out'. These predicates are inherently distributive predicates. In total, each participants received twelve trials involving *dou*.

All participants received two training items, followed by 20 trials: 12 trials involving *dou* and 8 fillers, presented in a randomized order. We counterbalanced which speaker provided the target response and which speaker responded first, to control for any potential preferences children might have for one speaker over the other.

In the filler items, the two speakers also answered a question of the form 'who among them [performed the action]?', with their responses differing in truth value. The fillers fell into two categories: 1/2 and 2/5, with four trials in each category. The 1/2 fillers involved the same four predicates used in the *dou*-trials and were designed to confirm that participants understood the meanings of these predicates. The 2/5 fillers were designed to parallel the 2/5 *dou*-trials to ensure a balance in story complexity. These fillers featured four additional predicates: *dai* 'bring', *mai* 'buy', *hua* 'draw', and *xuan* 'choose'.

The experiment was implemented using Qualtrics. All stories, questions, and the two speakers' responses were pre-recorded. The questions were also displayed on the screen in text form. Child participants were tested individually by an experimenter. During the experiment, the experimenter played the pre-recorded stories, questions, and responses for each child. Adult participants completed the experiment separately and independently in another room via a provided link.

4. Analysis and results

4.1. Analysis of raw response

Participants who answered at least three out of the four trials correctly for each filler type were included in the data analysis. This criterion led to the exclusion of five participants (two adults, two 4-year-olds and one 5-year-old).

Figure 1 displays the proportion of different response options across conditions for both adults and children of different age groups. Responses were coded as selecting the *dou*-speaker, selecting the no-*dou* speaker or 'other'. The 'other' category included trials in which participants either did not provide a response or selected both speakers.

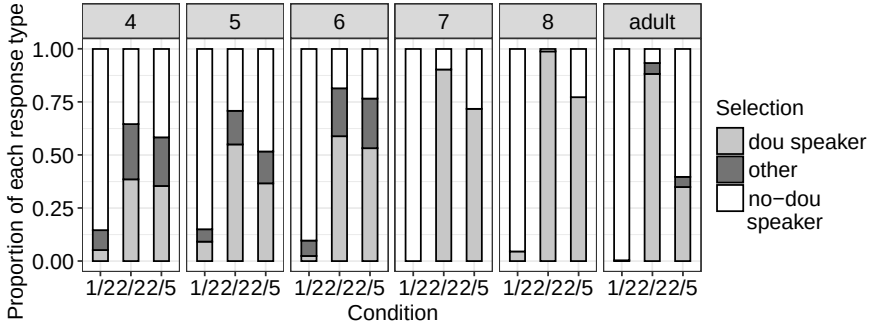


Figure 1: Proportion of selections of each response option

We begin by examining the adult data. Adults showed clear condition-sensitive responses. In the 1/2 condition, 99.6% of the responses selected the no-*dou* speaker, consistent with *dou*'s plurality requirement. In the 2/2 condition, 88.2% of the responses selected the *dou*-speaker (compared to 6.6% selecting the no-*dou* speaker). In the 2/5 condition, 60.3% of the responses selected the no-*dou* speaker, while 34.9% selected the *dou*-speaker. These results align with the pattern reported by Liu (2023) and reviewed in Section 1: *dou* is required when its prejacent (specifically, its literal content) completely addresses the QUD concerning the parts of its associated definite, but tends to be dispreferred otherwise.

We now turn to the child data. Visual inspection reveals that in the 1/2 condition, children's performance largely mirrored that of adults across all age groups, although younger children displayed greater variability. In the 2/2 and 2/5 conditions, the selection of the *dou*-speaker by children increased with age; notably, this increase appears to proceed in parallel across the two conditions. Furthermore, children in each age group consistently selected the *dou*-speaker more often in the 2/2 condition than in the 2/5 condition. Finally, while the response patterns of 7- and 8-year-olds resembled the adult pattern in the 2/2 condition, they diverged from the adult pattern in the 2/5 condition.

