

## A novel argument for an *even*-like semantics of Mandarin *dōu*\*

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**Abstract** There have been ongoing debates about the semantics of Mandarin particle *dōu*, which, among its various readings, has a distributive reading and a scalar reading. In the paper, we make a novel observation that *dōu*, on both readings, is sensitive to a standard on a scale associated with a contextually supplied gradable property, and take this to be new evidence in favor of a unified, scalar analysis of *dōu*. To uniformly capture its two readings and its standard-sensitivity, we propose to integrate insights from two proposals mooted respectively by Liu (2017) and Greenberg (2018a). Specifically, on the one hand, we follow Liu (2017) in arguing that (a) *dōu* is uniformly a scalar particle, (b) it operates on distinct types of alternatives on distinct readings and (c) a trivialization operation occurs on the distributive reading; on the other hand, we, deviating from Liu (2017), adopt two components adapted from the gradability-based semantics originally suggested for English *even* by Greenberg (2018a), i.e. (a) an evaluative presupposition and (b) a contextually determined scale, instead of one based on unlikelihood. Our revised proposal can successfully account for the two readings in a unified manner but circumvents the issue regarding the dimension of the scale faced by Liu (2017) in the meanwhile.

**Keywords:** *dōu*, focus, *even*, unlikelihood, distributivity, scalarity, standard-sensitivity, different types of alternatives, gradability, context-dependency

### 1 Introduction

The Mandarin particle *dōu* has been observed to have multiple readings. In this paper we will concentrate on two of these readings, known as the ‘distributive’ (1a) and the ‘scalar’ (1b) reading.<sup>1</sup> Prior studies diverge on the semantics of *dōu*: Some theories claim that *dōu* is ambiguous, able to function as a distributor and a scalar operator

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\* We would like to thank Mingming Liu, the anonymous reviewers of NELS 52 and SALT 32 for their constructive comments and suggestions, as well as the audiences at SALT 32 for their valuable feedback. All remaining errors are, of course, ours.

<sup>1</sup> *Dōu*’s distributive and scalar readings can be partly disambiguated through distinct accenting patterns. Usually, on the distributive reading, *dōu* itself is accented; on the scalar reading, its associate is accented. But exceptions exist. See e.g. Liu 2021 for discussion.

depending on different factors (e.g. Zhang 1997; Hole 2003; Chen 2008) whereas other theories advocate that the two readings of *dōu* are reducible to a single semantic core (Xiang 2008; Liao 2011; Liu 2017; Xiang 2020 a.o.). Within the latter camp, *dōu* has been variously suggested to be essentially a maximality operator (Xiang 2008), an existential modal (Tsai 2015), a pre-exhaustification exhaustifier (Xiang 2020) and an *even*-like scalar particle (Liao 2011; Liu 2017), among others. In this paper, we will offer a novel observation that *dōu* is standard-sensitive on both its distributive and scalar readings, and argue that this observation lends support to the view that *dōu* has a univocal core as an *even*-like particle following a proposal in Liu 2017. Liu's (2017) proposal elegantly captures the two readings of *dōu* uniformly, but it faces an issue regarding the dimension of the scale on which *dōu* operates. To maintain his insights but avoid the issue, we will revise his proposal by plugging in Greenberg's (2018a) gradability-based semantics for English *even*.

Before proceeding further, a syntactic clarification about *dōu* is in order: It's widely observed that *dōu* always occupies a pre-verbal position and mostly associates backwards.<sup>2</sup> In (1), *dōu* associates with the subject, as marked by [ ]<sub>F</sub>. If the focus associate of *dōu* is within the VP, then the focus associate needs to be pre-posed to a pre-*dōu* position (like (3a) below).

- (1) [tāmēn]<sub>F</sub> **dōu** mǎi le yí-liàng chēzi.  
 they dōu buy ASP one-CLF car
- a. "They each bought a car." Distributive Reading  
 b. "Even they bought a car." Scalar Reading

The remainder of the paper will be organized as follows: Section 2 presents our novel observation, namely *dōu*'s standard-sensitivity on both its distributive and scalar readings. Section 3 critically reviews Liu's (2017) theory. Section 4 proceeds to suggest a revised proposal by integrating Liu 2017 and Greenberg 2018a and shows how this revised proposal accounts for the data. Section 5 concludes, and points out open issues.

## 2 A novel empirical observation: *Dōu*'s standard-sensitivity on both readings

### 2.1 Standard-sensitivity & Its relevance

By standard-sensitivity, especially the standard-sensitivity in relation to *dōu*, we mean that *dōu* is sensitive to the standard of comparison on a scale associated with a gradable property. The observation that *dōu* is standard-sensitive on both its

<sup>2</sup> *Dōu* can also associate with in-situ scalar items and triggers an *already*-like flavor. We leave this reading for another occasion. Interested readers are referred to e.g. Xiang 2008 and Xiang 2020.

distributive and scalar readings is of relevance because *even*-like particles have been reported to display standard-sensitivity in this sense cross-linguistically, e.g. *even* in English (Greenberg 2018a), *afilu* and the stressed version of *bixlal* in Hebrew (Greenberg 2020), and *daže* in Russian (Miashkur & Greenberg 2019). If so, our novel observation provides evidence for the view that *dōu* has a single semantic core as a scalar, *even*-like particle.

Let's first use English *even* to illustrate standard-sensitivity in (2) before moving on to *dōu*. In (2a), drinking vodka would automatically place Bill above the standard on a scale associated with unsuitability for driving, and the presence of *even* is felicitous. In contrast, in (2b), drinking Becks Blue does not place Bill above the standard on a scale related to suitability for driving, and the presence of *even* makes the utterance infelicitous. This felicity contrast in (2) exemplifies what we mean by the standard-sensitivity of *even*-like particles as reported across the cited studies above, namely that *even*-like particles require its prejacent to indicate a degree above the standard on the relevant scale.

