A pragmatic explanation of the *mei-dou* co-occurrence in Mandarin

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Abstract

Mandarin universal terms such as *mei*-NPs in preverbal positions usually require the presence of *dou* ‘all/even’. This motivates the widely accepted idea from Lin (Nat Lang Semant 6:201–243, 1998) that Mandarin does not have genuine distributive universal quantifiers, and *mei*-NPs are disguised plural definites, which thus need *dou*—a distributive operator (or an adverbial universal quantifier in Lee (Studies on Quantification in Chinese. Ph. D. thesis, UCLA), Pan (in: Yufa Yanjiu Yu Tansuo [Grammatical Study and Research], vol 13, pp 163–184. The Commercial Press)—to form a universal statement. This paper defends the opposite view that *mei*-NPs are true universal quantifiers while *dou* is not. *Dou* is truth-conditionally vacuous but carries a presupposition that its prejacent is the strongest among its alternatives (Liu in Linguist Philos 40(1):61–95, 2017b). The extra presupposition triggers Maximize Presupposition (Heim in: Semantik: Ein internationales Handbuch der zeitgenössischen Forschung, pp 487–535. de Gruyter, Berlin, 1991), which requires [*dou* *S*] block [*S*] whenever *dou*’s presupposition is satisfied. This explains the *mei-dou* co-occurrence, if *mei*-NPs are universal quantifiers normally triggering individual alternatives (thus stronger than all the other alternatives). The proposal predicts a more nuanced distribution of obligatory-*dou*, not limited to universals and sensitive to discourse contexts.

Keywords Universal quantifiers · *Dou* · Alternatives · Maximize presupposition

1 The puzzle and Lin’s compositional solution

Mandarin universal terms such as *mei/suoyou*-NPs in preverbal positions usually have to co-occur with the famous multi-functional adverb *dou*, often glossed as ‘all’ in this environment. This is puzzling. If *mei/suoyou*-NPs are universal quantifiers like English *every/all*-NPs, it is unclear why an additional *all* is needed (or even possible),

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as shown by the impossibility of combining *every/all*-NP with another *all* in (1b) and the contrast between (1a) and (1b)¹

- (1) a. {Mei-ge/Suoyou} san-nianji xuesheng *(dou) lai-le. (Obligatory-*dou*)
           every/all   third-grade student   DOU   come-ASP
           ‘{Every/all} third-grade student(s) came.’
       b. {Every/all} third-grade student(s) (*all) came. (No additional *all*)

A well-known solution proposed in Lin (1998) and recently advocated by Zhang and Pan (2019) denies the status of *mei/suoyou*-NPs as genuine universal quantifiers (of type $\langle e, t \rangle$), and takes them to be referential (of type e), synonymous with plural definites. Concretely, *mei-ge san-nianji xuesheng*, according to Lin, denotes (by referring to) $\oplus$ THIRD.GRADE.STUDENT—the maximal mereological sum of all entities in the THIRD.GRADE.STUDENT set, as in the classical analysis of plural definite description (Sharvy 1980; Link 1983), and *mei* is a (generalized) sum operator^{2,3}. To illustrate, in context c_1 , where there are exactly three third-grade students Zhangsan, Lisi and Wangwu, and the speaker is pointing at them, *mei-ge san-nianji xuesheng* and the plural definite *zhexie san-nianji xuesheng* ‘these third-year students’ receive, according to this view the same denotation, both referring to the sum $ZS \oplus LS \oplus WW$. This equivalence between *mei*-NPs and plural definites is explicitly stated in Lin (1998: 241) “summarizing, I have proposed to account for the cooccurrence between *dou* and universal NPs with *mei* by treating the latter as denoting the same kind of entity as NPs of the form *the N*”.

- (2) a. $\llbracket \text{mei-ge san-nianji xuesheng} \rrbracket = \oplus \text{THIRD.GRADE.STUDENT}$
       b. $\llbracket \text{mei} \rrbracket = \oplus$
       c. $\llbracket \text{mei-ge san-nianji xuesheng} \rrbracket^{c_1} = \llbracket \text{zhexie san-nianji xuesheng} \rrbracket^{c_1} = ZS \oplus LS \oplus WW$

¹ Two notes on *mei*-NPs. First, a classifier such as the *ge* in (1a) is required between *mei* and the NP. This paper discusses the meaning of *mei*-NP as a whole and ignores its internal composition and the role of the classifier. Correspondingly, *mei ge xuesheng* ‘every CL student’ is presented and glossed as *mei-ge xuesheng* ‘every student’, following Lin (1998). Second, numerals can appear between *mei* and the classifier. If the numeral is *yi* ‘one’, it is optional: *mei-yi-ge san-nianji xuesheng* can be substituted for *mei-ge san-nianji xuesheng* in (1a) with no discernible semantic effect. With numerals other than *yi*, a reviewer notes that the resulting *mei*-NPs might have restricted distribution (often used as non-arguments) and seem immune to the *mei-dou* requirement—in (i), *dou* is optional and using another focus particle *jiu* is also fine. This paper focuses on *mei*-NPs with *yi* ‘one’ and leaves to another occasion extending the proposed account to cases like (i). See also Solt (2009: 263–266) on *every-n*.

(i) Tamen mei-liang-ge-yue {dou/jiu/Ø} qu yi-ci Niuyue.
       They every-two-CL-month DOU/JIU/Ø go one-CL New.York
       ‘They go to New York once every two months.’

² The entry of *mei* in (2b) looks different from the one in Lin (1998), since Lin uses *sets* to model plural individuals while this paper following more recent literature uses *sums*.

(i) $\llbracket \text{mei} \rrbracket =$ the function f such that for all $P \in D_{\langle e, t \rangle}$, $f(P) = \cup P$ (Lin 1998: (68))

³ The current paper focuses on *mei* ‘every’. A detailed discussion of other universal determiners such as *suoyou* (similar to English *all*) and a comparison between them is left to another occasion.

Next, Lin takes *dou* to be a distributive operator (3), similar to English *each*, citing (4) as evidence where *dou* forces a distributive reading.

- (3) $\llbracket \text{dou}_{\text{Lin}} \rrbracket = \lambda P \lambda x \forall y [y \leq_{\text{ATOM}} x \rightarrow P(y)]$ (cf. Link's (1987) D operator)
- (4) Zhangsan he Lisi dou hua-le liang-fu hua. (*dou* forces dist-reading)
 Zhangsan and Lisi dou draw-ASP two-CL pictures
 'Zhangsan and Lisi each drew two pictures.'

When combined with a *mei*-NP, *dou* quantifies over the atomic parts of the maximal sum referred to by the *mei*-NP, and together they deliver (5) as the meaning of (1a), capturing its equivalence in meaning with the English universal statement *every third-grade student came*.

- (5) $\forall y [y \leq_{\text{ATOM}} \oplus \text{THIRD.GRADE.STUDENT} \rightarrow \text{CAME}(y)]$ (Meaning of (1a))
 $\equiv \forall y [\text{THIRD.GRADE.STUDENT}(y) \rightarrow \text{CAME}(y)]$

Since *mei*-NP's are not quantificational, they need the aid of *dou*—a quantificational element—to express a quantificational meaning, and hence the co-occurrence is expected. Lin's analysis is compositional, in the sense that universal quantification is decomposed into maximization over NP and distributivity over VP. However, since maximization and distributivity are two independent operations, assigning *mei*-NPs a plural definite semantics (maximization) does not really explain why *dou* (distributivity) is needed: there is nothing in the semantics that prevents $\oplus \text{THIRD.GRADE.STUDENT}$ (of type *e*) from combining with $\lambda x. \text{CAME}(x)$ (an *et* predicate). Lin is aware of the problem and offers a syntactic solution. Following Beghelli and Stowell (1997), he proposes that *dou* is the head of a Distributive Phrase (DistP), and universal DPs such as *mei*-NPs carry a Q feature and *must* move to Spec of DistP to check it. The syntactic requirement explains the *mei-dou* co-occurrence (see Lin 2020b for refinements).

This paper (focusing on *mei*-NPs) discusses two types of problems for this line of analysis. First, there is ample evidence that *mei*-NPs are genuine distributive universal quantifiers (see also Liu 2017b) and cannot be reduced to plural definites. Second, explaining the *mei-dou* co-occurrence as a syntactic-semantic requirement of *mei* is both too strong and too weak. It is too strong since many occurrences of *mei*-NPs in preverbal positions do not need (or even cannot have) *dou* (Huang 1996; Chen and Liu 2019; Liu 2019a), suggesting that the co-occurrence might not be the result of a strict grammatical requirement. It is also too weak because the phenomenon of obligatory-*dou* goes beyond *mei*-NPs: in suitable contexts, a conjunction of proper names also requires *dou*. Crucially, this illustrates that obligatory-*dou* is sensitive to discourse contexts, a fact overlooked in the previous literature.

A pragmatic explanation is offered. *Mei*-NPs are true universal quantifiers while *dou* is not. *Dou* is truth-conditionally vacuous but carries a presupposition that its prejacent is the strongest (in terms of likelihood or entailment) among its alternatives (Liu 2017b). The presupposition triggers *Maximize Presupposition* (MP, Heim 1991), which requires that [*dou* S] block its counterpart [S] without *dou* whenever *dou*'s presupposition is satisfied. This explains the obligatory presence of *dou* with *mei* in ordinary contexts, if we assume that *mei*-NPs are universal quantifiers triggering

individual alternatives (cf. Zeijlstra 2017): since these alternatives are all weaker than the universal prejacent, *dou*'s presupposition is satisfied and the blocking of *mei-dou* over *mei* enforced by MP. Importantly, since the blocking effect does not rely on particular properties of *mei*, the proposal predicts that obligatory-*dou* is not restricted to universals. Finally, since what count as alternatives may be subject to contextual manipulation, there might be cases where the individual alternatives triggered by a *mei*-NP are irrelevant and thus missing for the evaluation of *dou*, and *dou* is expected to be absent. Overall, the proposal predicts a more nuanced distribution of obligatory-*dou*, not restricted to universal DPs and sensitive to discourse contexts.

The rest of the paper is structured as follows. Section 2 offers evidence that *mei*-NPs are not plural definites but similar to standard universal quantifiers like English *every*-NPs. This suggests that *dou* might not be an entity-level quantificational element. Section 3 presents the non-quantificational (over entities) analysis of *dou* in Liu (2017b), and highlights *dou*'s presuppositional contribution. Section 4 introduces Maximize Presupposition and demonstrates how it can be used to explain among a large array of *obligatory presupposition* effects the co-occurrence of *mei*-NPs with *dou*. It then shows how the explanation leads to the prediction that obligatory-*dou* is not limited to *mei*-NPs and sensitive to discourse contexts. Finally, Sect. 5 discusses some remaining issues.

2 *Mei*-NPs are quantificational

This section compares *mei*-NPs and plural definites, in view of the proposed equivalence between the two under Lin's (1998) analysis. It shows, however, that regardless of whether *dou* is present (e.g. no *dou* for post-verbal *mei*-NPs), the two are significantly different.

2.1 *Mei*-NPs without *dou* in post-verbal positions

Post-verbal *mei*-NPs do not occur with *dou*⁴, presumably for the syntactic reason that *dou* is a VP-external adverb that associates only to its left (see Sect. 5 for relevant discussion). We can use this feature to test whether *mei*-NPs indeed have a plural-definites semantics as Lin (1998) proposes, by comparing *mei*-NPs and real plural

⁴ Lin (1998) seems to take sentences with post-verbal *mei*-NPs as degraded, indicated by the “??” he assigns to sentences like (ia) (see Cheng 2009 for similar judgement). Thus post-verbal *mei*-NPs for Lin are required to move out of the VP with *dou* inserted, as in (ib). Indeed, my consultants agree that (ia)—while not entirely ungrammatical (Lee 1986: 105)—is less natural than (ib). However, if the *mei*-NP is modified or simply prosodically heavy as in (ic), it becomes perfect in post-verbal positions. In this paper, all the post-verbal *mei*-NP such as *mei-yi-ge san-nianji xuesheng* ‘every third-grade student’, are modified or prosodically heavy.

- (i) a. ??Wo kan-le mei-yi-ben shu. (Lin 1998:(29a))
       I read-ASP every-one-CL book
       ‘I read every book’
       b. Wo mei-yi-ben shu dou kan-le. (Lin 1998:(29b))
       I every-one-CL book DOU read-ASP
       ‘I read every book’

definites (such as demonstrative phrases and plural pronouns in Mandarin) in this environment. Since *dou* is absent in both cases, if the two show divergences, they must be attributed to an inherent difference between the two, and may well suggest that *mei*-NPs cannot be reduced to plural definites.

2.1.1 Non-homogeneous and maximal

Consider (6a) first. Its most salient reading (and the only reading for most speakers) is $\neg > \forall$, and this shows that, under negation, a *mei*-NP without *dou* still retains its universal quantificational force. By contrast, plural definites such as the demonstrative phrase in (6b) are interpreted existentially under negation, due to a well-known property of plural definites—*homogeneity*⁵ (Löbner 2000, a.o.). In other words, (6a) is true as long as there was a third-grade student to whom the speaker did not tell the news, while (6b) can only be true when the speaker told the news to *none* ($\approx$ *not any*, *any* being existential) of the third-grade students.