To better understand children's developmental patterns, we analyzed the child data using a multinomial mixed-effects logistic regression, implemented with the mclogit package (Elff, 2022) in R version 4.3.1 (R Core Team, 2021). For the three-level outcome variable (*dou*-speaker, no-*dou* speaker and 'other'), we set the *dou*-speaker as the reference level. For the three-level predictor Condition (1/2, 2/2 and 2/5), we set 2/5 as the reference level. We considered models with varying random-effect structures, including models with and without random intercepts and random slopes for Subject and Item. We also compared fixed-effect structures that included all possible combinations of the following predictors: Age (centered and treated as a continuous variable, hence labled as Age_c), Condition (1/2, 2/2 and 2/5), and their interaction. Based on Akaike Information Criterion (AIC) comparisons, following Bolker et al. (2009), the best-fitting model included all predictors and a random intercept for Subject: Selection ~ 1 + Condition * Age + (1 | Subject). The model results are summarized in Table 2.

Table 2: Results of multinomial logistic regression model on child data

	no-*dou* speaker vs. *dou*-speaker				
	β	*SE*	*z*	*p*	OR [95%CI]
Age_c	-0.58	0.20	-2.97	.003	0.56 [0.38-0.82]
Condition 1/2	5.78	0.44	13.19	.000	323.30 [136.97-763.15]
Condition 2/2	-1.87	0.26	-7.34	.000	0.15 [0.09-0.25]
Age_c: Condition 1/2	1.45	0.30	4.77	.000	4.26 [2.35-7.72]
Age_c: Condition 2/2	-0.74	0.18	-4.19	.000	0.48 [0.34-0.67]
	other vs. *dou*-speaker				
	β	*SE*	*z*	*p*	OR [95% CI]
Age_c	-1.06	0.33	-3.22	.001	0.35 [0.18-0.66]
Condition 1/2	-0.44	0.85	-0.52	.606	0.65 [0.12-3.41]
Condition 2/2	-0.36	0.51	-0.70	.482	0.70 [0.26-1.89]
Age_c: Condition 1/2	0.16	0.60	0.26	.793	1.17 [0.36-3.81]
Age_c: Condition 2/2	-0.40	0.38	-1.05	.295	0.67 [0.32-1.41]

For the contrast between 'no-*dou* speaker' and '*dou*-speaker', there was a significant effect of Age, suggesting that older children were more likely than younger children to select the *dou*-speaker. Comparing children's performance across different conditions, the model results indicate that children were more likely to select the no-*dou* speaker in the 1/2 condition than in the 2/5 condition, and more likely to select the *dou*-speaker in the 2/2 condition than in the 2/5 condition. The interactions between Condition and Age were also significant, suggesting that older children exhibit greater differentiation than younger children between the 1/2 and 2/5 conditions, as well as between the 2/2 and 2/5 conditions.

For the contrast between 'other' and '*dou*-speaker', there was a significant effect of Age, indicating that older children were less likely to choose 'other'. However, there was no significant effect of Condition or an interaction between Condition and Age.

4.2. Categorizing participants

To illustrate developmental shifts in individual patterns, we used a series of scatterplots, with each age group represented in a separate panel, as shown in Figure 2. In these plots, each participant is classified according to two parameters: the proportion of trials in which participants selected the *dou*-speaker in the 2/2 condition (x-axis) and the proportion of trials in which they selected the *dou*-speaker in the 2/5 condition (y-axis). Note that since 'other' responses do not provide information about participants' preferences between the two speakers, we excluded any participant who selected 'other' in half or more of the trials in the

2/2 or the 2/5 condition. This criterion led to the exclusion of 23 participants (four adults, seven 4-year-olds, five 5-year-olds, and seven 6-year-olds). In addition, we removed the remaining four 'other' responses from the dataset to ensure that the analysis focused exclusively on informative trials—namely, those in which participants selected either the *dou*-speaker or the no-*dou* speaker.[1] The circle size indicates the proportion of participants within a specific age group who share a specific response patten. Larger circles correspond to higher proportion of participants. The plot in each panel is divided into four quadrants, with 0.5 set as the cut-off point for each parameter: (a) Lower-left (LL): Participants selected the *dou*-speaker in less than half of the trials in both conditions; (b) Lower-right (LR): Participants selected the *dou*-speaker in more than half of the 2/2 trials but in less than half of the 2/5 trials; (c) Upper-left (UL): Participants selected the *dou*-speaker in more than half of the 2/5 trials but in less than half of the 2/2 trials; (d) Upper-right (UR): Participants selected the *dou*-speaker in more than half of the trials in both conditions.