- (2) Context: At a party, four beverages, cola, Becks Blue (a kind of pseudo-alcohol with an alcoholic intensity of 0.05%), wine and vodka, were served. A asked B whether Bill and John could drive later, B replied as follows:
- a. Bill drank wine, and John even drank [vodka]<sub>F</sub>.
  - b. # Bill drank cola, and John even drank [Becks Blue]<sub>F</sub>.

## 2.2 *Dōu*'s standard-sensitivity

### 2.2.1 *Dōu*'s standard-sensitivity on its scalar reading

We first observe that on its scalar reading, *dōu* is similar to other *even*-like particles in being standard-sensitive, as shown in (3). (3) is a Mandarin reproduction of (2), and exhibits the exact standard-sensitivity effects observed above. We further note that *shènzhì*, the unmarked counterpart of English *even* in Mandarin, behaves analogously, as illustrated in (4).<sup>3</sup> Note that both (3) and (4) share the same context as (2).

- (3) a. Yuēhàn hē le hóngjiǔ de, Bǐěr [fútèjiā]<sub>F</sub> **dōu** hē le de.  
 John drink PRF wine SFP Bill vodka *dōu* drink PRF SFP  
 "John drank wine, (and) Bill even drank vodka."  
 b. # Yuēhàn hē le kělè de, Bǐěr [bèikè píjiǔ]<sub>F</sub> **dōu** hē le de.  
 John drink cola PRF SFP Bill Becks beer *dōu* drink PRF SFP

<sup>3</sup> Astute readers may have noticed that the focus associate of *dōu* is pre-posed to a pre-*dōu*, pre-verbal position, as clarified in Section 1, while the focus associate of *shènzhì* remains in situ. This is a syntactic distinction between the two operators, which is orthogonal to our point.

“John drank cola, (and) Bill even drank Becks Blue.”

- (4) a. Yuēhàn hē le hóngjiǔ de, Bǐěr **shèzhì** hē le [fútèjiā]<sub>F</sub> de.  
 John drink PRF wine SFP Bill even drink PRF vodka SFP  
 “John drank wine, (and) Bill even drank vodka.”
- b. # Yuēhàn hē le kělè de, Bǐěr **shènzhì** hē le [bèikè píjiǔ]<sub>F</sub> de.  
 John drink PRF wine SFP Bill even drink PRF Becks beer SFP  
 “John drank cola, (and) Bill even drank Becks Blue.”

### 2.2.2 *Dōu*'s standard-sensitivity on its distributive reading

Crucially, we observe that *dōu* is standard-sensitive on its distributive reading as well. Firstly, it has been long noted in the literature (e.g. Liu 1997; Chen 2008; Liu 2021) that *dōu* is selective w.r.t. the nominal quantifiers it can combine with. Specifically, *dōu* prefers nominal quantifiers that seem to indicate a relatively large quantity or proportion, a phenomenon christened as *dōu*-(dis)harmony by Chen (2008). This is illustrated in (5), where *dōu* is compatible with *hěnduō* (*many*) but incompatible with *hěنشǎo* (*few*).

- (5) Hěnduō/#hěنشǎo háizǐ **dōu** huà le huà.  
 many/few kid *dōu* draw PRF picture  
 Intended: “Many/few kids each drew a picture.” (Chen 2008, ex.28 & 30)

Secondly, and more importantly, we make the novel observation that distributive *dōu* is standard-sensitive in the absence of quantifiers, too. This is shown in the distinct behaviors of *dōu* and *gè*, an operator that has been widely claimed to be a genuine, *each*-like distributor in Mandarin (e.g. Lin 1998; Lee, Zhang & Pan 2009; Yang 2013).<sup>4</sup> Take a look at the felicity contrast in (6). In (6a), the number of staff members that sold ten cars is four, satisfying the requirement for the bonus; the utterance is equally felicitous with *gè* and *dōu*. This stands in stark contrast with (6b) where the number of staff members that sold ten cars is below the requirement: (6b) remains felicitous with *gè* but is heavily degraded with *dōu*. The degraded status with *dōu* becomes even more obvious if *dōu* is accented, an accenting pattern usually associated with the distributive reading of *dōu* (see fn.(1)). If *dōu* is purely a distributor here, it is expected to behave like *gè*, contra fact.

<sup>4</sup> Although both *dōu* and *gè* can give rise to a distributive reading, they are subject to different restrictions. For instance, Lin (1998) notes that *gè* is subject to what he terms as the context-relatedness and the indefinite (semi)object requirements (see Lin 1998 for details) whereas *dōu* is not. The *gè*-containing sentences constructed in this paper meet these requirements, so the felicity contrast in the *gè* vs. *dōu* minimal pairs is not attributable to these factors. For more discussion on *gè*, see the relevant cited works and see e.g. Cheng 2021 for a more recent exploration.

- (6) Context: A company stipulates that if four or more salespeople each sell at least 10 cars, then they each get a bonus. An outlet manager says later:
- a. wǒmen diàn xiāoliàng hěn hǎo, yuángōng zhōng [Yuēhàn, Bǐěr, Mǎlì  
we store sales very good staff among John Bill Mary  
hé Yǎdāng]<sub>F</sub> gè/dōu mài le shí-liang chē. yǒu jiǎnglǐ, tài hǎo  
and Adam each/dōu sell PRF ten-CLF car have bonus too good  
le!  
SFP  
“Our store has very good sales. Among the staff, John, Bill, Mary and Adam each sold ten cars, (so we) have the bonus. That’s terrific!”
- b. wǒmen diàn xiāoliàng hěn chà, yuángōng zhōng Bǐěr hé Sū  
we store sales very bad staff among Bill and Sue  
gè/??(dōu) mài le shí-liang chē. měi yǒu jiǎnglǐ, hěn kěxǐ!  
each/dōu sell PRF ten-CLF car NEG have bonus very pity  
Intended: “Our store has very bad sales. Among the staff, Bill and Sue each sold ten cars, (so we) have no bonus. What a pity!”