- (6) a. Wo meiyou ba zhe-jian-shi gaosu mei-yi-ge san-nianji xuesheng.
 I not BA this-thing tell every third-grade student
 ‘I didn’t tell this to every third-grade student.’ $\neg > \forall$
- b. Wo meiyou ba zhe-jian-shi gaosu zhe-xie san-nianji xuesheng.
 I not BA this-thing tell these third-grade student
 ‘I didn’t tell this to these third-grade students.’
 $\approx$ I didn’t tell this to any of these third-grade students. $\neg > \exists$

The contrast clearly shows that *mei*-NPs are not plural definites. The fact that they lack homogeneity under negation and still retain their universal force even without *dou* suggests that they are universal quantifiers by themselves.

This contrast between *every*-NPs and plural definites is fully general. (7) exhibits distinct behaviors of the two under *nobody*. In a scenario where everyone will invite some but not all third-grade students, (7a) is true while (7b) is false.

Footnote 4 continued

- c. Wo kan-le [_{MODIFIER} Jin-Yong xie de] mei-yi-ben shu.
 I read-ASP Jin-Yong write DE every-one-CL book
 ‘I read every book Jin Yong wrote.’

⁵ *Homogeneity* refers precisely to this property of plural definites: they give rise to (quasi)-universal force in affirmative sentences but receive existential interpretation in the scope of negation, as the contrast between (ia) and (ib) shows. Crucially, the reading of (ib) is not the result of a wide scope plural definite interpreted as $\forall$ over $\neg$, since the same reading obtains in (ic) when the plural definite contains a bound variable and thus cannot take wide scope. See Križ and Spector (2020); Bar-Lev (2020) for recent proposals.

- (i) a. Mary read the books on the reading list. $\approx$ Mary read all of the books on the reading list.
 b. Mary didn’t read the books on the reading list. $\approx$ Mary didn’t read any of the books on the reading list.
 c. No boy found his presents. $\approx$ No boy found any of his presents.

- (7) a. Meiyou-ren hui qing mei-yi-ge san-nianji xuesheng.
no-body will invite every third-grade student
'Nobody will invite every third-grade student.' NOBODY > $\forall$
- b. Meiyou-ren hui qing zhe-xie san-nianji xuesheng.
no-body will invite these third-grade student
'Nobody will invite these third-grade students.'
 $\approx$ Nobody will invite any of these third-grade students. NOBODY > $\exists$

(8) shows the same contrast: (8a) is interpreted as *only* scoping over universal while (8b) is interpreted as *only* scoping over existential. (8a) is true iff Lisi invited every third-grade student but others did not invite them all, while (8b) requires Lisi to invite some of the third-grade students while others didn't invite any.

- (8) a. Zhiyou Lisi qing-le mei-yi-ge san-nianji xuesheng.
only Lisi invite-ASP every third-grade student
'Only Lisi invited every third-grade student.' ONLY > $\forall$
- b. Zhiyou Lisi qing-le zhe-xie san-nianji xuesheng.
only Lisi invite-ASP these third-grade student
'Only Lisi invited these third-grade student.'
 $\approx$ Only Lisi invited any of these third-grade students. ONLY > $\exists$

It is interesting to note in this connection that *suoyou*-NPs behave like *mei*-NPs: they do not exhibit homogeneity and retain their universal force in negative environments without *dou* as in (9a), unlike their demonstrative phrase and plural pronoun counterparts in (8b) and (9b). This suggests that *suoyou*-NPs cannot be treated as plural definites either.

- (9) a. Zhiyou Lisi qing-le suoyou san-nianji xuesheng.
only Lisi invite-ASP all third-grade student
'Only Lisi invited all third-grade students.' ONLY > $\forall$
- b. Zhiyou Lisi qing-le tamen.
only Lisi invite-ASP them
'Only Lisi invited them.'
 $\approx$ Only Lisi invited any of them. ONLY > $\exists$

Next, non-maximality is another property of predication with plural definites (Malamud 2012, a.o.). In a scenario where the speaker is pointing at all the contextually salient third-grade students and using *zhe-xie san-nianjie xuesheng* 'these third-grade students' to refer to them, (10b) can still be true if some of the third-grade students being referred to were not invited by Lisi. That is, predication with plural definites allows for exceptions. This is impossible for the *mei/suoyou*-NP in (10a). For (10a) to be true, Lisi had to invite every third-grade student in the context, without exceptions.

- (10) a. Lisi qing-le {mei-yi-ge/ suoyou} san-nianji xuesheng.
 Lisi invite-ASP every/ all third-grade student
 ‘Lisi invited {every/all} third-grade student(s).’ (Maximal only)
- b. Lisi qing-le zhe-xie san-nianji xuesheng.
 Lisi invite-ASP these third-grade student
 ‘Lisi invited these third-grade students.’ (Non-maximal allowed)

A reviewer reports that s/he and other two speakers find the non-maximal reading of (10b) unavailable. Note however that non-maximal readings are context-dependent (Krifka 1996; Malamud 2012) and one might need to look for suitable contexts to make them salient. Imagine a context where these third-grade students have tested positive for Covid-19, and the health department wants to find out who has been in contact with them. Lisi just heard the news and exclaims: “Damn! *wo zuotian qing-le zhe-xie san-nianji xuesheng*” ‘Yesterday I invited these third-grade students’. Lisi’s utterance is felicitous and true, even though he actually only invited 5 out of the 8 third-grade students. On the other hand, Lisi cannot use *mei-yi-ge/suoyou san-nianji xuesheng* in this case, illustrating again that they are always maximal, regardless of contexts. The contrast can also be demonstrated by considering the announcement made by the health department in this scenario: *if you have contacted zhexie third-grade students, you need to report to us* vs. *if you have contacted mei-yi-ge/suoyou third-grade students,....* Only the former is an appropriate announcement. See (Xiang 2008: Sect. 4.1) for relevant discussion of non-maximal readings of Mandarin plural definites without *dou*.

To summarize, a comparison between *mei*-NPs and plural definites in post-verbal positions, where *dou* is absent, suggests the two are very different. A *mei*-NP does not exhibit homogeneity and non-maximality, two well-known properties of plural definites across languages, and it always retains its maximal universal force, in both positive and negative contexts, just like its English counterpart *every*-NP.

2.1.2 Quantifier-sensitive expressions

There are quantifier-sensitive expressions that require the presence of a quantificational element in their host sentence, for instance exceptives *but/except* (von Stechow 1993) and approximatives *almost* (Penka 2006), both of which have been used as tests for the quantificational force of a DP (Carlson 1981; Kadmon and Landman 1993). In (11), we see a standard universal quantifier is compatible with *but/almost*, but a plural definite is not, illustrating the ability of a Q-sensitive expression to distinguish the two.

- (11) a. I invited {every boy/#the boys} but John.
 b. I invited almost {every boy/#the boys}.

Returning to Mandarin, (12a) shows post-verbal *mei*-NPs without *dou* are compatible with exceptives *chule* ‘except’ and (12b) shows they are fine with approximatives *jihu* ‘almost’. The two nevertheless reject plural definites, as (13) exhibits. An obvious explanation in view of (11) is that *chule* and *jihu* need the presence of a universal quantifier in the sentence, and *mei*-NPs – even in the absence of *dou* – contribute such a universal quantifier.

- (12) a. Chule Lisi, wo qing-le mei-ge san-nianji xuesheng.
 Except Lisi, I invite-ASP every third-grade student
 ‘I invited every third-grade student but Lisi.’
- b. Lisi jihu qing-le mei-ge san-nianji xuesheng.
 Lisi almost invite-ASP every third-grade student
 ‘Lisi invited almost every third-grade student.’
- (13) a. #Chule Lisi, wo qing-le zhe-xie san-nianji xuesheng.
 Except Lisi, I invite-ASP these third-grade student
 ‘#I invited these third-grade students but Lisi.’
- b. #Lisi jihu qing-le zhe-xie san-nianji xuesheng.
 Lisi almost invite-ASP these third-grade student
 ‘#Lisi invited almost these third-grade students.’

Similar to *mei*-NPs, *suoyou*-NPs without *dou* are also compatible with the two Q-sensitive expressions as in (14), suggesting they too are quantificational by themselves.

- (14) a. Chule Lisi, wo qing-le suoyou san-nianji xuesheng.
 Except Lisi, I invite-ASP all third-grade student
 ‘I invited all the third-grade students but Lisi.’
- b. Lisi jihu qing-le suoyou san-nianji xuesheng.
 Lisi almost invite-ASP all third-grade student
 ‘Lisi invited almost all the third-grade students.’

A reviewer points out that Q-sensitive expressions are fine with plural definites if *dou* is added, as in (15). This does not affect the conclusion based on (12)–(13) that *mei*-NPs are quantificational *on their own* and thus can license Q-sensitive expression in the absence of *dou*. (15), on the other hand, suggests that *dou* in combination with a plural definite contributes a quantificational element. This in fact supports the analysis of *dou* to be presented in Sect. 3: although *dou* is not an entity-level quantifier, its presence with a plural definite necessitates a covert distributivity operator (essentially a universal quantifier) at LF, and thus Q-sensitive expressions can be licensed.

- (15) a. Chule Lisi, zhe-xie san-nianji xuesheng wo dou qing-le.
 Except Lisi, these third-grade student I DOU invite-ASP
 ‘I invited all these third-grade students but Lisi.’
 b. Zhe-xie san-nianji xuesheng Lisi jihu dou qing-le.
 these third-grade student Lisi almost DOU invite-ASP
 ‘Lisi invited almost all these third-grade students.’

The position of *jihu* ‘almost’ adds support to the above view. In the case of definite-*dou*, *jihu* needs to appear *after* the definite and immediately before *dou*, as in (15b). Putting it before the definite in (16a) is not allowed (Li 2014: (12a)). By contrast, for *mei-dou*, speakers strongly prefer to put *jihu* immediately *before* the *mei*-NP as in (16b). The contrast supports the view that *mei*-NPs, differing from plural definites, are true universals: assuming that *jihu* needs to precede the universal it modifies, we predict its appearance before *mei*-NP, for the latter is the true universal quantifier⁶. As for definite-*dou*, if we take the position of *jihu* as indicating the position of the underlying semantic $\forall$, the contrast between (15b) and (16a) is expected under the account hinted at above, where the source of $\forall$ comes from a covert distributivity operator adjacent to *dou* (to be discussed in detail in Sect. 3).

- (16) a. *Jihu zhe-xie san-nianji xuesheng Lisi dou qing-le.
 almost these third-grade student Lisi DOU invite-ASP
 Intended: ‘Lisi invited almost all these third-grade students.’
 b. Jihu mei-ge san-nianji xuesheng Lisi dou qing-le.
 almost every third-grade student Lisi DOU invite-ASP
 ‘Lisi invited almost every third-grade student.’
 c. ??Mei-ge san-nianji xuesheng Lisi jihu dou qing-le.
 every third-grade student Lisi almost DOU invite-ASP
 Intended: ‘Lisi invited almost every third-grade student.’

2.2 *Mei*-NPs with *dou*

As the discussion of *mei*-NPs without *dou* in the previous subsection has shown, *mei*-NPs are significantly different from plural definites, unexpected under the line of analysis following Lin (1998) that treats the two on a par. This subsection turns to *mei*-NPs with *dou*, which as we will see again, exhibit properties distinct from their plural definite counterparts.

⁶ Some consultants, while agreeing that (16b) is better than (16c), still accept (16c). This can be explained by assuming the *mei*-NP in (16c) moves from somewhere adjacent to *dou* to its surface position, and that *jihu* modifies the *mei*-NP before it moves and thus is left behind. See the discussion on the scope of *mei* below.

2.2.1 Partitives

Since a plural definite is referential and denotes the maximal plural individual that satisfies the NP denotation, we can use a partitive construction to predicate over only a sub-part of its referent. (17) shows that an English plural definite is compatible with partitives, while an *every*-NP is not (see the *Partitive Constraint* in Jackendoff 1977). Without going into a detailed discussion of partitives (see Ladusaw 1982 for a proposal, among others), the point to note is that an *every*-NP, being a universal quantifier, is unable to provide the plural individual that is needed for a partitive construction.

- (17) a. Many of the boxes were stolen.
 b. *Many of every box were stolen.

Turning now to Mandarin, (18a-b) show that plural definites, even co-occurring with *dou*, are still compatible with partitives⁷, while *mei*-NPs never are. The contrast confirms that plural definites but not *mei*-NPs are referential sum-denoting expressions, suggesting the latter are in fact quantificational elements.

- (18) a. {Zhexie-xuesheng/Tamen} {henduo/daduo} dou xihuan Jin Yong.
 {these-students/they} {most/many} DOU like Jin Yong
 ‘Most/Many of these students/them like Jin Yong.’
 b. *Mei-ge xuesheng {henduo/daduo} dou xihuan Jin Yong.
 every student {most/many} DOU like Jin Yong
 ‘*Most/many of these students like Jin Yong.’

- (19) *Suoyou xuesheng {henduo/daduo} dou xihuan Jin Yong.
 every students {most/many} DOU like Jin Yong
 ‘*Most/many of all the students like Jin Yong.’