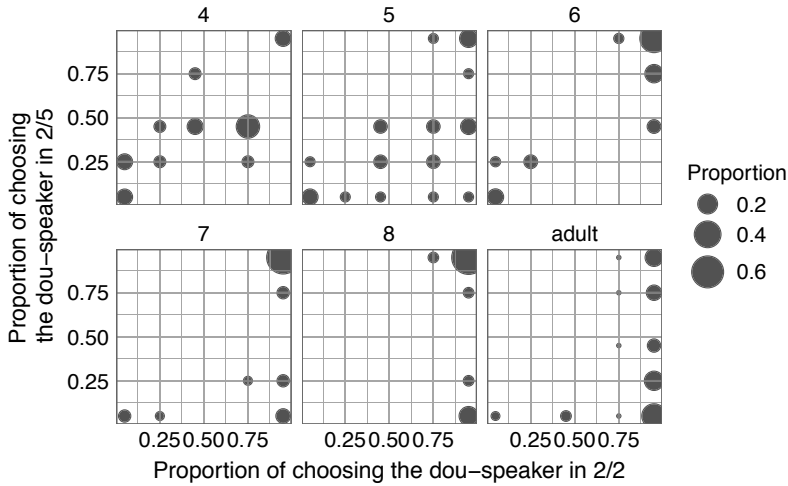


Figure 2: Participants' distribution of choosing the *dou*-speaker in 2/2 and 2/5 across age groups. Circle size represents the proportion of participants within a specific age group who share a specific response pattern.

Visually inspecting Figure 2, we see that adult participants were mostly clustered in the LR quadrant (preferring the *dou*-speaker in the 2/2 condition but the no-*dou* speaker in the 2/5 condition) and the UR quadrant (preferring the *dou*-

[1] Here we used different exclusion criteria based on the frequency of 'other' responses. Participants who selected 'other' in half or more of the trials in either the 2/2 or 2/5 condition yielded insufficient data (at most two informative trials) to reliably assess their preference in the relevant condition. These participants were therefore excluded from the analysis. In contrast, for participants who selected 'other' accidentally, we removed the non-informative responses but retained their remaining data.

speaker in both conditions). Children exhibited a developmental trajectory: 4- and 5-year-olds had more scattered responses, while 6-year-olds predominantly clustered in the LL and UR quadrants, indicating consistent preferences across the 2/2 and 2/5 conditions. Some 7- and 8-year-olds began to shift into the LR quadrant, showing adult-like differentiation between the two conditions.

In sum, the Felicity Judgment Task shows that children appear to acquire the QUD-based constraint on *dou* late. While they demonstrated adult-like knowledge to *dou*'s plurality requirement, as evidenced by their performance in the 1/2 condition, their responses in the 2/2 and 2/5 conditions were not adult-like. Moreover, we observed a developmental trajectory: children's responses shifted from being highly variable to showing uniformed preferences for or against using *dou*. It was not until age 7 or 8 that some children began to distinguish the two conditions: consistently preferring the *dou*-response in the 2/2 condition and the no-*dou* response in the 2/5 condition. In the next section, we discuss how these findings can be explained in light of existing theoretical analyses of *dou*.

5. Discussion

5.1. On participants who know *dou* 's sensitivity to QUD

To lay the groundwork for our discussion, we first review the analysis proposed by Liu (2018, 2021, 2023), as it is, to our knowledge, the only analysis currently available that explicitly accounts for *dou*'s sensitivity to QUD. Liu proposes a uniform semantics for quantificational *dou* and scalar (even-)*dou*, as shown in (11). In prose, *dou* is truth-conditionally vacuous but presupposes that its prejacent is the strongest among the alternatives within the QUD. The notion of "strength" varies across different uses of *dou*: for scalar use it is defined in terms of likelihood ($<_{likely}$), whereas for quantificational use it is defined in terms of entailment ($\subset$).

(11) $[\![dou_C\ S]\!]$ is defined only if $\forall q \in C\ [[\![S]\!] \neq q \rightarrow [\![S]\!] < q]$
if defined, $[\![dou\ S]\!] = S$ (where $<$ is either $<_{likely}$ or $\subset$)
(Liu 2021, p. 294, ex.(35))