### 2.3 Interim Summary

We observe that Mandarin *dōu* is sensitive to standards on both its scalar reading and distributive reading regardless of the presence / absence of quantifiers. Given that *even*-like particles are shown to be standard-sensitive cross-linguistically, we have good reasons to believe that *dōu* is basically scalar, *even*-like as well. In the next section, we will take a critical look at Liu 2017 where a proposal of this nature was independently suggested.

## 3 Liu 2017: An *even*-based analysis of *dōu*

### 3.1 Liu’s (2017) proposal on *dōu*

Let’s first take a brief look at the canonical semantics of English *even* on which Liu’s proposal is based. The semantics of English *even* has been roughly taken to be along the analysis of entry (7). There are ongoing debates about the dimension of the scale along which the alternatives are ordered, and many identify it with comparative unlikelihood, namely that the prejacent is less likely than all of its contextually relevant alternatives. Given this understanding, (7) is often reformulated as (8) following e.g. Horn 1969; Karttunen & Peters 1979; Rooth 1985, 1992; Guerzoni

2004; Chierchia 2013.<sup>5</sup>

$$(7) \quad \llbracket \text{even} \rrbracket^{s:c} = \lambda C \lambda p. : \forall q \in C [q \neq p \rightarrow p >_c q]. \lambda w. p(w) = 1$$

where  $C \subseteq \llbracket p \rrbracket^F \wedge \llbracket p \rrbracket^O \in C$

In prose: *even*( $C$ )( $p$ )( $w$ ) presupposes that the prejacent,  $p$ , is stronger than every contextually relevant alternative  $q$  distinct from  $p$  on a scale and asserts that  $p$  is true in the world of evaluation  $w$ .

$$(8) \quad \llbracket \text{even} \rrbracket^{s:c} = \lambda C \lambda p. : \forall q \in C [q \neq p \rightarrow p <_{\text{likely}} q]. \lambda w. p(w) = 1$$

Modelling Mandarin *dōu* on English *even*, Liu (2017) suggests that *dōu* is uniformly a scalar particle that is truth-conditionally vacuous but contributes a scalar presupposition. His proposal can be viewed as consisting of four core components:

- (9) Four components of Liu's (2017) proposal on *dōu*
- a. *Dōu* is uniformly a scalar particle triggering a scalar presupposition that the prejacent  $p$  is stronger than any of its contextually relevant alternatives  $q$  in  $C$  ( $\forall q \in C [\neg(q = p) \rightarrow p >_c q]$ ) (cf. entry (7));<sup>6</sup>
  - b. *Dōu* operates on distinct types of alternatives on distinct readings:
    - i. On the distributive reading, *dōu* operates on sum-based alternatives to the focus associate triggered through the sum operator  $\oplus$  (Link 1983). Moreover, the presence of a covert distributor as in (9) (Link 1987) is posited on this reading.
 
$$(9) \quad \llbracket \text{Dist} \rrbracket = \lambda P \lambda x. \forall y [(y \leq x \wedge \text{Atom}(y)) \rightarrow P(y)]$$
    - ii. On the scalar reading, *dōu* operates on atom-based alternatives. The group operator  $\uparrow$  (Landman 1989) helps to turn the focus associate of *dōu*, if not purely atomic, into an impure atom understood collectively.
  - c. On the distributive reading, the scalar presupposition is automatically satisfied and thus trivialized (see details below);
  - d. The trivialization operation is achieved by taking the dimension of the scale along which *dōu* operates to be unlikelyhood. Based on this, Liu (2017) takes (8) to be the entry for *dōu* as well.

<sup>5</sup> There is a debate w.r.t. the quantificational force over alternatives, i.e. whether English *even* requires its prejacent  $p$  to be universally (e.g. Greenberg 2018b) or existentially (e.g. Kay 1990; Xiang 2020) stronger than its alternatives  $q$ . In this paper, we, following Liu (2017), adopt the universal view for *dōu*. Another long-debated issue concerns the additive presupposition, namely, whether *even* triggers the presupposition that at least one distinct alternative to the prejacent is true in  $w$  as well. See e.g. Rullmann 1997; Wagner 2013; Greenberg 2016 on this. We leave the additive presupposition debate aside because neither Liu's (2017) proposal nor ours hinges on this.

<sup>6</sup> Liu (2017) does not say this explicitly, but we take this to be an underlying assumption in his proposal.

With these tools, Liu’s proposal can capture the two readings of (1). Suppose that on the distributive reading, the subject ‘they’ refers to three individuals Zhangsan ( $z$ ), Lisi ( $l$ ) and Wangwu ( $w$ ), i.e.  $z \oplus l \oplus w$ , and the triggered alternatives to ‘they’ via the sum operator  $\oplus$  are as in (10a) (the underlined is the ordinary semantic value of the focus associate). With a covert distributor, the alternatives to the prejacent are as in (10b) (the underlined is the prejacent). As can be seen, the prejacent asymmetrically entails all of its distinct alternatives. Given that likelihood respects entailment (Crnič 2011), the prejacent is less likely than all its distinct alternatives, so the likelihood-based scalar presupposition as defined above (8) is trivialized. This trivialization accounts for the lack of any scalar flavor on the distributive reading of *dōu*. On the scalar reading, the subject ‘they’ can be any combination of two or more individuals, and is understood collectively or, in other words, impurely atomic with the help of the group operator. Let’s assume that ‘they’ refers to  $z \oplus l$ , and the triggered alternatives are any of the contextually relevant atom-based alternatives, purely atomic or impurely atomic via the group operator. If so, there exists no entailment relationship among the prejacent and any of the alternatives: The prejacent that  $z \oplus l$  together bought a car does not entail any of its purely atomic alternatives (e.g.  $w$  bought a car), and nor does it entail any of its impurely atomic alternatives (e.g.  $z \oplus w$  together bought a car). The atom-based alternatives simply have nothing to do with one another. As a result, the scalar presupposition cannot be trivialized but resurfaces instead, giving rise to the scalar, *even*-like flavor.