It is worth noting that *suoyou*-NPs also resist partitives as in (19). The contrast between (19) and (18a) and the parallel between (19) and (18b) indicates *suoyou*-NPs are also quantificational.

2.2.2 Scope

Now we turn to the scope facts discussed in Liu (2017b). Liu reports that in the case of *mei*-NPs, it is the surface position of the *mei*-NP—rather than *dou*—that determines

⁷ While *henduo* and *daduo* are treated as quantificational adverbs in Liu (2017b), they are taken to be part of a partitive construction here, roughly [NP *tamen* (zhong) *henduo*] ‘many among them’. Let me offer two pieces of evidence for the current view. First, *henduo/daduo* behave more or less like English Q-adjective *many*. In particular, they combine with nouns to form noun phrases (e.g. *henduo/daduo xuesheng* ‘many students’), and thus do not seem adverbial. Second, unlike real quantificational adverbs such as *tongchang* ‘usually’, *henduo/daduo* cannot bind singular indefinites: *a quadratic equation tongchang/*henduo/*daduo has 2 solutions*. A detailed syntax and semantics of *henduo/daduo* has to be left to another occasion (see Jin 2018 on Mandarin partitive constructions). But regardless of how these expressions are analyzed, the contrast between (18a) and (18b) clearly demonstrates that *mei*-NPs are distinct from plural definites, even with *dou* present for both.

the scope of the underlying semantic $\forall$, and concludes that it must be the *mei*-NP that contributes the $\forall$. The relevant facts are in (20). (20a) shows that in the case of *mei*-NPs with negation, to obtain a negation scoping over universal construe ($\neg > \forall$), the negation needs to appear *before* the *mei*-NP, not just before *dou* as in (20b) (Huang 1995; Li 1997: 154; Shyu 2004: (21))⁸.

- (20) a. Bu-shi *mei-ge* *xuesheng* *dou* *xihuan* *Jin Yong*.
           not-be every student DOU like Jin Yong
           ‘Not every student likes Jin Yong.’
       b. *Mei-ge *xuesheng* bu(-shi) *dou* *xihuan* *Jin Yong*.
           every student not(-be) DOU like Jin Yong
           Intended: ‘Not every student likes Jin Yong.’

Conversely, for plural definites with *dou*, a wide scope negation can be put either before or after the definite (but before *dou*), as in (21)⁹.

- (21) a. ?Bu-shi {*zhe-xie xuesheng* /*tamen*} *dou* *xihuan* *Jin Yong*.
           not-be {these student /they} DOU like Jin Yong
           ‘It is not the case that these students/they all like Jin Yong.’
       b. {*Zhe-xie xuesheng* /*tamen*} bu(-shi) *dou* *xihuan* *Jin Yong*.
           {these student /they} not(-be) DOU like Jin Yong
           ‘These students/they don’t all like Jin Yong.’

The contrast between (20) and (21) can be better understood if the standard distinction between referential and quantificational terms is maintained in Mandarin, with plural definites being non-quantificational while *mei*-NPs are scope-taking universals. Since Mandarin is a highly scope-isomorphic language (Huang 1982), it is the surface position of the *mei*-NP that determines its semantic scope, and thus to obtain a $\neg > \forall$ construe, the negation needs to appear above the *mei*-NP.

Concretely, I assume with Li (1997); Lin (1998); Wu (1999); Constant and Gu (2010) and many others that *dou* heads a functional projection, requiring its associate to move from below *dou* to its specifier position, and further dislocation between *dou* and its associate can be achieved via topicalization of the latter (Lin 1998: 218; Constant and Gu 2010: fn. 2). Next, I assume that a topicalized associate needs to reconstruct

⁸ Li (2014) claims that *mei* and *dou* can be intervened by sentential negation *bu(-shi)* (Li 2014: 225; fn. 21). However, the examples she offers (Li 2014: (44a), (54)) all involve rhetorical questions. It is currently unclear to me why negation is good between *mei* and *dou* in rhetorical questions, and I set this use of negation aside.

⁹ Some speakers I consulted prefer (21b) over (21a), and for them, (21a) has only a negated cleft interpretation, such as ‘it’s not THESE STUDENTS that all like Jin Yong’. On the other hand, one reviewer finds (21a) grammatical with an ordinary wide-scope negation reading. The explanation to be given in the text below is fully compatible with the reviewer’s judgement, and the preference some speakers have can be treated as a preference for topicalizing a plural definite across negation (see below for discussion), presumably because Mandarin is a topic-prominent language and negation does not make a good topic. Finally, let me point out that the status of (21a) is not crucial to our purpose at hand, as the distinction between *mei*-NPs and plural definites is already established by the contrast between (20b) and (21b).

to Spec-*dou* to get interpreted¹⁰. The two assumptions, together with the General Condition on Scope Interpretation proposed in Huang (1982), offer an explanation why (20b) is ungrammatical while (21b) is not.

- (22) The General Condition on Scope Interpretation (Huang 1982: 220)
Suppose A and B are both QPs or both Q-NPs or Q-expressions, then if A c-commands B at SS, A also c-commands B at LF.

In (20b), the *mei*-NP is topicalized across negation and needs to reconstruct to Spec-*dou* for interpretation; this however violates (22), since at SS the *mei*-NP c-commands negation while at LF it is the other way around; consequently, (20b) is predicted to be bad. On the other hand, (21b) is predicted to be well-formed: a plural definite, being referential, can be reconstructed across negation without violating (22). Finally, (21a) is also expected to be fine, a nice result for the speakers who find (21a) grammatical (though see fn. 10).

The above explanation is supported by the following four types of facts. First, non-quantificational expressions (such as the proper name subject in (23)) generally do not incur intervention between a *mei*-NP and *dou*, as is illustrated by (23b). This is predicted, for reconstruction of a *mei*-NP across a non-quantificational element does not violate (22).

- (23) a. Lisi mei-ben shu dou xihuan.
Lisi every book DOU like
'Lisi likes every book.'
b. Mei-ben shu Lisi dou xihuan.
every book Lisi DOU like
'Lisi likes every book.'

Second, similar to negation, other quantificational expressions (such as the *only*-phrase in (24)) cannot appear between *dou* and a *mei*-NP, for the same reason that negation causes intervention. Again, this contrasts with plural definites, illustrated by (25b) where *zhiyou* 'only' is fine between *zhe-xie shu* 'these books' and *dou*. This is again expected: since plural definites do not take scope, moving them around never violates (22).

¹⁰ This can be derived from the requirement that *dou* (and alternative sensitive operators in general) needs to scope over its associate, (implicitly) assumed by several recent alternative-based analyses of *dou*, including this paper (Liao 2011; Liu 2017b; Xiang 2020). In particular, reconstruction to Spec-*dou* amounts to scoping below *dou* if we adopt a two-place semantics of *dou* (fn. 15; Liu 2019c, cf. Wagner 2006) and use movement—specifically, to the specifier of the operator (Drubig 1994)—for focus/alternative-association. Let me also mention that this association-from-Spec-*dou* idea represents one of the several attempts within the alternative-based approaches to reconcile the assumption that *dou* needs to scope over its associate and the fact that the latter actually appears above *dou* at the surface. Other means proposed so far include movement of *dou* (Liu 2017b) and positing covert *even* at a higher position (Liao 2011). Xiang 2020 uses reconstruction below *dou* to handle minimizers but is not explicit about how the other LFs (where *dou* clearly scopes over its associates) are derived. The idea presented here can be seen as generalizing Xiang's reconstruction proposal to all types of *dou*'s associates (in a restricted way, in the sense that the associate does not always reconstruct to its base position). More work is needed to decide between these different syntactic implementations.

- (24) a. Zhiyou san-ge xuesheng mei-ben shu dou xihuan.
 only three student every book DOU like
 ‘Only three students like every book.’ ONLY > $\forall$
 b. *Mei-ben shu zhiyou san-ge xuesheng dou xihuan.
 every book only three student DOU like
- (25) a. Zhiyou san-ge xuesheng zhe-xie shu dou xihuan.
 only three students these book DOU like
 ‘Only three students like all these books.’
 b. Zhe-xie shu, zhiyou san-ge xuesheng dou xihuan.
 these book only three student DOU like
 ‘Only three students like all these books.’

Third, to have a *mei*-NP scope *above* another scope-bearing element at LF, the latter has to be positioned after *dou*, as in (26). This is predicted by the current story. Since a *mei*-NP always occupies Spec-*dou* at LF, anything scoping under it must be lower than the head.

- (26) a. Mei-ge xuesheng dou bu xihuan Jin Yong.
 every student DOU not like Jin Yong
 ‘Every student does not like Jin Yong.’ ($\forall > \neg$) (cf. (20))
 b. Mei-ben shu dou zhiyou san-ge xuesheng xihuan.
 every book DOU only three student like
 ‘For every book there are only three students who like it.’ ($\forall > \text{ONLY}$) (cf. (24))

Finally, the difference between *mei-dou* and definite-*dou* with respect to scope reveals a general distinction between quantificational and referential associates of *dou* (Li 2014). The expressions that are intuitively quantificational (in the sense that they correspond to English items that are standardly treated as quantificational) such as *suoyou* ‘all’, *dabufen* ‘most’, and *henduo* ‘many’ all pattern with *mei*. (27)–(28) show that when associated with *dou*, these items do not allow another Q-element between the two, suggesting that they are indeed quantificational. As for other types of associates, *wh*-items, *renhe* ‘any’ and minimizers behave like *mei*, while bare nouns (under both definite and generic readings) pattern with plural definites (examples not exhibited due to constraints of space). This is again expected under the assumptions that *wh*-items, *renhe* and minimizers are underlyingly existential quantifiers (Liao 2011; Liu 2019c; Xiang 2020), while bare nouns denote kinds and are referential (e.g. Chierchia 1998).

- (27) a. Bu-shi {suoyou/ dabufen/ henduo} xuesheng dou xihuan Jin Yong.
 not-be all/ most/ many student DOU like Jin Yong
 ‘It is not the case that all/most/many of the students like Jin Yong.’
 b.* {Suoyou/ dabufen/ henduo} xuesheng bu(-shi) dou xihuan Jin Yong.
 all/ most/ many student not(-be) DOU like Jin Yong

- (28) a. Zhiyou san-ge xuesheng {suoyou/ dabufen/ henduo} shu dou xihuan.
 only three students all/ most/ many book DOU like
 ‘Only three students like all/most/many of these books.’
 b.* {Suoyou/ dabufen/ henduo} shu zhiyou san-ge xuesheng dou xihuan.
 all/ most/ many book only three student DOU like

In view of the above facts, it seems incorrect to say that *dou* always determines scope (of the semantic $\forall$), as is usually assumed in the literature and predicted by Lin (1998). Instead, a more accurate description seems to be that “QPs in Chinese, even when they are paired with *dou*, are still scope-bearing elements, entering into scope relations with other elements, just as in other languages. At the same time, *dou* also bears scope” (Li 2014: 229). The above discussion on the scope of *mei* ‘every’ offers a concrete proposal as to how a QP and *dou* together determine scope: the QP is the real (entity-level) scope-bearer, but it needs to appear next to *dou* (at its specifier) at LF, and thus the surface position of *dou* plays a role in revealing the LF position of the QP. In combination with the scope-isomorphic property of the language, the account captures correct scopal behaviors of quantificational associates of *dou*.

2.2.3 Quantifier-internal anaphora

In English only genuine distributive universals license sentence-internal readings of singular *different* (Carlson 1987; Brasoveanu 2011; Bumford 2015). We observe in Mandarin these readings are easily found with *mei-dou* but are hard to obtain with definite-*dou*, and thus the former but not the latter make good candidates for true universals. Crucially, since *dou* is present in both cases and yet a difference is observed, we conclude it is the *mei*-NPs (but not *dou*) that contribute the true distributive universal force.

Consider English facts first. (29a) shows that *every* licenses sentence-internal readings of singular *different*, in the sense that the books that are being compared are all present within the sentence, in this case introduced by different boys¹¹. In contrast to *every*-NPs, plural definites do not license sentence-internal singular *different*, as in (29b). To get the sentence-internal reading, the NP that combines with *different* has to be plural, as in (29c).

- (29) a. Every boy read a different book. (sentence-internal ✓)
 b. The boys read a different book. (sentence-internal #)
 c. The boys read different books. (sentence-internal ✓)

The same pattern is found in Mandarin, between *mei-dou* and definite-*dou*. (30a), with *mei-dou* scoping over a (semantically) singular indefinite containing *butong* ‘different’ (singularity indicated by the numeral *yi* ‘one’ followed by a classifier), has a salient sentence-internal reading, under which for any two students *a* and *b*, *a*’s book is

¹¹ Compare (29a) with (i) below, which involves a sentence-external *different*: the other book needed for evaluation of *different* is external to its host sentence; that is, *The Raven*.

(i) John read *The Raven*. Then, Bill read a different poem.

different from *b*'s. By contrast, it is hard (or even impossible) to get this reading for the corresponding (30b) with definite-*dou*; the most natural interpretation for (30b) is a sentence-external one where the students all bought a book different from the contextually salient one(s). To bring back the sentence-internal reading to salience, the numeral *yi* 'one' and the classifier need be removed to turn the *different-DP* into a semantically non-singular one, as in (30c)¹².