We illustrate how this analysis captures *dou*'s QUD-sensitivity using (5) as an example. Given that the use of *dou* in these examples is quantificational, "being the strongest" in (11) is evaluated in terms of entailment. In (5-a), the alternatives within the QUD include: Zhangsan smiled, Lisi smiled, Zhangsan and Lisi smiled. The prejacent of *dou* entails all the other alternatives within the QUD; therefore, the presupposition of *dou* is satisfied. To account for native speaker's preference of the *dou*-response over its *dou*-less counterpart, Liu further adopts Heim's (1991) *Maximize Presupposition!* (MP), a pragmatic principle requiring speakers to choose the presuppositionally strongest statement among a set of contextually equivalent alternatives (e.g., The sun came out vs. #a sun came out). Assuming that the *dou*-sentence and its *dou*-less counterpart are competitors, when the presupposition of *dou* is satisfied, as in (5-a), MP favors the *dou*-response. In

contrast, in (5-b), where additional individuals are included in the question, the alternatives within the QUD expands to include propositions including Wangwu smiled, Zhangsan and Wangwu smiled, Lisi and Wangwu smiled, Zhangsan, Lisi and Wangwu smiled. In this richer set, the prejacent of *dou* does not entail all the other alternatives. As a result, the presupposition of *dou* is not satisfied, rendering its use infelicitous.

This analysis aligns with the response pattern of most adult participants and with a subset of 7- and 8-year-olds in our experiment, specifically, those who consistently preferred the *dou*-speaker in the 2/2 condition but the no-*dou* speaker in the 2/5 condition.[2] We therefore adopt this semantics as a possible representation of the target state of acquisition.

5.2. On child participants who consistently preferred *dou*

Our experiment also showed that a number of child participants consistently selected the *dou*-speaker in both the 2/2 and 2/5 conditions (occupying the UR quadrant). What kind of mental representation of *dou* might they have that yields this response pattern?

One possibility is that these child participants analyze *dou* in a way that resembles traditional proposals (e.g., Jiang 1998; Lee 1986; Lin 1998; Pan 2006), namely, as a distributive universal quantifier. To account for their consistent preference for the *dou*-response over its *dou*-less counterpart, we additionally hypothesize that for these children, *dou* carries a plural presupposition, an assumption inspired by Xiang (2020).[3] To illustrate such an analysis, we present in (12) an adapted version of Lin's (1998) distributive-operator analysis of *dou*, augmented with a plural presupposition. In prose, the analysis states that *dou* presupposes that its associate is non-atomic and distributes the predicate over each atomic part of its associate.

(12) $[\![dou]\!] = \lambda P \lambda X\colon \exists x < X.\ \forall y\ [y < X \wedge \mathrm{ATOM}(y) \rightarrow P(y)]$, where $<$ indicates proper part relation (cf. Link 1983).

Because the plural presupposition is satisfied in both the 2/2 and 2/5 conditions in our experiment, an analysis of this kind, when combined with a MP-style pragmatic principle, predicts that the *dou*-response should be preferred over its *dou*-less counterpart. This prediction aligns with the behavior of child participants who consistently selected the *dou*-speaker in both conditions.

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[2] For possible explanations of why some adults consistently preferred the *dou*-speaker in both conditions, see Liu (2023).

[3] Note that Xiang (2020) does not propose a plural presupposition for *dou*. Instead, she proposes a non-vacuity presupposition requiring *dou*'s prejacent to have at least one sub-alternative. For the examples we focus on in this article, where quantificational *dou* associates with a definite plural NP and the predicate is inherently distributive, this requirement effectively behaves like a plural presupposition. We therefore adopt this simplification for expository purposes.

5.3. Accounting for children's developmental trajectory

To account for children's developmental shift, we propose that children start with an analysis of *dou* that yields truth-conditional effects of distributive universal quantification (as in traditional analyses; e.g., Jiang 1998; Lee 1986; Lin 1998; Pan 2006). Only later do they come to recognize that *dou* is QUD-sensitive and reanalyze the particle accordingly (perhaps along the line of Liu 2018, 2021, 2023). We emphasize that although we used the denotation in (12) to illustrate an analysis that treats *dou* as a distributive universal quantifier, other analyses that derive the same truth-conditional effect (specifically, denoting universal quantification and licensing free choice interpretations) could equally serve as the child's initial representation. Nor do we assume that the plurality requirement must be encoded as a presupposition in children's early grammar (to be discussed below). What is crucial is that the early analysis lacks QUD-sensitivity.

We now turn to the question of how children's initial analysis of *dou* can generate the diverse response patterns observed among younger participants. We consider several possibilities, depending on (i) whether children encode the plurality requirement as a presupposition in their semantic representation of *dou*, and (ii) whether they have acquired MP and the relevant competition between the *dou*-sentence and its *dou*-less counterpart.