- (10) a. Sum-based alternatives to ‘they’ ( $z \oplus l \oplus w$ ):  $\text{Alt}(\llbracket they_F \rrbracket_{sum}) = \{z, l, w, z \oplus l, z \oplus w, l \oplus w, \underline{z \oplus l \oplus w}\}$   
 b. Sum-based alternatives to the prejacent =  $\{z$  bought a car,  $\dots z \oplus w$  each / DIST bought a car,  $\dots \underline{z \oplus l \oplus w}$  each / DIST bought a car  $\}$

### 3.2 An issue with the unlikelihood-based component (9d) of Liu’s proposal

As laid out above, Liu’s (2017) proposal elegantly captures the two readings in a uniform fashion, but it faces an issue with respect to the fourth component that *dōu* operates on a scale of unlikelihood (9d). It has been cross-linguistically challenged that *even*-like particles necessarily operate on a scale of unlikelihood (see e.g. Kay 1990; Rullmann 1997, 2007; Greenberg 2015, 2016, 2018a for English *even*; see e.g. Greenberg 2020 for Hebrew *aflu*, and see e.g. Miashkur & Greenberg 2019 for Russian *daže*).<sup>7</sup> In particular, Greenberg (2015, 2016, 2018a) demonstrated that the scalar presupposition that the prejacent  $p$  is less likely than its alternatives  $q$  is neither a necessary condition nor a sufficient condition to license English *even*; instead,

<sup>7</sup> Note that the Burmese particle *hmá* which can trigger an *even*-like flavor is shown to necessarily operate on a likelihood-based scale in Erlewine & New 2021.

English *even* is shown to operate on a scale associated with a gradable adjective that is dependent on the context. In the rest of this part, we will first show that unlike what has been suggested in Liu 2017 and similarly to English *even*, the likelihood-based scalar presupposition is neither a necessary nor a sufficient condition to license *dōu*, and then proceed to illustrate that analogous to the aforementioned particles, the scale which *dōu* operates on is also context-dependent.

### 3.2.1 Not necessarily an unlikelihood-based scale

Take a look at (11a) and (11b).

- (11) a. Context: Bill, very shy and solitary, only hangs out with John, the most sociable guy in his class. Mary, Bill's another classmate, invited him to her birthday party by saying:

lái cānjiā wǒde shēngrì-huì ba! Hǎo ma? [Yuēhàn]<sub>F</sub> **dōu** yào  
 come participate my birthday-party SPF good Q John dōu will  
 lái.  
 come

“Please come to my birthday party! Okay? Even John will come.”

- b. Context: Only two beverages, beer and vodka, were served at a party. Someone uttered:

#Yuēhán bù néng kāi-chē. Tā hē le jiǔ de, (lián)  
 John NEG can drive-car he drink PRF alcohol SFP including  
 [píjiǔ]<sub>F</sub> **dōu** hē le de.  
 beer dōu drink ASP SFP

Intended: “John cannot drive. He drank alcohol, (and he) even drank beer.”

In (11a), given the context that John is the most sociable guy in his class and is thus most likely to be invited and to show up at the party, the prejacent that John will come is supposed to be more likely than any of its alternatives, i.e. somebody else in the class will come. *Dōu* would be predicted to be infelicitous according to the unlikelihood-based scalar presupposition (see entry (8) and component (9d)), contra fact, illustrating that this presupposition is not a necessary condition to license *dōu*. In (11b), the prejacent that John drank beer is less likely than its contextually salient alternative that John drank alcohol; *dōu* would be predicted to be felicitous, contra fact, illustrating that this scalar presupposition is not a sufficient condition to license *dōu*, either.

We also note that akin to *dōu*, *shènzhì*, the unmarked *even* in Mandarin, does not necessarily operate on a scale of unlikelihood, either. (12a) is a duplication of (11b),

illustrating that ‘*p* is less likely than *q*’ is not a sufficient condition to license *shènzhì*. In (12b) which is translated from an example in Greenberg 2018a: 53, the prejacent is not less likely but actually more likely than its contextually salient alternative “given our world knowledge about what working tools are usually made of” (Greenberg 2018a: 53), but *shènzhì* is felicitous, showing that the scalar presupposition is not a necessary condition to license *shènzhì*, either.<sup>8</sup>

- (12) a. # Yuēhàn bù néng kāi-che. tā hē le jiǔ de, shènzhì hē  
 John NEG can drive-car he drink PRF alcohol SFP even drink  
 le [píjiǔ]<sub>F</sub> de.  
 PRF beer SFP  
 “John cannot drive. He drank alcohol, (and he) even drank beer.”
- b. Context: Seller said to the client who wanted to buy a strong tool:  
 zhè liǎng-gè gōngjù hěn jiēshí. yòu-biān nà-ge shì hěn jiēshí  
 this two-CLF tool very robust right-side that-CLF COP very robust  
 de lǔ zuò de, zuǒ-biān nà-gè shènzhì shì [gāng]<sub>F</sub>  
 DE aluminum make SFP left-side that-CLF even COP steel  
 zuò de.  
 make SFP  
 “These two tools are very strong. The one on the right is made of strong  
 aluminum, (and) the one on the left is even made of steel.”

### 3.2.2 Context-dependency

Let’s look at (13), an example with English *even* borrowed from Greenberg (2018a). In (13), the prejacent *p* (with *a boy*) that she gave birth to a boy and the prejacent *p*’ (with *a girl*) that she gave birth to a girl are of equal likelihood and both are less likely than the contextually salient alternative that she gave birth, so *even*, according to the canonical likelihood-based semantics (see entry (8)), is supposed to be equally felicitous with both *p* and *p*’, contra fact. If the context is tweaked in a such way that Princess Jane would become a queen on the condition that she gives birth to a girl rather than a boy, *ceteris paribus*, then *even* would become felicitous with *girl* but turns infelicitous with *boy*. The shifted felicity status of *even* subject to the contextual manipulation evinces that the scale which *even* operates on is context-dependent but not necessarily based on unlikelihood.