- (30) a. Mei-ge xuesheng dou mai-le yi-ben butong de shu.
 Every student DOU buy-ASP one-CL different DE book
 'Every student bought a different book.' (sentence-internal ✓)
- b. {Zhe-xie xuesheng /tamen} dou mai-le yi-ben butong de shu.
 these student /they DOU buy-ASP one-CL different DE book
 'All of these students/them bought a different book.' (sentence-internal ??)
- c. {Zhe-xie xuesheng /tamen} dou mai-le butong de shu.
 these student /they DOU buy-ASP different DE book
 'These students/they bought different books.' (sentence-internal ✓)

In view of the generalization exhibited by (29) that sentence-internal readings of singular *different* generally need licensing from a true distributive universal (see Brasoveanu 2011 for corpus data and cross-linguistic evidence), the contrast between (30a) and (30b) demonstrates that *mei-dou*, but not definite-*dou*, behaves more like genuine distributive universals. Since *dou* alone does not seem to have the full capacity of this licensing effect (or (30b) would have a salient sentence-internal reading), it is the *mei* that is the true universal.

Let me offer further evidence. First, adding a distributive expression such as *gezi* 'each' to (30b) is felicitous (Xiang 2020: (15)) and gives rise to a salient sentence-internal reading, as in (31a). In fact, simply replacing the *dou* in (30b) with *ge* 'each' has the same effect (see Lee et al. 2009 on *ge*). This is similar to English where overt distributivity operators such as *each* license sentence-internal singular *different*. The fact that *dou* alone (with plural definites) does not easily licence sentence-internal singular *different* while *gezi/ge* do (with or without *dou*) suggests again that the latter are distributivity operators while *dou* is not.

¹² While some speakers accept the sentence-internal reading of (30b), they all agree that under the relevant reading the sentence is less natural than (30a) and (30c). In addition, roughly half of my consultants (7 out of 13) find the internal reading of (30b) entirely impossible. There are also examples such as (i) below where the internal reading is absent for everyone. The judgement given in (30b) reflects this variation between speakers and examples. Overall, the claim is that there is indeed a contrast between *mei-dou* and definite-*dou* with respect to their ability to license sentence-internal readings of singular *different*.

(i) a. Lisi {mei-tian/#zhexie-tian} dou qu yi-jia butong de guanzi.
 Lisi every-day/these-days DOU go one-CL different DE restaurant
 'Lisi goes to a different restaurant {every day/#these days}' (under internal reading)

- (31) Zhe-xie xuesheng gezi dou mai-le yi-ben butong de shu.
 these student each DOU buy-ASP one-CL different DE book
 ‘These students each bought a different book.’ (sentence-internal ✓)

Second, sentence-internal readings of singular *different* involve quantifier/distributivity-internal anaphora, in the sense that the distributive universal could introduce two discourse referents within its nuclear scope (Brasoveanu 2011; Bumford 2015), the values of which are needed for the evaluation of a sentence-internal singular *different*. Internal interpretations of certain comparatives also belong to this category and are only permitted when under a distributive universal (Beck 2000; Brasoveanu 2011; Bumford 2015). This is again true in Mandarin. The next two examples illustrate that while *mei-dou* licenses internal readings of comparatives such as *geng-da* ‘bigger’ and *xin* ‘new’, the corresponding definite-*dou* does not.

- (32) [Xiaomi has launched several new phones this year.]¹³
- a. Mei-kuan dou caiyong-le yi-kuai geng-da de pingmu.
 every-CL DOU use-ASP a-CL more-big DE screen
 ‘Each uses a bigger screen.’ (sentence-internal ✓)
- b. Zhexie shouji dou caiyong-le yi-kuai geng-da de pingmu.
 these phone DOU use-ASP a-CL more-big DE screen
 ‘All use a bigger screen.’ (sentence-internal #)
- (33) a. Lisi mei-tian dou you yi-ge xin xiangfa.
 Lisi every-day DOU have one-ASP new idea
 ‘Lisi has a new idea every day.’ (sentence-internal ✓)
- b. Lisi zhexie-tian dou you yi-ge xin xiangfa.
 Lisi these-day DOU have one-ASP new idea
 ‘Lisi has a new idea these days.’ (sentence-internal #)

The fact that *mei-dou* in general licenses quantifier/distributivity-internal anaphora while definite-*dou* does not, shows that the two, though they may have equivalent truth-conditions, involve different types of distributivity/quantification. Indeed, singular *different* according to Brasoveanu (2011) is a *distributivity-dependent item* and can be used to reveal the nature of the distributivity it is associated with. Without going into the technical details of modeling different varieties of distributivity/quantification (see Brasoveanu 2011 and Bumford 2015 for implementations in dynamic semantics), the contrast suggests that *mei* but not *dou* contributes the kind of universal quantifica-

¹³ Some speakers find it difficult to get the relevant internal readings without an explicit *bi*-phrase (‘than’-phrase); in other words, they prefer (i) over (32a). This does not affect the point we are making here, since adding the same *bi*-phrase to (32b) still does not activate the internal reading.

- (i) Mei-kuan dou caiyong-le yi-kuai bi shang-yi-kuan geng-da de pingmu.
 every-CL DOU use-ASP a-CL than previous-one-CL more-big DE screen
 ‘Every model uses a screen that is bigger than the previous one.’

tion/distributivity English *every* conveys, and thus is the prime candidate for universal quantifier in Mandarin.

Summary A large array of facts have been discussed, all pointing to the conclusion that Mandarin *mei*-NPs are true universal quantifiers. The facts are summarized below.

(34) Evidence for the quantificational status of *mei*-NPs

- a. Even without *dou*, *mei*-NPs still lack *homogeneity* and *non-maximality* — two distinctive properties exhibited by plural definites without *dou*, and retain their maximal universal force in both positive and negative contexts, similar to English *every*-NPs.
- b. Even without *dou*, *mei*-NPs are still compatible with Q-sensitive expressions, similar to English *every*-NPs, but different from their plural definite counterparts.
- c. *Mei*-NPs are incompatible with partitive constructions, similar to English *every*-NPs, but different from the corresponding plural definites, which license partitives even in the presence of *dou*.
- d. Even with *dou*, *mei*-NPs still determine the scope of the underlying $\forall$, unlike plural definites with *dou*.
- e. Unlike plural definites with *dou*, *mei*-NPs easily license sentence-internal singular *different* and other quantifier-internal anaphora, a property that only true distributive universals have.

With *mei*-NPs being quantificational, we need a non-quantificational (over-entities) story of *dou* to avoid the *double quantification/requantification* problem (Yuan 2012; Xu 2014; Wu and Zhou 2019). The next section introduces such an analysis of *dou*, based on Liu (2017b).

3 Non-quantificational *dou* (at the entity-level)

Mandarin *dou* draws a lot of attention in the literature (Lee 1986; Cheng 1995; Shyu 1995; Huang 1996; Lin 1998; Hole 2004; Pan 2006; Xiang 2008; Liao 2011; Yuan 2012; Xu 2014; Liu 2017b; Wu and Zhou 2019; Xiang 2020). The current paper, following recent development on the topic, takes *dou* to be an alternative sensitive operator (Liao 2011; Liu 2017b; Xiang 2020). Specifically, we take *dou* to be a strongest-prejacent operator as defined in (35): it is truth-conditionally vacuous but carries a presupposition that its prejacent is the strongest among its contextually relevant alternatives (the *C* in (35); cf. Karttunen and Peters's (1979) analysis of English *even*¹⁴

¹⁴ Let me clarify that *dou* is not English *even*, which according to Karttunen and Peters (1979) presupposes that its prejacent is the most *unlikely* proposition among its alternatives. *Dou* is more abstract. It presupposes that its prejacent is the *strongest* among its alternatives, with strength unspecified (Liu 2017a). When *dou* expresses a *even* reading, an additional particle *lian* is often used to form the [*lian...dou*] construction (*lian* is always optional). We can think of *lian* as a marker for strength based on likelihood; in other words, in [*lian...dou*], *dou* requires its prejacent to be the strongest, and *lian* indicates that the strength is based on likelihood. Together, they form the presupposition that the prejacent of [*lian...dou*] is the most unlikely one among its alternatives.

and the idea of *intensifier* in Xu 2014; Wu and Zhou 2019.). Distinct ‘uses’ of *dou* are then analyzed by conceptualizing strength differently: *even-dou* corresponds to being the strongest in terms of likelihood ($<_{\text{likely}}$), while distributive-*dou* in terms of entailment ($\subset$). In the former case, *dou* presupposes that its prejacent is the most unlikely one in the context; in the latter case, *dou* requires its prejacent entail all the relevant alternatives¹⁵.

- (35) $\llbracket \text{dou}_C S \rrbracket$ is defined only if $\forall q \in C[\llbracket S \rrbracket \neq q \rightarrow \llbracket S \rrbracket < q]$
 if defined, $\llbracket \text{dou } S \rrbracket = \llbracket S \rrbracket$ (where $<$ is either $<_{\text{likely}}$ or $\subset$)

To illustrate the analysis, consider two widely discussed uses of *dou*: its *even-use* in (36a), and its use as a distributivity operator similar to English *each* in (36b). The two uses correspond to two ways of understanding strength between propositions: (un)likelihood vs. entailment.

- (36) a. LISI dou mai-le wu-ben shu.
 Lisi DOU buy-ASP five-CL book
 ‘Even Lisi bought five books.’ *Even-dou* $\leftarrow$ Likelihood
 b. Zhangsan he Lisi DOU mai-le wu-ben shu.
 Zhangsan and Lisi DOU buy-ASP five-CL books
 ‘Zhangsan and Lisi each bought five books.’ Distributive-*dou* $\leftarrow$ Entailment

In (36a) with prosodic focus on *Lisi*, *dou* presupposes that the prejacent *Lisi bought 5 books* is less likely than all the other alternative propositions (such as *Zhangsan bought 5 books*), and this straightforwardly explains the observed *even-flavor*¹⁶. (36b) with stress on *dou* involves setting strength to entailment, and *dou* presupposes that its prejacent entails all the other alternatives. Assume that the alternatives to the prejacent are *Zhangsan bought 5 books* and *Lisi bought 5 books*; the requirement can be satisfied only if the prejacent is understood distributively (*Zhangsan and Lisi each bought 5 books* $\subset$ *Zhangsan/Lisi bought 5 books*). In other words, entailment-based *dou* forces distributive readings of plural predication (cf. Szabolcsi’s (2015: 181–182) explanation of the distributivity effect associated with MO-style particles), giving rise to the appearance that *dou* is a distributivity operator¹⁷.

¹⁵ Here is the two-place semantics of *dou* mentioned in fn. 10: $\llbracket \text{dou} \rrbracket = \lambda B \lambda F \lambda w : \forall F' \in C[B(F) \subseteq B(F')]. B_w(F)$, where F is the denotation of *dou*’s associate and B the denotation of the rest (Liu 2019c).

¹⁶ It is worth mentioning at this point, as suggested by a reviewer, a line of analysis that assigns an existential presupposition to *even-like* particles (e.g. Kay 1990; Xiang 2020). According to Xiang 2020, the *dou* in (36a) conveys that Lisi is less likely than some contextually salient individual to buy 5 books. Due to constraints of space, I have to assume without argument a universal presupposition, simply following (i) previous researchers on [*lian...dou*] that it presents a sentence as the extreme/least likely case (see Yuan 2012: chapter 7 and references cited there), and (ii) the common wisdom that *dou* is somehow related to universality.

¹⁷ To clarify, (36b) is ambiguous. It can also mean ZS and LS together bought 5 books, which is unlikely. This reading can be captured by setting strength to likelihood and comparing the prejacent *ZS and LS (as a group) bought 5 books* with alternatives like *ZS, LS and John as a group bought 5 books*. A similar ambiguity exists in (41) below (with the additional reading being ‘a group of 3 students bought 5 books, which is unlikely’) and the same story applies there. Finally, as hinted in the text, stress (indicated by CAPITAL letters when necessary) can disambiguate. Entailment-based *dou* in association with a definite

Let me now turn to a question raised by a reviewer concerning this analysis of *dou*. The reviewer asks how scope is established in (37), and in general “how *dou* as a semantically vacuous item affects sentence meanings”. Note however *dou* is not semantically vacuous. It is *truth-conditionally* vacuous (vacuous in assertion), but has a semantic contribution at the level of presupposition. The presupposition often forces a sentence to be interpreted in specific ways to meet its requirement. Crucially, *dou*’s surface position indicates at which point the presupposition is evaluated (the scope of *dou*). Thus putting *dou* at different positions leads to distinct presuppositions, which may have truth-conditional repercussions.

- (37) a. Tamen mei dou kao yi-bai fen.
           they not DOU get one-hundred point
           ‘It is not that all of them got 100 points on the test.’ $\neg > \forall$
- b. Tamen dou mei kao yi-bai fen.
           they DOU not get one-hundred point
           ‘All of them didn’t get 100 points on the test.’ $\forall > \neg$

Consider (37). In (37a) the scope of *dou* does not include negation and thus distributivity is forced below negation, giving rise to a $\neg > \forall$ interpretation. In (37a) negation is within the scope of *dou*, and as we will see immediately, the presupposition can only be satisfied with construing distributivity above negation ($\forall > \neg$).