First, some children may analyze *dou* as a distributive universal quantifier that carries a plural presupposition (as exemplified in (12)). If these children have already mastered MP and know that the *dou*-sentence competes with its *dou*-less counterpart, they are predicted to consistently choose the *dou*-speaker in both the 2/2 and 2/5 conditions, hence appearing in the UR quadrant.

Second, consider children who assume that *dou* carries a plural presupposition but have not yet mastered MP (Yatsushiro, 2008)[4] or do not yet know that the *dou*-sentence competes with its *dou*-less counterpart. In this scenario, several response patterns may arise: children may make random choices, producing inconsistent responses; they may rely on simple heuristics that lead them to consistently prefer or disprefer *dou* (appearing in the UR or LL quadrant); or they may avoid committing to either option, choose both speakers or give no answer (producing 'other' responses).

Finally, children may treat *dou* as a distributive universal quantifier without a plural presupposition. Since the *dou* and no-*dou* responses are truth-conditionally equivalent, they may guess and provide inconsistent answers, or produce 'other' responses. Alternatively, because the predicates used in our experiment stimuli were all inherently distributive, these children may consistently choose the no-*dou* speaker (occupying the LL quadrant), because they perceived no need for *dou*.

[4] Acquisition work on children's knowledge of MP shows mixed results across presupposition triggers: some studies point to early mastery, others to late acquisition. See Aravind (2018); Legendre et al. (2011); Torma et al. (2021); Wexler (2003); Yatsushiro (2008) for more details.

Taken together, these possibilities show that our proposal about children's initial analysis of *dou* is capable of generating the full range of response patterns observed in younger children.

6. Conclusion

In this study, we used a Felicity Judgment task to investigate children's knowledge of the felicity conditions governing the appearance or absence of quantificational *dou*, focusing in particular on its QUD-based felicity condition. Our results show that although preschool-aged children already know that *dou* requires a non-atomic associate, it takes considerably longer for them to acquire the discourse-related constraint that its use is regulated by the QUD. We proposed that children may begin with an analysis of *dou* that yields the truth-conditional effects of distributive universal quantification and only later come to recognize that the particle is QUD-sensitive, prompting a reanalysis in which this QUD-sensitivity is incorporated into its meaning. We hope that the present study provides new insights into the theoretical analysis of this much debated particle in Mandarin Chinese.

References

An, Shanshan, Zhou, Peng, & Crain, Stephen. (2020). The interpretation of disjunction in the scope of *dou* in child Mandarin. *Frontiers in Psychology, 11*, Article 609492.

Aravind, Athulya. (2018). *Presupposition in context* (Unpublished doctoral dissertation). Massachusetts Institute of Technology.

Bolker, Benjamin M., Brooks, Mollie E., Clark, Connie J., Geange, Shane W., Poulsen, John R., Stevens, M. Henry H., & White, Jada-Simone S. (2009). Generalized linear mixed models: A practical guide for ecology and evolution. *Trends in Ecology & Evolution, 24*(3), 127–135.

Deng, Xiangjun, & Zhang, Hanchi. (2025). *The acquisition of dou by Mandarin-speaking monolingual children and Mandarin-English bilingual children.* Talk presented at the 31st International Association of Chinese Linguistis (IACL-31).

Elff, Martin. (2022). *mclogit: Multinomial logit models, with or without random effects or overdispersion.* Retrieved from https://CRAN.R-project.org/package=mclogit

Erbaugh, Mary. (1982). *Coming to order: Natural selection and the origin of syntax in the Mandarin-speaking child* (Doctoral dissertation). University of California, Berkeley.

Feng, Yuli, & Pan, Haihua. (2023). Chinese *dou* quantification. *Oxford research encyclopedia of linguistics.* Oxford University Press.

Heim, Irene. (1991). Artikel und definitheit. *Semantik: Ein internationales Handbuch der zeitgenssischen Forschung* (pp. 487–535). Berlin: de Gruyter.

Hsieh, Miao-Ling. (2008). Acquiring scope: A longitudinal study. *Taiwan Journal of Linguistics*, *6* (1), 55–95.