- (13) Context: Any princess who gives birth can stay in the palace. If she gives birth to a boy she becomes a queen (with the result that on average 50% of

<sup>8</sup> We did not duplicate (11a) to make this point because *shènzhì*, unlike *dōu*, cannot associate with the subject. See e.g. Shyu 2004, 2018 for the syntactic properties regarding *shènzhì*.

those who have given birth become queens).

Princess Jane gave birth. She (even) gave birth to [a boy]<sub>F</sub>/#[a girl]<sub>F</sub>.

This argument can be straightforwardly extended to *dōu* as in (14a), as well as *shènzhì* (14b).

(14) Context: Identical to that of (13). Moreover, A, unaware of whether Princess Jane has become a queen or not, asks B whether she has a child, B replies:

a. tā yǒu, (lián) [érzi]<sub>F</sub>/#[nǚer]<sub>F</sub> **dōu** yǒu.  
she have including son/daughter dōu have

Intended: “(Yes,) she has, (and) she even has a son / a daughter.”

b. tā yǒu, **shènzhì** yǒu (yí-gè) [érzi]<sub>F</sub>/#[nǚer]<sub>F</sub>  
she have even have one-CLF son/daughter

Intended: “(Yes,) she has, (and) she even has a son / a daughter.”

### 3.3 Interim summary

In this section, we showed that Liu’s (2017) proposal, on the one hand, can capture both scalar and distributive readings uniformly, but, on the other hand, it faces an issue regarding the scale *dōu* operates on. Unlike what is encoded in Liu’s proposed semantics for *dōu*, *dōu* operates on a scale that is dependent on the context. We would like to maintain Liu’s insights on how to univocally account for the two readings, but revise his proposal to circumvent this issue in the meantime. In addition, we would like the semantics of *dōu* to capture its sensitivity to standards on both its distributive and scalar readings.

## 4 A revised proposal integrating Liu 2017 and Greenberg 2018a

### 4.1 A gradability-based semantics of *dōu* operating on distinct types of alternatives

Our proposal integrates two building blocks, i.e. (i) the first three components in Liu’s (2017) proposal and (ii) a gradability-based entry of *dōu* adapted from Greenberg 2018a. Below, we look at the two building blocks respectively.

For the first building block, we follow Liu (2017) in adopting component (9a), component (9b) and component (9c) in his proposal above (9). The upside of adopting these three components is that it would help to keep a **uniform** account of the two readings. But this is not enough; instead, our final entry should be enhanced in such a way that it can also capture our observations that (a) *dōu* operates on a scale associated with a contextually supplied gradable property and (b) *dōu* is

standard-sensitive on both readings. This motivates us to plug in the second building block below.

The second building block is a gradability-based entry adapted from Greenberg 2018a. As we saw above, Greenberg (2018a) observes that English *even* is standard-sensitive (see Section 2.1) and that it operates on a context-dependent scale. To capture these observations, she, inspired by Rullmann 2007 where *even* is suggested to operate on a scale “correlated with some graded property” (Rullmann 2007: 11) and by Beck’s (1997) idea of correlative comparative, proposes a gradability-based semantics for English *even*. Given the similarities between English *even* and Mandarin *dōu* in these two regards, we adopt for *dōu* an adapted version of her proposal. Roughly speaking, following her account designed for English *even*, we suggest that the semantics of *dōu* also comprises three elements, namely, a contextually supplied gradable property  $G$ , a presupposed comparative requirement and a presupposed evaluative requirement. Informally, the contextually supplied gradable property  $G$  is adopted to capture the observation that *dōu* does not necessarily operate on a scale of unlikelihood but a contextually supplied scale. The comparative requirement says that the prejacent indicates a degree higher than its alternatives on a scale associated with  $G$ ; this is aimed to capture the ordering relation between the prejacent and its alternatives. The evaluative requirement, aimed to capture the standard-sensitivity, says that the prejacent must indicate a degree above the standard on the scale associated with  $G$ .<sup>9</sup> We take this to be the semantics of Mandarin *dōu* and formalize it as in entry (15).

(15) **A gradability-based semantics of *dōu***

$dōu(C)(p)(w)$  triggers the following scalar presupposition:

$\forall w1, w2 [w1Rw \wedge w2Rw \wedge w2 \in p \wedge w1 \in [q \wedge \neg p]] \rightarrow$

a.  $\underbrace{\text{the max } d2(\lambda d2.G(d2)(x)(w2)) > \text{the max } d1(\lambda d1.G(d1)(x)(w1))}_{\text{comparative requirement}} \wedge$

b.  $\underbrace{\text{the max } d2(\lambda d2.G(d2)(x)(w2)) > \text{Stand}_G}_{\text{evaluative requirement}}$

If defined,  $p(w)= 1$

In prose:  $dōu (C)(p)(w)$  presupposes that (a) the maximal degree  $x$ , a non-focused item in the prejacent  $p$ , holds on a scale associated with a contextually supplied gradable property  $G$  is higher in the accessible worlds  $w2$  (where  $p$

<sup>9</sup> In actuality, the evaluative element in Greenberg’s (2018a) original entry for English *even* is more restrictive in that it requires both the prejacent and its alternatives to indicate a degree above the standard. But we observe that on the distributive reading of *dōu*, it seems that *dōu* does not impose this evaluative requirement on the alternatives to the prejacent. This motivates us to relax the evaluative element in our formalization (15) in such a way that it only applies to the prejacent in our case. See Section 5 for a more detailed discussion on this issue.

holds), than in the accessible worlds  $w_1$  (where  $q$ -and-not- $p$  holds) and **(b)** the maximal degree that  $x$  holds in  $w_2$  worlds is above the standard on the  $G$  scale. If defined, the prejacent is true in  $w$ .