To implement the above idea, we need to be specific about how distributivity is forced by the presupposition of *dou*. I will assume that distributive readings are conveyed by a covert distributivity operator *Dist* (Liu 2017b), as in (38) (cf. the semantics of *dou* in Lin 1998).

- (38) $\llbracket Dist \rrbracket = \lambda P \lambda x \forall y [y \leq_{\text{ATOM}} x \rightarrow P(y)]$ (cf. the *D* operator in Link 1987)

The existence of covert *Dist* in Mandarin is evidenced by (39). As an answer to (39Q), (39A) (where no *dou* is present) is strongly preferred to be read distributively (Liu 2017b).

- (39) Q: Who drew two pictures?
       A: Zhangsan he Lisi hua-le liang-fu hua.
           Zhangsan and Lisi draw-ASP two-CL pictures
           ‘Zhangsan and Lisi drew two pictures.’ $\leadsto$ each drew two

With *Dist*, the fact that entailment-based *dou* (associated with definites) forces distributive readings is equivalent to the requirement that *dou* forces a *Dist* within its scope.

Next, as Shyu (2018) observes, Mandarin *dou* on its *even*-interpretation ([*lian...dou*], see fn. 14), in contrast to English *even*, never scopes over a higher negative element. The difference is most clearly illustrated in (40). In (40a), *even* conveys that Syntactic Structures (SS) is an easy book to understand. This can be analyzed as *even* scoping over *nobody* at LF (see the *scope theory* in Karttunen and Peters 1979; cf. the *lexical ambiguity theory* in Rooth 1985), triggering the presupposition that it is less likely for

is often stressed (though not always, see fn. 26), while for *even-dou* stress always falls on *dou*’s associate. The prosodic pattern has been observed for a long time and yet no concrete proposal is currently available.

nobody to understand SS than for nobody to understand any other book—equivalently, it is most likely for somebody to understand SS. This presupposition explains the perception that (40a) presents SS as an easy book. By contrast, the corresponding (40b) in Mandarin, in which *mei-you ren*—roughly ‘nobody’—appears above *dou* and its associate at the surface, does not have this reading. Instead, it conveys that SS is a hard book, which can only be obtained by interpreting *dou* under *nobody*. To obtain the easy-reading, *nobody* needs to appear within the surface scope of *dou*, as in (40c).

- (40) a. Nobody even understands Syntactic Structures. (easy)
 b. Mei-you ren (lian) Syntactic Structures dou dong.
 not-have person LIAN Syntactic Structures DOU understand
 ‘Nobody understands Syntactic Structures, which is too hard!’ (hard)
 c. (lian) Syntactic Structures dou mei-you ren dong.
 LIAN Syntactic Structures DOU not-have person understand
 ‘Nobody even understands Syntactic Structures.’ (easy)

It is natural to assume that *dou* on its different readings shares the same scopal property. Consequently, the *dou* in (37a) also scopes below negation and has its presupposition evaluated there. The presupposition requires that the prejacent *they got 100 points* entail all other alternatives such as *John got 100 points*, and this can only be satisfied by inserting *Dist* to the VP below *dou* (and thus below $\neg$). This explains the $\neg > \forall$ reading¹⁸.

Finally consider (37b). Negation now appears below *dou* at the surface and thus the prejacent that *dou* evaluates includes negation. In other words, *dou* requires *they didn't get 100 points* entail alternatives such as *John didn't get 100 points*. This can only be met by inserting *Dist* below *dou* but above negation, and thus the $\forall > \neg$ reading is obtained.

To sum up, the above discussion illustrates how *dou* can be assigned a truth-conditionally vacuous meaning and yet still seems to incur truth-conditional effects and determine scope at the entity-level when associated with a plural definite. Crucially, the presupposition of *dou* can force a covert *Dist* within its scope, and it is the *Dist* that affects the truth-conditions (by contributing $\forall$). Since the surface position of *dou* determines where its presupposition is evaluated, it indicates where *Dist* is inserted and thus reveals the scope of $\forall$.

Besides offering a conceptually simple way of understanding *dou*'s various uses, the present analysis brings together two prominent accounts of *dou* proposed in the literature: the distributivity operator approach that takes *dou* to be a distributivity operator similar to English *each* (Lin 1998; Chen 2008), and the maximality operator approach that takes *dou* to be ι (or σ as in Sharvy 1980; Link 1983) that encodes maximality/uniqueness, similar to English definite article *the* (Giannakidou and Cheng 2006; Xiang 2008; Cheng 2009). Consider (41) (with stress on *dou*, see fn. 17), which illustrates both of *dou*'s maximality and distributivity effects. In (41), the bare numeral

¹⁸ Other examples with embedded *dou*, about which the same reviewer wonders, can be analyzed analogously. In general, the surface position of *dou* determines where its presupposition is evaluated. See fn. 10 on how the associate of *dou* gets evaluated within its scope.

subject associated with *dou* is interpreted as a definite, indicated by *the* in the gloss (see Cheng and Sybesma 1999, (57b) and Constant and Gu 2010, (16) a.o. for the observation), and the VP following *dou* has a distributive construe marked by *each* in the gloss. Obviously, neither the distributivity operator approach (motivated by and thus only capturing *each*) nor the maximality operator approach (motivated by and thus only capturing *the*) accounts for the full range of *dou*'s effects exhibited in (41).

- (41) San-ge xuesheng DOU mai-le wu-ben shu.
 three-CL student DOU buy-ASP five-CL book
 'The three students each bought five books.'

Taking the *dou* in (41) as an operator that evaluates strength at the level of propositions (based on entailment in this case) predicts both effects. As an entailment-based strongest-prejacent operator, *dou* presupposes that its prejacent (*3 students bought five books*, 3 being *at least* 3) entails all the other alternatives such as *2/1 students bought five books* (recall that *dou* associates to its left and thus *san* 'three' triggers alternatives here). The entailment from the prejacent to the alternatives goes through only if the VP is interpreted distributively (*3 students each bought five books* $\subset$ *2/1 students each bought five books*), but not collectively/cumulatively. This explains the distributivity effect, in parallel with the explanation of (36b) discussed above.

Furthermore, for the prejacent of (41) to entail *all* the other alternatives, there have to be exactly three students in the context. This can be illustrated by comparing (42) and (43). With exactly three students in the context, propositions of the form *n students each bought five books* with $n > 3$ would be excluded from the relevant set of alternatives under discussion, for it makes no sense to consider a proposition like *4 students each bought five books* if we already know there could only be three students. As a results the prejacent indeed entails all the other alternatives, as illustrated in (42). (43) is different. In this case, there are more than 3 students (say 4) in the context and thus there is a proposition (*4 students each bought five books*) in the alternative set (asymmetrically) entailing the prejacent; consequently, *dou*'s strongest-prejacent presupposition cannot be satisfied and the sentence is infelicitous in such a context. In other words, the analysis of *dou* in (35) as a strongest-prejacent operator predicts (41) to carry a presupposition that there are exactly three students in the context, and this is exactly the maximality/definiteness effect.

- (42) $Alt_{=3} :$ $\left\{ \begin{array}{l} 3 \text{ students each bought five books (= the prejacent),} \\ 2 \text{ students each bought five books,} \\ 1 \text{ students (each) bought a books,} \end{array} \right\}$

- (43) $Alt_{>3} :$ $\left\{ \begin{array}{l} 4 \text{ students each bought five books,} \\ 3 \text{ students each bought five books (= the prejacent),} \\ 2 \text{ students each bought five books,} \\ 1 \text{ students (each) bought a books,} \end{array} \right\}$

In sum, taking *dou* to be a strongest-prejacent operator (based on likelihood or entailment, and in this particular case entailment) accounts for both distributivity and maximality of *dou*: the former is required to ensure entailment among alternatives while the latter is needed so that the prejacent can entail *all* the other alternatives (in schematic words, strongest = distributivity + maximality). In this sense, the current analysis inherits insights from both the distributivity operator analysis and the maximality operator analysis¹⁹.

The paper adopts this analysis of *dou* as a strongest-prejacent operator. Since *dou* is non-quantificational at the entity-level, it is compatible with the facts presented in Sect. 2 that suggest the *mei* is the genuine universal quantifier in *mei du*

Before ending the section, I would like to emphasize that the contribution of *dou* is a presupposition, as presuppositions will turn out to be crucial in the explanation of the *mei-dou* co-occurrence. A well-known property of presuppositions is that they project. The following examples illustrate that the contribution of *dou* projects across polar questions, possibility modals, negation and conditional antecedents. In particular, all the sentences in (44) convey that Lisi is the least likely one to buy 5 books, while all the sentences in (45) (with stress on *dou*, see fn. 17) convey that there are exactly 3 students in the context²⁰.

(44) *That Lisi is the least likely one to buy 5 books projects:*

- a. LISI *dou* mai-le wu-ben shu ma?
Lisi DOU buy-ASP five.CL book Q
'Did even Lisi buy five books?'
- b. Haoxiang LISI *dou* mai-le wu-ben shu.
seem Lisi DOU buy-ASP five-CL book
'It seems that even Lisi bought five books.'

¹⁹ A reviewer wonders whether the maximality-effect associated with *san-ge xuesheng* in (41) indeed comes from *dou*, and offers an alternative view that *san-ge xuesheng* is "interpreted as a definite, and subject to a unique-reference requirement". Indeed, the covert *ι* proposed for the definite readings of Mandarin bare nouns (see e.g. Jenks 2018) can in principle combine with NUM-CL-NPs and turns them into definites. However, the empirical picture is that NUM-CL-NPs without *dou*, in contrast to bare nouns, are overwhelmingly NOT interpreted as definites, as the reviewer acknowledges "it's hard to find grammatical sentences as such", and is summarized in Cheng and Sybesma (2005: 263): "In Mandarin, bare NPs can be interpreted as definite, indefinite or generic. NUM-CL-NPs and CL-NPs are invariably indefinite". The facts thus favor an analysis where Mandarin NUM-CL-NPs do not combine with *ι* (for whatever reason) and their maximality/definiteness-effects as in (41) come from the presupposition of *dou* (Cheng 2009). That said, there is still a possibility that NUM-CL-NPs would only combine with *ι* in the presence of *dou*. I leave this option open but would like to note that under this proposal *dou* still needs to encode some sort of maximality to ensure the observed connection between the definite readings of NUM-CL-NPs and the presence of *dou*. Finally let me mention that (41) is given as illustrating the more general point that the facts motivating the maximality-operator approach can in principle be handled in the current analysis. For other maximality-effects of *dou*, see Giannakidou and Cheng (2006); Xiang (2008); Cheng (2009).

²⁰ As discussed above, I have proposed, following in particular Cheng (2009), that the definiteness effect observed with *three students*—that is, there are exactly 3 students in the context—comes from *dou*, and specifically, from its presupposition that the prejacent entails all the contextually relevant alternatives. To the extent that this view is correct (see fn. 19), the fact that the former projects shows that the latter is a presupposition.

- c. Wo bu juede LISI dou mai-le wu-ben shu.
 I not think Lisi DOU buy-ASP
 'I do not think that even Lisi bought five books.'
- d. Ruguo LISI dou mai-le wu-ben shu, na...
 If Lisi DOU buy-ASP five-CL book, then...
 'If even Lisi bought five books, then...'

(45) *That there are exactly 3 students projects:*

- a. San-ge xuesheng DOU mai-le wu-ben shu ma?
 three-CL students DOU buy-ASP five-CL book Q
 'Did the three students all buy five books?'
- b. Haoxiang san-ge xuesheng DOU mai-le wu-ben shu.
 seem three-CL students DOU buy-ASP five-CL book
 'It seems that the three students all bought five books.'
- c. Wo bu juede san-ge xuesheng DOU mai-le wu-ben shu.
 I not think three-CL students DOU buy-ASP
 'I do not think that the three students all bought five books.'
- d. Ruguo san-ge xuesheng DOU mai-le wu-ben shu, na...
 If three-CL students DOU buy-ASP five-CL book, then...
 'If the three students all bought five books, then...'

In sum, *dou* is truth-conditionally vacuous but carries a presupposition that its prejacent is the strongest among its contextually relevant alternatives. With this independently motivated semantics of *dou*, we now turn to an explanation of the *mei-dou* co-occurrence.

4 Obligatory *dou* as obligatory presupposition

Taking *dou* to be a presupposition trigger allows us to reduce obligatory *dou* to the general phenomena of *obligatory presupposition* (Amsili and Beyssade 2009), attested independently for a wide class of presupposition triggers across different languages. As we will see in this section, the new proposal predicts that obligatory *dou* is not limited to *mei-dou* and sensitive to discourse contexts.

4.1 Explaining *mei-dou* co-occurrence via obligatory presupposition

The effects of obligatory presupposition refer to the pragmatic phenomena where a class of presupposition triggers gives rise to obligatory presence when their presupposition is satisfied. Relevant examples discussed in the literature (Kaplan 1984; Heim 1991; Chemla 2008; Amsili and Beyssade 2009; Eckardt and Fränkel 2012, see also Bade 2016; Aravind and Hackl 2017) are offered in (46).