Jiang, Yan. (1998). Yuyong tuili yu dou de jufa/yuyong tezheng [pragmatic reasoning and syntactic/semantic characterization of *dou*]. *Xiandai Waiyu [Modern Foreign Languages]*, 24–39,

Kong, Lingda, Hu, Deming, Ouyang, Junlin, Chen, Changhui, Ding, Lingyun, Wang, Xiangrong, Zhu, Wanxi, Fu, Manyi, & Yao, Wenbing. (2004). *Hanzu ertong shici xide yanjiu [research on the acquisition of content words by han children]*. Hefei, China: Anhui daxue chubanshe [Anhui University Press].

Lee, Thomas Hun-tak. (1986). *Studies on Quantification in Chinese* (Unpublished doctoral dissertation). UCLA.

Lee, Thomas Hun-tak. (2012). Quantificational structures in three-year-old Chinese-speaking children. D. Xu (Ed.), *Plurality and classifiers across languages of China* (pp. 243–282). Berlin, Germany: Mouton de Gruyter.

Legendre, Géraldine, Barrière, Isabelle, Goyet, Louise, & Nazzi, Thierry. (2011). On the acquisition of implicated presuppositions: Evidence from French personal pronouns. M. Pirvulescu, M.C. Cuervo, A.T. Pérez-Leroux, J. Steele, & N. Strik (Eds.), *Selected Proceedings of the 4th Conference on Generative Approaches to Language Acquisition North America (GALANA 2010)* (pp. 150–162). Somerville: Cascadilla Proceedings Project.

Lin, Jo-Wang. (1998). Distributivity in Chinese and its implications. *Natural Language Semantics*, *6*, 201–243, https://doi.org/10.1023/a:1008299031574

Link, Godehard. (1983). The logical analysis of plurals and mass terms: A lattice-theoretic approach. *Meaning, Use, and Interpretation of Language* (pp. 302–323). Berlin: de Gruyter.

Liu, Mingming. (2018). *Varieties of alternatives: Focus particles and wh-expressions in Mandarin* (Vol. 2). Singapore: Springer Singapore.

Liu, Mingming. (2021). A pragmatic explanation of the *mei-dou* co-occurrence in Mandarin. *Journal of East Asian Linguistics*, *30* (3), 277–316.

Liu, Mingming. (2023). Cong *dou* de yujing shiyong tiaojian kan shenme shi zongkuo [on the felicity conditions of *dou*: What does universality really mean?]. *Dangdai Yuyanxue [Contemporary Linguistics]*, *25* (1), 29–55.

Pan, Haihua. (2006). Jiaodian, sanfen jiegou yu hanyu dou de yuyi jieshi [focus, tripartite and the interpretation of *dou*]. *Yufa Yanjiu Yu Tansuo [Grammatical Study and Research]* (Vol. 13, pp. 163–184). The Commercial Press.

R Core Team (2021). *R: A language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/.

Torma, Cindy, Brody, Gabor, & Aravind, Athulya. (2021). More than the sum of its parts: Acquiring semantically complex quantifiers. *Proceedings of the Annual Meeting of the Cognitive Science Society* (Vol. 43, pp. 2135–2141).

Wexler, Kenneth. (2003). *Maximal trouble.* (Paper presented at the CUNY Human Sentence Processing Conference)

Xiang, Yimei. (2020). Function alternations of the Mandarin particle *dou*: Distributor, free choice licensor, and 'even'. *Journal of Semantics*, *37* (2), 171–217.

Yang, Yu'an, Goodhue, Daniel, Hacquard, Valentine, & Lidz, Jeffrey. (2022). Do children know wh anything? 3-year-olds know the ambiguity of wh-phrases in Mandarin. *Language Acquisition*, *29* (3), 296–326.

Yatsushiro, Kazuko. (2008). Quantifier acquisition: Presuppositions of "every". *Proceedings of Sinn und Bedeutung* (Vol. 12, pp. 663–677).

Zhang, Yunqiu, Zhou, Jianshe, & Fu, Jing. (2010). Zaoqi hanyu ertong duoyici de xide celüe—yige beijinghua ertong de ge'an yanjiu [early mandarin-speaking children's strategies for acquiring polysemous words: A case study of a Beijing child]. *Zhongguo Yuwen [Chinese Language]* (1), 34–43.

Zhou, Peng. (2015). Children's knowledge of wh-quantification in Mandarin Chinese. *Applied Psycholinguistics*, *36* (2), 411–435.

Zhou, Peng, & Crain, Stephen. (2011). Children's knowledge of the quantifier *dou* in Mandarin Chinese. *Journal of Psycholinguistic Research*, *40* (3), 155–176.

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