## 4.2 How our integrated proposal can account for our data

### 4.2.1 Accounting for the distributive and the scalar readings of $d\bar{o}u$

Recall that in Liu 2017 the distributive reading of  $d\bar{o}u$  is derived via trivialization (component (9c)) of the scalar presupposition which is built on an unlikelihood-based scale (component (9d)). On the other hand, the scalar reading re-emerges due to the lack of trivialization of the likelihood-based scalar presupposition. Given that we reject the comparative unlikelihood-based scale but instead assume a gradability-based scale, we need to derive trivialization in another way. Below we show how this is achieved by our proposal.

On the **distributive reading**, we suggest that the most salient gradable property  $G$  is **cardinality**. Assuming this kind of scale and adopting component (9b-i) that  $d\bar{o}u$  operates on sum-based alternatives on the distributive reading with a covert distributor in place, we can now show how the distributive reading is derived, and why it does not give rise to a scalar, *even*-like effect. Consider again the example in (1). The cardinality of the car-buying events indicated in the  $p$  worlds where each of  $z \oplus l \oplus w$  bought a car is larger than the cardinality of car-buying events in the  $[q \wedge \neg p]$  worlds where each of the sum-based alternatives to  $z \oplus l \oplus w$  bought a car, automatically satisfying the comparative requirement in the scalar presupposition (15a). Moreover, whatever the standard on the scale of cardinality of car-buying events is, the cardinality indicated in the  $p$  worlds is the largest cardinality possible, i.e. the maximum, and therefore always meets the standard, automatically satisfying the presupposed evaluative requirement (15b) as well. These two operations combined trivialize  $d\bar{o}u$ 's scalar presupposition in its entirety, and following Liu's ideas, no scalar flavor arises.

On the **scalar reading**, atom-based alternatives are triggered. A scale of cardinality or other dimension does not work to achieve trivialization. The cardinality of car-buying events indicated in the  $p$  worlds where  $z \oplus l$  together bought a car is identical to the cardinality of car-buying events in the  $[q \wedge \neg p]$  worlds where any of its atom-based alternatives (e.g. *it is the case that  $w$  bought a car and it is not the case that  $z \oplus l$  together bought a car*, or *it is the case that  $z \oplus w$  together bought a car and it is not the case that  $z \oplus l$  together bought a car*) holds, i.e. one. The event in  $p$  and the events in its atom-based alternatives here simply have nothing to do with one another. Therefore, no entailment relationship exists regardless of the dimension of the scale, and neither the comparative requirement (15a) nor the

evaluative requirement (15b) is met. In consequence, no trivialization occurs and the scalar presupposition re-surfaces, giving rise to the scalar, *even*-like effect. What the gradable property  $G$  precisely is here heavily depends on the context. It could be how difficult or surprising the event is in the  $p$  worlds where  $z \oplus l$  together bought a car than in the  $[q \wedge \neg p]$  worlds where, say,  $w$  bought a car.

#### 4.2.2 Accounting for the standard-sensitivity and context-dependency with *dōu*'s scalar reading

Entry (15) straightforwardly accounts for the standard-sensitivity of *dōu* on its scalar reading, as manifested in (3). Given the QUD explicitly stated in (3), a plausible, contextually supplied gradable property  $G$  is unsuitability for driving in (3a) and suitability for driving in (3b). If so, applying entry (15) to (3a) and (3b) would receive the following two presuppositions respectively:

- (16) Presuppositions of (3a) by applying entry (15):  
 $\forall w1, w2[w1Rw \wedge w2Rw \wedge w2 \in [\text{Bill drank vodka}] \wedge w1 \in [\text{Bill drank wine but no vodka}]] \rightarrow$
- a. **Comparative requirement:** the  $\max d2(\lambda d2.\text{UNSUITABLE-FOR-DRIVING}(d2)(\text{Bill})(w2)) > \text{the } \max d1(\lambda d1.\text{UNSUITABLE-FOR-DRIVING}(d1)(\text{Bill})(w1)) \wedge$
  - b. **Evaluative requirement:** the  $\max d2(\lambda d2.\text{UNSUITABLE-FOR-DRIVING}(d2)(\text{Bill})(w2)) > \text{Stand}_{\text{UNSUITABLE-FOR-DRIVING}}$
- (17) Presuppositions of (3b) by applying entry (15):  
 $\forall w1, w2[w1Rw \wedge w2Rw \wedge w2 \in [\text{Bill drank Becks Blue}] \wedge w1 \in [\text{Bill drank cola but no Becks Blue}]] \rightarrow$
- a. **Comparative requirement:** the  $\max d2(\lambda d2.\text{SUITABLE-FOR-DRIVING}(d2)(\text{Bill})(w2)) > \text{the } \max d1(\lambda d1.\text{SUITABLE-FOR-DRIVING}(d1)(\text{Bill})(w1)) \wedge$
  - b. **Evaluative requirement:** the  $\max d2(\lambda d2.\text{SUITABLE-FOR-DRIVING}(d2)(\text{Bill})(w2)) > \text{Stand}_{\text{SUITABLE-FOR-DRIVING}}$

Given in (16), the scalar presuppositions of *dōu* in (3a) are met. Specifically, on the one hand, the comparative requirement says that John's maximal degree of unsuitability for driving is higher in the  $w2$  worlds where he drank vodka than in the  $w1$  worlds where he drank beer but no vodka; this requirement is satisfied. On the other hand, the evaluative requirement says that John's maximal degree of unsuitability for driving in the  $w2$  worlds is above the standard; this requirement is also satisfied. As a result, *dōu* is correctly predicted to be felicitous in (3a). But for (3b) whose presuppositions are presented in (17), this is not the case. Concretely, the comparative requirement says that Bill's maximal degree of suitability for driving is

higher in the  $w_2$  worlds where he drank Becks Blue (a pseudo alcohol) than in the  $w_1$  worlds where he drank cola but no Becks Blue. This is not the case considering that both are non-alcoholic, thus failing the comparative requirement. Moreover, his degree of suitability for driving in the  $w_2$  worlds is by no means necessarily above the standard because there is no correlation between drinking Becks Blue and qualifying someone for driving, failing the evaluative requirement as well. Consequently, *dōu* is correctly predicted to be infelicitous.