- (46) a. John went to the party. Bill went to the party, #(too).
 b. Mary went swimming yesterday. She went swimming #(again) today.
 c. Sam was in New York yesterday. He is #(still) there today.
 d. {The/#A} sun is shining.
 e. I washed {both/#all} of my hands.
 f. Sam {knows/#thinks} that Paris is in France.

To illustrate, consider (46b). The trigger is *again*, which presupposes that the event described by its modified VP happened at a previous time. In (46b) it presupposes that the event of swimming by Mary happened before, and the requirement is locally satisfied by the first clause in (46b), and hence *again* is obligatory. Consider next (46d). Since *the* carries an extra uniqueness presupposition which is always satisfied by the world knowledge that there is one and exactly one sun, the presupposition trigger *the* is obligatory in (46d), and blocks the version of the sentence with *a*. Similarly, *both* blocks *all* in (46e) by its duality presupposition satisfied by the NP *hands*, and *know* blocks *believe* when its complement is already known to be true as in (46f), by its factive presupposition.

The same effects are observed in Mandarin, illustrated below from (47a) to (47f), to which the above remarks also apply.²¹

- (47) a. Zhangsan canjia-le juhui, Lisi ??(ye) canjia-le juhui.
 Zhangsan attend-ASP party, Lisi also attend.ASP party
 ‘Zhangsan attended the party, Lisi ??(also) attended the party.’
 b. Zhangsan zuotian qu youyong, jintian #(you) qu youyong.
 Zhangsan yesterday go swimming, today again go swimming
 ‘Zhangsan went swimming yesterday. She went swimming #(again) today.’
 c. Zhangsan zuotian (jiu) zai Beijing, jintian #(hai) zai.
 Zhangsan yesterday (already) in Beijing, today still in
 ‘Zhangsan was in Beijing yesterday. He is #(still) there today.’
 d. Wo liang-zhi shou #(dou) xi-le.
 I two-CL hands DOU wash.ASP
 ‘I washed both of my hands.’
 e. Lisi {zhidao /#xiangxin} Bali zai Faguo.
 Lisi {know /#believe} Paris in France
 ‘Lisi {knows/#thinks} that Paris is in France.’
 f. Chule Lisi, Zhangsan #(ye) lai-le
 In.addition.to Lisi Zhangsan also pass-ASP
 ‘In addition to Lisi, Zhangsan also passed.’

²¹ See the discussion of (41) on how *dou* could give rise to a maximality/definiteness presupposition in (47d). As for (47f), *chule* is ambiguous between *except* and *in addition to*; when *chule* means *in addition to*, the additive presupposition of *ye* ‘also’ in the main clause is satisfied (see Liu 2019b on *chule*), and as a result *ye* is obligatory.

Obligatory presupposition can be explained by the pragmatic principle Maximize Presupposition in (48), proposed in Heim (1991).

(48) Maximize Presupposition (MP)

Make your contribution presuppose as much as possible.

MP mandates that a speaker choose among sentences with identical assertive information the one that has more presuppositions, when the presuppositions are satisfied. Consider (46a). Here *too* is truth-conditionally vacuous but carries an additive presupposition that an alternative proposition to its prejacent is true; the presupposition is satisfied in its local context; thus MP favors [*Bill went to the party too*] over [*Bill went to the party*] where the two have the same assertion but the former has an extra presupposition, and *too* is obligatory²².

Returning to the puzzle of obligatory *dou* with *mei*, I propose that the co-occurrence of *mei*-NPs and *dou* is an instance of obligatory presupposition regulated by MP. Consider the universal sentence in (49a). We have established in Sect. 2 that *mei*-NPs are true universal quantifiers, so the prejacent of *dou* is a universal statement, as in (49b). Next, *dou* is truth-conditionally vacuous but presupposes that its prejacent is stronger than all the other contextually relevant alternatives. Suppose the alternatives to a universal statement are its individual instantiations, as in (49c). *Dou*'s prejacent in this case entails all of its alternatives and its presupposition is automatically satisfied. MP is then triggered and requires [*mei-ge student dou came*] block its *dou*-less version [*mei-ge student came*], and *dou* is obligatory with *mei* as a result.

(49) Explaining obligatory *dou* via obligatory presupposition

a.	Mei-ge xuesheng <u>*(dou)</u> lai-le. every student DOU come 'Every student came.'	Obligatory- <i>dou</i>
b.	$\forall x[\text{STUDENT}(x) \rightarrow \text{CAME}(x)]$	Prejacent of <i>dou</i>
c.	$\left\{ \begin{array}{l} \text{student A came,} \\ \text{student B came,} \\ \dots \end{array} \right\}$	Alternatives
d.	<i>Dou</i> 's prejacent entails all the alternatives, and its presupposition is satisfied and thus [<i>mei-ge xuesheng dou lai-le</i>] blocks # [<i>mei-ge xuesheng lai-le</i>] via MP	

An important ingredient in the above explanation is the idea that *mei*-NPs activate individual alternatives. Let me elaborate on this assumption and make it a bit more precise. First, these individual alternatives actually belong to the type of *domain alternatives* of generalized quantifiers—alternative generalized quantifiers with (only) their domain of quantification different from (usually smaller than) the one in the

²² A reviewer notes a simplification is made here. There are accounts of obligatory-*too* that are not based on MP, but use obligatory implicatures, e.g. Bade (2016). Space prevents me from discussing this line of analysis, but see Eckardt and Fränkel (2012: §2.1) for arguments against it. The reviewer also wonders how MP competition can happen between pairs of seemingly different complexity such as $\{\emptyset, \text{too}\}$. The issue is solved in Singh (2008), who proposes that the competition is between *too* and Rooth's $\sim$. Singh's solution can be extended to *dou*-competition.

prejacent²³. (50) spells out the domain alternatives of *mei* and the corresponding propositional alternatives of the sentence in (49a). Note that $\forall x[x \in \{A\} \rightarrow \text{CAME}(x)]$ is just *student A came* in (49c), and (49c) in fact equivalent to (50c) if the former contains propositions involving plural individuals ($\forall x[x \in \{A,B\} \rightarrow \text{CAME}(x)]$ is *student a and b came*).

- (50) a. $\llbracket \text{mei}_D \rrbracket = \lambda P \lambda Q \forall x [[x \in D \wedge P(x)] \rightarrow Q(x)]$
 b. Domain alternatives of $\llbracket \text{mei}_D \rrbracket$
 $= \{\lambda P \lambda Q \forall x [[x \in D' \wedge P(x)] \rightarrow Q(x)] \mid D' \subseteq D\}$
 c. Domain alternatives of (49a)
- $$\left\{ \begin{array}{l} \forall x[x \in \{A\} \rightarrow \text{CAME}(x)], \\ \forall x[x \in \{B\} \rightarrow \text{CAME}(x)], \\ \forall x[x \in \{A,B\} \rightarrow \text{CAME}(x)], \\ \forall x[x \in \{A,B,C\} \rightarrow \text{CAME}(x)], \\ \dots \end{array} \right\} \quad \text{In a context where A,B,C are students}$$

Domain alternatives are usually associated with disjunctions and indefinites in the literature (Kratzer and Shimoyama 2002; Sauerland 2004; Katzir 2007). An influential line of thinking also argues that polarity items such as *any* are simply existential quantifiers obligatorily triggering domain alternatives (among other ones) (Krifka 1995; Chierchia 2013). Given existential quantifiers can trigger domain alternatives, it is a small step to extend the idea to universal quantifiers (see e.g. the formal definitions in Chierchia 2013: 138; Xiang 2020: (25)). Indeed, Zeijlstra (2017), based on some of the positive polarity properties of Dutch *iedereen* ‘everybody’ (it can appear under negation, but cannot reconstruct below negation once it is above it at the surface, unlike English *everybody*), claims that it is a universal quantifier that obligatorily triggers domain alternatives.

The idea that universal quantifiers trigger domain alternatives is in fact hard to avoid in the structure-based theory of alternatives (Katzir 2007; Fox and Katzir 2011). In this theory, alternatives of an expressions can be *formally* defined, as in (51). Assuming the domain argument D is a syntactic variable at LF (von Stechow 1994), whose interpretation depends on the index of the variable, the domain alternatives of a quantifier are simply transformed from the quantifier by replacing the index of the domain variable with other indices.

²³ Two points to note. First, scalar alternatives on Horn scales like $\langle \text{yixie}, \text{mei} \rangle$ ‘(some, every)’ will also work for the analysis sketched in (49), for *every student came* entails *some students came* (assuming universals carry existential import), and *dou*’s presupposition is satisfied. For the same reason, including scalar alternatives as extra alternatives of *mei* is also harmless. I leave these options open. Second, subdomain alternatives (domain alternatives with only smaller domains) are often used in the literature. For the purpose of this study, it is unnecessary to limit alternatives to subdomain ones, since the domain of a universal statement seems always to be the largest contextually salient one. *Every student came* cannot mean *every math student came* via covert domain restriction in a context with both math and non-math students.

- (51) $ALT(\phi) = \{\phi \text{ can be transformed into } \phi' \text{ by a finite series of deletions, contractions, and replacements of constituents in } \phi \text{ with constituents of the same category taken from the lexicon.}\}$ (Formal Alternatives, Katzir 2007)

We adopt Katzir's (2007) general view of how formal alternatives are generated. Furthermore, to capture the fact that alternatives are also contextually constrained, we assume following (Fox and Katzir 2011), and Katzir (2014) that the set of alternatives eventually operated by an alternative sensitive operator is the intersection of both the set of formally determined alternatives $ALT(\phi)$ and a second set of alternatives C that represents contextual relevance (cf. the idea behind C in Rooth 1992). This is explicitly stated for *dou* in (52).

- (52) $\llbracket \text{dou}_C S \rrbracket$ is defined only if $\forall q \in \{\llbracket S' \rrbracket \mid S' \in ALT(S)\} \cap C[\llbracket S \rrbracket \neq q \rightarrow \llbracket S \rrbracket < q]$
if defined, $\llbracket \text{dou } S \rrbracket = \llbracket S \rrbracket$

Consequently, for cases of *mei*-NPs that require the presence of *dou*, such as (49), the individual alternatives are both formally defined (in $\{\llbracket S' \rrbracket \mid S' \in ALT(S)\}$) and contextually relevant (in C). This seems natural given that contextually relevant alternatives are usually taken to represent the current Question Under Discussion (QUD in Roberts 2012; Büring 2003), and an immediate QUD for a universal statement is whether the universal statement is true (the *least subject matter* in Lewis 1988), which in turn is reduced to the question of whether each individual instantiation is true. Intuitively, to evaluate the truth of a universal statement such as the one in (49), each individual alternative needs to be checked. It is in this sense that the individual alternatives of (49) are relevant.

To summarize, we have shown that the individual alternatives we posit for *mei*-NPs belong to the domain alternatives of generalized quantifiers and are commonly assumed for various purposes in recent literature. Building on Katzir (2007) and Fox and Katzir (2011), we have distinguished formal alternatives and contextually relevant ones, and propose that *dou* makes reference to their intersection. The distinction is useful, since it predicts that when the individual alternatives triggered by the *mei*-NP are not relevant, *dou* is not needed (for the intersection would be a singleton set with no non-trivial alternatives for *dou* to operate on). The next subsection shows that this is a correct prediction.

4.2 A more nuanced characterization of obligatory-*dou*

4.2.1 Irrelevance of individual alternatives and *dou*'s absence

Mei-NPs sometimes do not need *dou*, and this could happen when the individual alternatives of a *mei*-NP are contextually irrelevant. Consider the discourse in (53). We find a sharp contrast between the two occurrences of the same *mei*-sentence. When *mei-ben mai* \$10 'every-CL sells-for \$10' is first uttered in (53), *dou* is not needed (and, in fact, better not to appear), while in its second occurrence *dou* is obligatory. This suggests that the *mei-dou* co-occurrence is sensitive to discourse contexts—an aspect of the phenomenon overlooked by the previous literature.

(53) [At a secondhand bookstore]

- a. The owner: Ben dian da-jianjia, [mei-ben mai SHI yuan]! (stress on *shi*)
 our store big-sale, every sell ten dollar
 ‘Our store is have a big sale. Every book is 10 dollars!’
- b. John: Zhe-ben manhua-shu zheme xin, ye mai shi yuan?
 this-CL comic-book so new, also sell ten dollar
 ‘This comic book seems brand new. Is it also 10 dollars?’
- c. The owner: [MEI-BEN dou mai shi yuan]! (Stress on *mei*)
 every DOU sell ten dollar
 ‘EVERY book is 10 dollars!’

Contexts can affect *dou*’s presence in the current analysis, by manipulating the QUD that determines the shape of *C* needed for the interpretation of *dou*. Concretely, in (53a) when the owner first uttered *mei-ben mai \$10*, her focus was on \$10 (indicated by the stress perceived on *shi* ‘ten’), and it is naturally understood that she, as the owner of the bookstore, was assuming that every book was sold at the same price and the QUD is *how much IS a book?*. In such a context, the individual books are intuitively not relevant to the QUD, and do not figure in *C*. As a result, the set of alternatives evaluated by *dou* if *dou* were present (the intersection of the formal alternatives triggered by *mei*-NP and *C*) would be the singleton set that only contains *dou*’s prejacent. Assuming that *dou*, like other alternative sensitive operators, needs to be associated with a non-singleton set of alternatives (see the non-vacuity presupposition of *dou* in Xiang 2020), its absence here is correctly predicted.

By asking about a particular book in (53b), John shifted the QUD to *which books are \$10?*. In the new context, individual books are clearly relevant (*this comic book sells for \$10* for instance is simply a member of the Hamblin denotation of the new QUD), and the *C* now contains propositions of the form *x sells for \$10*. As a result, the intersection of the formal alternatives and *C* is just the set of salient individual instantiations of the universal statement. Since all the alternatives in this set are entailed by the universal prejacent, *dou*’s presupposition is satisfied and its obligatory presence required by MP in (53c).

It might be worth comparing the current view with Huang’s (1996) influential generalization regarding optional-*dou*, according to which an indefinite noun phrase within the scope of a *mei*-NP renders *dou* optional. The generalization however is inaccurate in view of (53): the same *mei-ben mai \$10*, which arguably has an indefinite object, *cannot* take *dou* in its first occurrence but *requires* it in the second; that is, in neither case is *dou* optional.

Consider next (54), based on which (among other similar examples) Huang (1996) forms her generalization. In (54), an indefinite object appears under the *mei*-NP, and according to Huang’s judgement *dou* is not needed in the sentence, supporting the generalization.

- (54) Mei-ge chushi zuo yi-dao cai. (Huang 1996:3)
 every chef make one-CL dish
 ‘Every chef makes a dish.’

It turns out however that sentences like (54) need extra contextual support. This is clearly stated in Cheng (2009: 62) “It should be noted that native speakers tend to consider the variant without *dou* incomplete (and should be preceded by statements such as ‘our restaurant has a policy’).” While Cheng (2009) does not explain why contextual support is necessary, contexts obviously play a key role in the pragmatic explanation. To sharpen the intuition, consider some other contexts where (54) sounds natural. For example, (54) can be used in a context where the speaker is calculating the total number of dishes, and she either assumes every chef will make the same number as in (55a), or just ignores the differences between individual chefs, as in (55b) with *pingjun* ‘on average’. (54) can also be used as a command to the entire group of chefs (without paying attention to the individual ones) in an imperative (55c) (similar to the restaurant-policy context offered by Cheng (2009)). In all these cases, the intuition seems to be that the idiosyncrasies between chefs are ignored. According to the account of (53) above, this means the individual alternatives of the *mei*-NP are not in *C* and *dou* is hence not present.

- (55) a. Mei-ge chushi zuo yi-dao cai, women yigong keyi you ba-dao cai.
 every chef make one-CL dish, we altogether can have 8-CL dish
 ‘With every chef making a dish, we can have 8 dishes altogether.’
 b. Pingjun mei-ge chushi zuo yi-dao cai, yigong keyi you ba-dao.
 on-average every chef make one-CL dish, altogether can have 8-CL
 ‘With the chefs making an average of 1 dish each, we can have 8 dishes altogether.’
 c. Qing mei-ge chushi zuo yi-dao cai.
 Please every chef make one-CL dish
 ‘To every chef: please make a dish each.’

Another significant fact is that contexts can also force *dou* to be present in cases like (54). Specifically, we can construct a context where individual chefs are clearly relevant, and *dou* is then predicted to be obligatory by the pragmatic account. This seems a correct prediction. Consider (56). Both questions explicitly ask about individual chefs, and answering either of them with (54) requires *dou*. This is unexpected for proposals that try to explain the *mei-dou* co-occurrence in terms of certain syntactic-semantic requirements of *mei*, which can be satisfied either by *dou* or by an indefinite within the VP (Huang 1996, Lin 2020b).

- (56) Q1: Na-xie chushi zuo yi-dao cai?
 which-CL chef make one-CL dish?
 ‘Which chefs make one dish?’
 Q2: Bangchu ye zuo yi-dao cai ma?
 commis.chef also make one-CL dish Q?
 ‘Do commis chefs also make one dish?’
 A: MEI-ge chushi *(dou) zuo yi-dao cai. (Answering either Q1 or Q2)
 every chef DOU make one-CL dish
 ‘EVERY chef makes one dish.’

That irrelevance of individual alternatives can lead to *dou*’s absence is further supported by the observation reported in Liu (2019a) that *mei*-NPs with a classifier that describes a standard unit of measurement (e.g. *mi* ‘meter’, *sheng* ‘litter’, ...) usually do not appear with *dou*. Examples are in (57). Here again, individual alternatives are intuitively not relevant—in typical scenarios where rice is sold in big bags, a particular 500-gram bag of rice is no different from another 500-gram bag of rice in terms of its price, and thus the set of alternatives operated by *dou* would only contain the prejacent. Consequently, *dou*’s presupposition is not met and it is absent²⁴.

- (57) a. Shengyin mei-miao chuanbo san-bai-sanshi mi.
 Sound every-CL_{second} transmit 3-hundred-30 meter
 ‘Sound travels 330 meters every second.’
 b. Mei-jin dami san-kuai-qi.
 Every-CL_{500-gram} rice 3-CL-7
 ‘Every 500 gram of rice costs ¥3.7 (in RMB).’

4.2.2 Over-generation?

A reviewer worries that the pragmatic account might over-generate, and offers (58) as a challenge. According to the reviewer, (58) is (categorically) ungrammatical; in other words, it should always be ill-formed, regardless of what context it is in. In particular, simply putting “a focus on *gui*..., intending that every book has the same property

²⁴ Two reviewers wonder whether the *mei* discussed in this subsection (especially in (53a) and (57)) involves a second use of *mei* that is truth-conditionally vacuous with a multiplicity presupposition or simply conveys partitioning. Note however that (53a) and (57) share the same truth-conditions as other universal statements, e.g. $\forall x[\text{BOOK}(x) \rightarrow \text{SELL.FOR}.\$10(x)]$ for (53a). Taking the *mei* to be a universal quantifier captures this basic fact, without the need to posit ambiguities of *mei*. Next, English *every* also seems to have this “partitioning use”, e.g. *for every 10 cups of coffee you buy, you get one free* (Solt 2009: 265), and it seems unlikely that *every* is ambiguous too. Furthermore, although (53a) and (53c) have the same truth-conditions, they are associated with different sets of alternatives in the current proposal. Taking these sets to reflect different QUDs, perhaps we can explain the reviewers’ intuition that (53a) and (53c) involve different *mei*: one is less about individual books than the other. Finally, a reviewer points out *mei*-(*yi*)-*ben mai \$10* sounds equivalent to *yi-ben mai \$10* and wonders if one is derived from the other. Space prevents me from pursuing this interesting idea. I will instead assume the two are not derivationally related, for (i) truth-conditionally equivalent sentences do not always have the same compositional semantics; (ii) similar equivalences are found in English: *John did 30 situps [every/a] day for a year*, and a derivational path between the two in English seems unlikely.

and that the individual price of books is not what the speaker cares about” does not save (58). The reviewer then asks: “what then determines the difference between this example and (53a)? Is the difference grammatical or pragmatic?”.

- (58) **Mei-ben shu hen gui.*
 every-CL book very expensive.
 Intended: ‘Every book is expensive.’

The reviewer is correct that simply adding a focus somewhere within the VP often does not make *dou* optional with *mei*. On the other hand, one of the main points of the paper is to suggest that a purely grammatical view to the *mei-dou* occurrence is inadequate. I now offer examples involving (58) to show that discourse contexts can indeed help improve the sentence, and manipulate the presence of *dou* in a similar way as they do in (53). Consider (59) and (60). Both contain [*mei-ben (shu) hen gui*] without *dou* and sound natural to me and my informants, unexpected on a purely syntactic-semantic view²⁵.

- (59) *Zhe-jia shu-dian bu zenme-yang, shu you-po-you-jiu,*
 This-CL book-store not very-good, book shabby-and-old,
erqie [mei-ben hai hen gui].
 and every-CL also very expensive
 ‘The bookstore is not good. The books are shabby, and every book is expensive too.’

- (60) *Wo zhi shuo [mei-ben shu hen gui], mei shuo bie-de.*
 I only say every-CL book very expensive, not say other-things
 ‘I only said that every book was expensive.’

From the pragmatic perspective proposed in the paper, (59)–(60) are easy to understand. (59) indicates a context where the bookstore is under discussion and prices of the individual books not so relevant. This context can be modeled as having a QUD (C) for the last clause that does not involve individual alternatives of *mei-ben shu*. *Dou* is then predicted to be absent. (60) is similar. Here the matrix *zhi* “only” is associated with *hen gui_F* “expensive” (or with the entire embedded clause with *F*). Again, the focus particle and its associated focus reveal that the QUD is not about the individual books, and thus *dou* can be absent.

Just as in (53)/(56), *dou*’s obligatory presence can be brought back by contexts. Imagine that the owner of the bookstore overheard you uttering (60) or (61) to your friend. She asked (61Q) unpleasantly. Now you can respond with (61A). Crucially, *dou* is obligatory, as the owner activates the relevance of individual books with an explicit question.

²⁵ Let me immediately point out that adding *dou* before *hen gui* “expensive” in (59) and (60) also sounds fine. This means that the extra focus particles here (*also* in (59) and the matrix *only* in (60)) are not incompatible with *dou*. Thus explaining *dou*’s absence by simply stipulating its incompatibility with other focus particles does not seem to work. A side note: the additive particle *hai* “also” is present in the third clause in (59) since the clause is an *additional* comment on the bookstore.

(61) Q: Ni shuo na-xie shu gui?
 you say which-CL book expensive
 ‘Which books were you saying were expensive?’

A: Mei-ben shu *(dou) hen gui.
 every-CL book DOU very expensive.

Intended: ‘Every book is expensive.’

The parallel between (53) and (59)–(61) suggests my answer to the reviewer’s question: there is no fundamental difference between [*mei-ben shu hen gui*] and [*mei-ben shu mai \$10*]. *Dou*’s presence in both cases can be manipulated by discourse contexts, specifically by the QUDs, which are reflected by focus and focus particles.

That focus and focus particles could in general affect the presence of *dou* is reported in Li (2014). Li offers (62) to show that the focus marker *shi* ‘be’ can make *dou* optional. Let me add (63). In (63a) *dou* is required, but adding *zhi* ‘only’ in (63a) obviates the requirement.

(62) Shi {suoyou-de/ quanbu-de/ mei-ge} nanhai xihuan shu, bu-shi...
 be all-DE/ all-DE/ every-CL boy like book, not-be
 ‘It is all the boys/every boy that like(s) books, not...’ (Li 2014: fn. 3)

(63) a. Mei-ge zuo-le zuoye de xuesheng *(dou) de-le gao-fen.
 every do-ASP homework DE student DOU get-ASP high-score
 ‘Every student who did the homework got a high score (in the exam).’
 b. Zhiyou mei-ge zuo-le ZUOYE de xuesheng de-le gao-fen.
 Only every do-ASP homework DE student get-ASP high-score
 ‘Only every student [who did the homework]_F got a high score (in the exam).’

From the pragmatic perspective, (62)–(63) are no different from (59)–(60). In all these cases there is no indefinite in the VP (recall Huang’s (1996) generalization) and yet focus/focus particles could manipulate the presence of *dou*. The fact that the *mei-dou* co-occurrence is sensitive to focus/focus particles and ultimately to the underlying QUD, supports the pragmatic analysis. Under the current proposal, an additional focus particle and its associated focus could indicate contextually salient alternatives other than the individual ones formally triggered by the *mei*-NP. These alternatives (strictly speaking their intersection with the individual alternatives) do not necessarily satisfy *dou*’s presupposition and thus *dou* can be absent. In (63b) for instance, the focus associated with *only* is the modifier, indicating a contextually salient set of alternatives {*every student who did the homework got a high score, every student who didn’t do the homework got a high score*}. *Dou*’s presupposition clearly is not satisfied with this set and thus does not appear in (63b).

Let me make two final remarks. First, in (59), (60), (62) and (63b), *dou* can be added back. This is compatible with the pragmatic analysis, as there could be multiple QUDs in a particular context and QUDs can have complex structures (Büring 2003). In a context where the main point of the discussion is not about the individual alternatives

of the *mei*-NP, *dou* can be truly optional and its presence depends on whether the speaker treats the question concerning these individual alternatives as an additional sub-question.

Second, there is also a difference between [*mei-ben shu hen gui*] and [*mei-ben shu mai \$10*]. Specifically, in the second case a plain focus is sufficient to make *dou* disappear while an additional focus particle is needed for the first. I would like to suggest that the difference is due to (i) the fact that there is a numeral in the VP in the second case, and numerals can easily attract focus and become the main point of discussion, and (ii) the world knowledge that things can be sold in kilos/meters/pieces, with one kilo/meter/piece not different from another with respect to the price. Thus it is easier for the second to have a *dou*-less *mei*.

I admit the current paper is unable to offer an explicit theory of relevance that can construct, combining different factors (focus, focus particles, features of discourse and world knowledge), an explicit Roberts-style discourse structure for every *mei*-sentence. The best the paper can do (as is done) is to add a syntactic variable *C* whose value is contextually determined and depends on the QUD. Despite this vague aspect, the proposal makes two clear predictions. First, a connection between focus/focus particles and *mei-dou* co-occurrence is predicted. Second, when it is clear that the individual alternatives of the *mei*-NP are relevant, as in (53b-c), (56) and (61) where an explicit question is asked about these individuals, *dou* is obligatory. Both predictions can be empirically tested, and as far as I can tell, are correct.