Entry (15) also easily captures the context-dependency of the scale *dōu* operates on, as indicated in the felicity contrast in (14a). For example, in (14a), the gradable property *G* in this context can plausibly be how important Princess Jane is, and *dōu* is correctly predicted to be felicitous with *boy* as its focus associate and infelicitous with *girl* as its focus associate.

#### 4.2.3 Accounting for the standard-sensitivity manifested on *dōu*'s distributive reading

As seen above (5), *dōu* prefers *hěnduō* (many) to *hěنشǎo* (few). Assuming that with the distributive reading of *dōu* *G* measures cardinality, we propose that this is the case because the former indicates a quantity that is above the standard on a quantity-based scale while the latter indicates a quantity that is below the standard and thus violates the evaluative requirement in the scalar presupposition in (15b). In the car-sale scenario (6), (6a) is felicitous with *dōu* because the number of individuals successfully selling ten cars is above the contextually determined standard; (6b) is infelicitous with *dōu* because the number is below the standard, again violating the evaluative requirement in the scalar presupposition.

Let's briefly point out how our proposal fares better in explaining *dōu*'s selective combination with quantifiers as exemplified in (5) than Chen's (2008) proposal. As mentioned above, it is an old observation that *dōu* is compatible with quantifiers like *hěnduō* (many) and *dàbùfēn* (most) but incompatible with quantifiers like *hěنشǎo* (few), which is termed as *dōu*'s (dis)harmony by Chen (2008). Chen (2008) suggests that distributive *dōu* and scalar *dōu* should be treated as two separate *dōus* (Chen 2008: §3.4.1) and that the two *dōus* are connected through a shared "higher than expectation" presupposition (Chen 2008: 76). According to her explanation, distributive *dōu*'s selective combination with quantifiers is attributed to its "higher than expectation" presupposition. Specifically, *hěnduō* (many) indicates a quantity that is inherently higher than expected and is thus compatible with *dōu*'s "higher than expectation" presupposition; *dàbùfēn* (most) is not incompatible with this presupposition and therefore it can combine with *dōu*, too. In contrast, *hěنشǎo* (few) indicates a degree that is below the expectation, contradicting distributive *dōu*'s presupposition and thus resulting in its incompatibility with *dōu*. Chen's (2008)

proposal successfully accounts for *dōu*'s selective combination with quantifiers but it is somewhat stipulative: By hardwiring into the semantics of *dōu* as a **distributor** a **scalar** presupposition of “higher than expectation”, it boils down to *scalarizing* distributivity. Such a move is not independently motivated given that typical distributors cross-linguistically are not reported to carry a similar **scalar** presupposition (see e.g. Zimmermann 2002; Champollion 2016a,b for distributors). Our proposal fares better in that analyzing *dōu* as triggering a scalar presupposition with an evaluative requirement (similarly to English *even*) naturally captures what is intended to be captured by the “higher than expectation” presupposition.<sup>10</sup>

### 4.3 Predictions

Our proposal makes two predictions. Akin to English scalar particle *only* (Zeevat 2009; Beaver & Clark 2008 a.o.), its Mandarin counterpart *zhǐ* triggers a “below the standard” effect,<sup>11</sup> in opposition to *dōu*. Given that *dōu* imposes an evaluative requirement that the prejacent indicates a degree above the standard, our proposal predicts that an utterance would get degraded if *zhǐ* and *dōu* share the same focus associate due to their opposite requirements regarding the standard, which is borne out (18a). In (18a), *zhǐ* associates forwards with the subject whereas *dōu* associates backwards with the subject. The utterance is degraded with *dōu*, as predicted by our proposal. This contrasts with *gè*, which, as aforementioned, has been generally argued to be a bona fide distributor in Mandarin (e.g. Lin 1998; Lee et al. 2009). The presence of *zhǐ* does not affect the felicity of *gè* (18b).

- (18) a. **zhǐ** you [Yuēhàn, Bǐěr hé Mǎlì]<sub>F</sub> (??**dōu**) mǎi le yí-tào gōngyù.  
 only have John Bill and Mary *dōu* buy PRF one-CLF apartment  
 Intended: “Only [John, Bill and Mary]<sub>F</sub> each bought an apartment.”
- b. **zhǐ** yǒu [Yuēhàn, Bǐěr hé Mǎlì]<sub>F</sub> **gè** mǎi le yí-tào gōngyù.  
 only have John Bill and Mary each buy PRF one-CLF apartment  
 “Only [John, Bill and Mary]<sub>F</sub> each bought an apartment.”

The second prediction is related to the first one. If *zhǐ* and *dōu* have distinct focus associates, then the presence of *dōu* would be felicitous as long as the standard in relation to *dōu* is satisfied. This is borne out in (19). In (19), on the one hand, *dōu* associates backwards with the subject which indicates a cardinality of four individuals that satisfies the contextual requirement regarding the cardinality of

<sup>10</sup> For a more recent exploration on *dōu*'s selective combination with quantifiers, see Liu 2021 in which Liu extends his semantics of *dōu* developed in Liu 2017 to account for *dōu*'s combination with quantifiers.

<sup>11</sup> At this point we do not deal with the status of this inference with English *only* or Mandarin *zhǐ*, i.e. with whether this effect is presupposed (Zeevat 2009), or implicated (Greenberg 2018b).

individuals; on the other hand, *zhǐ* associates forwards with ‘nine’, the number of cars sold, which is below the required number of cars sold in order for staff members to get a bonus. Our proposal predicts this utterance to be felicitous because the standard in relation to *dōu* is satisfied, and this is indeed the case.

(19) Context: Identical to that of (6).

wōmēn diàn [Yuēhàn, Bǐěr, Mǎlì hé Yǎdāng]<sub>F(dōu)</sub> **dōu zhǐ** mài lē  
 we store John Bill Mary and Adam dōu only sell PRF  
 [jiǔ]<sub>F(zhǐ)</sub> liàng chēzi, méi yǒu jiǎnglì, hěn kěxī!  
 nine CLF car NEG have award very pity

“Of our store, John, Bill, Mary and Adam each only sold nine cars, (so) we have no bonus. What a pity!”

## 5 Concluding remarks & Open issues

We made a novel empirical observation that Mandarin *dōu* is standard-sensitive on both its distributive and scalar readings, which serves as novel evidence for a unified, scalar account of *dōu*. To capture its standard-sensitivity and the context-dependency of the scale it operates on, we proposed an analysis of *dōu* that integrates insights from Liu (2017) and Greenberg (2018a), and successfully account for the data without running into the issue faced by Liu (2017).

There remain to be several issues left for future investigation. Firstly, we note that *dōu*, although it is standard-sensitive on both its scalar and distributive readings as observed above, seems to be asymmetrical in imposing its evaluative requirement (see also fn.(9)). Specifically, on its scalar reading, *dōu* behaves like English *even* (20a vs. 20b) and Mandarin *shènzhì* (20c vs. 20d) in that it requires both the prejacent *p* and its alternatives *q* to indicate a degree above the standard (20e vs. 20f). However, on the distributive reading, it seems that *dōu* does not require the alternative to the prejacent to indicate a degree above the standard on a cardinality scale (21). In (21), whatever the contextually determined standard on the cardinality scale is, the contextually salient alternative *q* (*none of us bought a car*) indicates the non-existence of car-buying events, but the utterance is felicitous.

(20) Context: Identical to that of (2).

- a. John drank wine, and Bill even drank [vodka]<sub>F</sub>.
- b. ?? John drank cola, and Bill even drank [vodka]<sub>F</sub>.
- c. Yuēhàn hē le hǒngjiǔ de, Bǐěr **shènzhì** hē le [fútèijiā]<sub>F</sub> de.  
 John drink PRF wine SFP Bill shènzhì drink PRF vodka SFP  
 “John drank wine, (and) Bill even drank vodka.”

- d. ?? Yuēhàn hē le kělè de, Bǐěr **shènzhì** hē le [fútèjiā]<sub>F</sub> de.  
 John drank PRF cola SFP Bill shènzhì drink PRF vodka SFP  
 Intended: “John drank cola, (and) Bill even drank vodka.”
- e. Yuēhàn hē le hǒngjiǔ de, Bǐěr [fútèjiā]<sub>F</sub> **dōu** hē le de.  
 John drink PRF wine SFP Bill vodka dōu drink PRF SFP  
 “John drank wine, (and) Bill even drank vodka.”
- f. ?? Yuēhàn hē le kělè de, Bill [fútèjiā]<sub>F</sub> **dōu** hē le de.  
 John drink PRF cola SFP Bill vodka dōu drink PRF SFP  
 Intended: “John drank cola, (and) Bill even drank vodka.”

- (21) wǒmēn zhōng méi rén mǎi chēzi, tāmen **dōu** mǎi le yí-liàng chēzi.  
 we middle NEG person buy car they dōu buy ASP one-CLF car  
 “Nobody among us bought a car; they each bought a car.”

For this asymmetry, we have two potential explanations for now. **(a)** This could be due to the parametric variation among *even*-like particles cross-linguistically and intra-linguistically. **(b)** It might be the case that with a cardinality-based scale, discourse salient alternatives do not necessarily go into *C*. For instance, it is noted in [Greenberg 2018b](#) that unlike its overt version *only*, the covert exhaustifier EXH seems to ignore the cardinality indicated by its discourse salient alternative (22).

- (22) John wrote 2 papers, and Bill #only / exh wrote [3]<sub>F</sub>. ([Greenberg 2019](#): ex.14a)

Secondly, what is the non-focused item *x* in utterances like (1) where the subject is focused and no other apparent item can serve as *x*? Note that [Greenberg \(2018a\)](#) discusses the similar issue faced by English *even*. For instance, [Greenberg](#) notes that in (23) there is “no salient entity denoted by a non-focused item” ([Greenberg 2018a](#): 62) and suggests that it could be a “covert time space argument” (*ibid.*). Back to our case, a direction for future research, as already hinted in the descriptive interpretation given above, is to take it to be covert, namely event. If so, on the distributive reading, *dōu* (*p*) presupposes that (a) the cardinality of car-buying events in the worlds where  $z \oplus l \oplus w$  each bought car is larger than in the worlds where sum-based alternatives to  $z \oplus l \oplus w$  each bought car and (b) the cardinality of car-buying events in the world where  $z \oplus l \oplus w$  each bought a car is above the standard. We hope to pursue this line of analysis in the future.

- (23) The weather forecast says it is going to rain. And later on it may even [snow]<sub>F</sub>. ([Greenberg 2018a](#): ex.(i) in fn.(15))

Thirdly, apart from the distributive and scalar readings, *dōu* has been observed to have e.g. a universal free choice licenser reading (e.g. [Giannakidou & Cheng 2006](#);

Liao 2011; Xiang 2020) and an *already*-like reading (e.g. Hole 2003; Xiang 2008; Xiang 2020). We hope to investigate to which extent our proposal can be applied to such readings of *dōu* in future research.

- (24) nǎ-gè xuéshēng \*(**dōu**) kěyǐ jìnlái.  
 which-CLF student dōu can enter  
 “Any student can enter.” (Giannakidou & Cheng 2006: ex.69(a))
- (25) yìzhūǎnyǎn, hái zǐ **dōu** dà le.  
 in-a-blink child dōu grow PRF  
 “(Time flies!) In a blink of time, the child/children has/have already grown up. (Xiang 2008: ex.4)

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