4.2.3 Obligatory *dou* with conjunction

The pragmatic account also predicts that the phenomenon of obligatory *dou* goes beyond *mei*-NPs and other universals, because obligatory *dou* is not explained by some unique properties of Mandarin universal noun phrases, but via satisfaction of *dou*'s presupposition and the general pragmatic principle MP. As long as the relevant set of alternatives satisfies *dou*'s presupposition, MP will enforce the presence of *dou*.

Consider (65). Since *smile* is an inherently distributive predicate (*a and b smiled* iff *a smiled* and *b smiled*), (65a) and (65b) would be equivalent in meaning if the contribution of *dou* is just truth-conditional. The two, however, sound different. In particular, to answer the question in (64a), (65a) but not (65b) can be used. In other words, when (65a) is used as an answer to (64a), *dou* is obligatory and we have an instance of obligatory *dou* with conjunction.

- (64) a. Who among Zhangsan and Lisi smiled?
       b. Who among Zhangsan, Lisi and Wangwu smiled?
- (65) a. Zhangsan he Lisi *dou* xiao-le. (*dou* obligatory as an answer to (64a))
       Zhangsan and Lisi *DOU* smile-ASP
       ‘Both Zhangsan and Lisi smiled.’
       b. Zhangsan he Lisi xiao-le. (as an answer to (64b))
       Zhangsan and Lisi smile-ASP
       ‘Zhangsan and Lisi smiled.’

The current account straightforwardly explains the obligatory *dou* in (65a) as an answer to (64a). The *wh*-question in (64a) explicitly establishes *Zhangsan smiled* and *Lisi smiled* as the only two relevant alternatives. Since *Zhangsan and Lisi smiled* entails both, the presupposition of *dou* is satisfied, and MP requires the obligatory presence of *dou*.

Interestingly, to answer the question in (64b), (65b) can be used. This is again predicted. Since in the new context with three relevant individuals, not every alternative is entailed by *Zhangsan and Lisi smiled* (consider *Wangwu smiled*), *dou*'s presupposition is not satisfied, and it is predicted to be absent²⁶.

A reviewer asks how the account handles answers to polar questions like (66). According to the reviewer's judgment, both (65a) and (65b) are fine as answers to (66).

(66) Did Zhangsan and Lisi smile?

That (65b) is a felicitous answer to (66) follows naturally from the current account. The polar question establishes {*ZS and LS smiled*, *ZS and LS didn't smile*} as the QUD²⁷. With the prejacent being *ZS and LS smiled*, *dou*'s presupposition cannot be non-trivially met with this QUD (or its intersection with any set), and its absence is thus explained. Meanwhile, that (65a) can answer (66) can be explained by assuming that in this case a new question *exactly who among the two smiled?* is accommodated and (65a) targets the new QUD.

5 Conclusion and remaining issues

The paper has defended the view that *mei*-NPs are true universal quantifiers while *dou* is not, based on a large array of novel facts. *Dou* is truth-conditionally vacuous but carries a presupposition that its prejacent is the strongest among its alternatives. A pragmatic explanation of the *mei-dou* co-occurrence has been offered: in most contexts where a *mei*-NP is used, its individual alternatives are relevant, and thus the universal prejacent entails all the other alternatives and *dou*'s strongest-prejacent-presupposition is satisfied; Maximize Presupposition then mandates that a speaker choose *mei-dou* instead of *mei* without *dou*, for the former carries more presuppositions. As we have seen, the proposal predicts a more nuanced picture of obligatory-*dou*, beyond *mei*-NPs and sensitive to discourse contexts.

²⁶ (65a) is fine as an answer to (64b) for some speakers I consulted. This could be due to the fact that these speakers are implicitly accommodating (64a) as a new sub-question of (64b). There are two pieces of evidence for this view. First, when (65a) is used as an answer to (64b), *dou* is not stressed and an accent that seems to indicate contrastive topics falls on *Zhangsan and Lisi* (see Büring (2003) on contrastive topics and their role in marking sub-questions). Second, speakers strongly prefer to continue (65a) with *Wangwu didn't smile* when answering (64b), suggesting the former only answers a sub-question.

²⁷ The reviewer who asks about (66) seems to suggest that the denotation of (66) is {*ZS and LS smiled*, *LS smiled*, ...}, since conjunctions "activate domain alternatives". However, polar questions are usually not assigned denotations of this kind. Even if conjunctions trigger domain alternatives (Magri 2014), they are handled within the question nucleus below Q (via e.g. covert *O*) and do not project to the question level.

There are many open issues within this pragmatic account that remain to be explored. In this section I will mention two.

Other quantificational DPs Two reviewers ask about DPs other than universals. This subsection sketches how to extend the account to *dabufen* ‘most’, *henduo* ‘many’, *yixie* ‘some’, *henshao* ‘few’ and “negative quantifiers”. I take the basic pattern to be: while the former two optionally occur with *dou*²⁸, the latter three and *dou* are incompatible (Chen 2008: Sect. 2.1).

- (67) a. {Dabufen/henduo} xuesheng (dou) lai-zi Faguo.
 Most/many student DOU come-from France
 ‘Most/many students come from France.’
 b. {Yixie/henshao/mei-you} xuesheng (*dou) lai-zi Faguo.
 Some/few/no-have student DOU come-from France
 ‘Some/few/no students come from France.’

The fact that *dabufen* ‘most’ can optionally co-occur with *dou* is compatible with the current proposal. Assume that the alternatives of *dabufen* are its scale-mates on a Horn scale {*yixie*, *henduo*, *dabufen*, *quanbu/suoyou*} ‘{some, many, most, all}’ (see fn. 23 on scalar alternatives). *Dabufen* is possible with *dou* if the more informative *quanbu* is not relevant (not in *C*), or to use Chierchia’s (2013) term, the scale is “truncated” to {*yixie*, *henduo*, *dabufen*}. This is plausible given Ariel’s (2004) conclusion based on a corpus study of English *most* that “it is a rare case that the difference between a strong but nonmaximal expression (such as *most*) and a maximal one (*all*) matters for the current purposes of the exchange” (Ariel 2004: 668).

Henduo ‘many’ can be analyzed in a similar manner. There could be contexts where the difference between *henduo* and *dabufen/quanbu* is not relevant. *Henduo* then becomes the most informative one on the scale and is predicted to be compatible with *dou*.

Yixie ‘some’ is different. As the bottom of its (positive) Horn scale, *yixie* can never become the top element unless all of its scale-mates are truncated, which however would violate the non-vacuity constraint that requires an alternative set to be a non-singleton (Xiang 2020). It is thus correctly predicted *yixie* is incompatible with *dou*.

Neither is *henshao* ‘few’ compatible with *dou* (Liu 1997; Chen 2008). On the assumption that {*few*, *no*} form a (negative) Horn scale (Horn 1989) and *no* is more informative than *few*, *Henshao*, just like *yixie*, does not have a chance of occupying the top element of a non-trivial scale, and thus is predicted to be incompatible with *dou*.

Next, consider “negative quantifiers”. Given that (67a) and (68) below are unacceptable, one may conclude that they are incompatible with *dou* and thus a problem for the current account (for a negative statement entails all its subdomain alternatives). However, it is very likely that *mei-you* ‘not-have’ does not form a full-fledged negative DP with its adjacent NP. Indeed, Huang (2003), based on the fact that *mei-you*-NPs do not appear post-verbally in (69a) or as the object of a preposition, proposes that

²⁸ Lin (1998) claims that *dabufen* requires *dou*. I follow Chen (2008) instead, for my consultants judge (67a) to be fine without *dou*, and a quick search on the web returns many examples of subject *dabufen* without *dou*.

mei-you is a head in the TP domain (say the head of NegP) and Mandarin “negative quantifiers” are syntactically derived from an underlying [*mei-you ...renhe*-NP] string ‘not...any-NP’ under adjacency. Specifically, when the *renhe*-NP appears preverbally, it is adjacent to *mei-you* and the two can conflate (or be reanalyzed) into *mei-you*-NP by a local rule, as indicated in (69b).

- (68) **Mei-you ren dou kanjian wo.*
 not-have person DOU saw me
 Intended: “Nobody saw me.”
- (69) a. **Wo kanjian-le mei-you ren.* (Huang 2003: (5b))
 I saw-ASP not-have person
 Intended: ‘I saw nobody.’
 b. *Mei-you [ren kanjian wo].* (Conflation of *mei-you* and *renhe-ren*)
 not-have any person saw me
 ‘Nobody saw me.’
 c. *Renhe ren_i dou [mei-you t_i kanjian wo].*
 Any person DOU not-have saw me
 ‘Nobody saw me.’ (No conflation due to movement)

Under this view, (68) can be explained by assuming that (i) when *dou* is merged into the sentence, it needs to appear above *mei-you* (see Sect. 3 on the scope of *dou*), and (ii) the *renhe*-NP, being *dou*’s associate, has to move to its left (Lin 1998, a.o.). After movement however, the *renhe*-NP is not adjacent to *mei-you*, no conflation happens and *renhe* has to be pronounced, as in (69c), which is indeed grammatical. In short, *dou* is incompatible with “negative quantifiers”, for there is no genuine negative quantifier in Mandarin.

Finally, a reviewer asks about the difference between *henduo/dabufen* on the one hand and *mei* on the other. Specifically, the reviewer wonders why *dou* is completely optional in (70a) but somehow required in (70b) (examples and judgment from the reviewer).

- (70) a. *Zhe-ge paidui hen wuliao, henduo ren (dou) likai-le.*
 this-CL party very boring, many person DOU leave-ASP
 ‘This party is very boring. Many people have left.’
 b. *Zhe-ge paidui hen wuliao, mei-ge ren ??(dou) likai-le.*
 this-CL party very boring, every person DOU leave-ASP
 ‘This party is very boring. Everyone has left.’

Let me first point out that a distinction is already made between the two in the current account. While additional contextual restrictions are needed for *dou*’s *absence* in the case of *mei* (by pruning the individual alternatives), they are responsible for *dou*’s *presence* with *henduo/dabufen* (by pruning the more informative alternatives). It is not implausible to assume that contextual manipulations of the second kind are more natural and frequent than the first, for speakers tend to care more about the

individual instantiations when a universal statement is uttered. Consequently, in natural contexts, *mei* always co-occurs with *dou* but for *henduo/dabufen* it is entirely optional, depending on whether the speaker takes the more informative alternatives as relevant. Finally, there is also the possibility that there are syntactic features (strong or weak) in the grammar that regulate whether an expression obligatorily triggers alternatives (Chierchia 2013); *mei* but not *henduo/dabufen* could bear one such strong feature (cf. the strong Q-feature in Lin 1998). I leave this option open.

Summing up, the current proposal, together with some reasonable assumptions, predicts that *dou* is compatible with *dabufen* and *henduo*, and incompatible with *yixie*, *henshao* and *mei-you*-NPs²⁹. I think these are all welcome results. Meanwhile, let me emphasize that the above discussion is only preliminary and “quantifiers need to be approached on a case by case basis” (Nouwen 2010). The interested reader is referred to Lin (2020a) for a recent discussion of the interaction between *dou* and different quantificational DPs.

Object *mei* *Mei*-NPs in object positions do not occur with *dou*. This is compatible with our proposal. For syntactic reasons, *dou* only associates with items to its left and thus (71b) is *syntactically* ill-formed. Consequently, (71b) cannot block (71a) via MP (competition and blocking only happens between grammatical sentences), even if the *every*-NP in (71a) could trigger individual alternatives. This is very different from the case of pre-verbal *mei*-NPs, where both [*mei*-NP *dou* VP] and [*mei*-NP VP] are grammatical (the latter indeed surface in special contexts), and the former could block the latter via MP in ordinary contexts.

- (71) a. Wo qin-le mei-yi-ge san-nianji xuesheng.
       I invite-ASP every third-grade student
       ‘‘I invited every third-grade student.’’
       b. *Wo dou qing-le mei-yi-ge san-nianji xuesheng.
       I DOU invite-PERF every third-grade student

A reviewer then wonders what happens to the individual alternatives of an object *mei*-NP. I will assume that they are still activated but are taken care of by one of the many covert alternative sensitive operators proposed in the literature, e.g. Chierchia’s *O* or Rooth’s $\sim$. I leave the options open but would like to point out adding these operators does not affect pre-verbal *mei*-NPs, as [*mei*-NP *dou* VP] contains more presuppositions than the version with *O*/ $\sim$, and thus MP still favors the sentence with *dou*.

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²⁹ A reviewer also asks about *zuiduo* ‘at most’ and *zuishao* ‘at least’, and points out *dou* is only compatible with the latter. The issue of modified numerals is complex and I have to leave it open. Nevertheless, it seems that the same pattern holds for English *even*: *there are even at least 5 professors here* vs. *#there are even at most 5 professors here*. Thus, this is not a problem and may turn out to support the current account, where *dou* is close to *even*.

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