

Ways of Decomposing Events: Structural Differences between Adnominal and Adverbial Distributive Numerals*

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1 Introduction

Natural languages often have specialized constructions to indicate that a plurality of events is distributed with respect to another plurality. In this paper, we investigate one kind of such constructions: distributive numerals (DistNums) in Mandarin Chinese, which can be either adverbial or adnominal modifiers. We present novel data in which the use of an adverbial or an adnominal DistNum in a sentence gives rise to different truth conditions. Rather than concluding that these two kinds of DistNums have different meanings, we argue for a unified analysis in which the contrast between them is due to a Neo-Davidsonian architecture of the clause in the spirit of Schein (1993).

DistNums are morphosyntactic constructions containing a numeral whereby the sentence as a whole receives a distributive reading, and the numeral itself is interpreted as if it is within the scope of a distributive operator (Cable 2014). In Mandarin, DistNums are formed by reduplicating a numeral and classifier combination; a basic example featuring *liang-ge-liang-ge-de* “in twos” is given in (1).¹

- (1) Haizi-men **liang-ge-liang-ge-de** dao le.
child-PL two-CL-two-CL-DE arrive PERF
‘The children arrived in twos/two by two.’

Syntactically, Mandarin DistNums come in two flavors: adverbial ones and adnominal ones.² These two types of DistNums can be distinguished in at least two ways: (i) adverbial DistNums are pre-verbal, whereas adnominal DistNums are strictly pre-nominal, modifying the head noun in a DP; (ii) adverbial and adnominal DistNums bear orthographically distinct markers, 地_{adv} and 的_{adn} respectively. An example for adverbial and adnominal DistNums is given in (2a) and (2b):

- (2) a. Yanhua **liang-duo-liang-duo-de** zai kong-zhong zhanfang.
firework two-CL-two-CL-DE_{adv} at sky-in explode
‘The fireworks are exploding in the sky in twos/two by two.’

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¹To the best of our knowledge, Mandarin DistNums have only been previously studied in Donazzan & Müller (2015).

²The distribution of adnominal DistNums is rather limited, in ways we don’t fully understand yet, but Cable (2014) also notes that there seems to be a cross-linguistic tendency for distributive numerals to be adverbial.

- b. **Liang-duo-liang-duo-de** yanhua zai kong-zhong zhanfang.
 two-CL-two-CL-DE_{adn} firework at sky-in explode
 ‘The fireworks are exploding in the sky in twos/two by two.’

The two sentences in (2) are truth-conditionally equivalent. Although one might think that this is always the case, in Section 3 we will present new data arguing that this is not true: there are situations where adverbial and adnominal DistNums make different contributions to the sentence. The crucial minimal pairs will involve sentences with two DistNums evaluated in contexts where there is more than one salient way to decompose the topical event into subevents. We present our proposal in Section 4, arguing that the adnominal DistNums will be explained as a result of structural rather than denotational differences. To help us navigate through the main puzzle, in Section 2 we begin with a working analysis of DistNums.

2 A working analysis of Mandarins distributive numerals

In this section, we first establish that distributivity in sentences with DistNums take very low scope: only above the numeral itself. We then present a denotation for DistNums that is consistent with such facts within the framework of Neo-Davidsonian algebraic event semantics (Davidson 1967; Krifka 1989; Champollion 2017).

2.1 The scope of distributivity

DistNums are event modifiers that decompose the plural event described by the main clause (i.e. the topical event) into non-overlapping subevents and specify the cardinality of a given participant of these subevents.³ They therefore fall into the category of what Beck & von Stechow (2007) call *pluractional adverbials*.

A question that arises concerns the scope of the distributivity associated with DistNums. Here are two different ways of stating the truth conditions of (1):

- (3) a. There is a plural event e s.t.
 e **divided into salient non-overlapping subevents** e' s.t.
 e' is an event of two children arriving
 b. There is an event e s.t.
 e is an event of the children arriving, and
 e **can be divided into salient non-overlapping subevents** e' s.t.
 e' is an event in which there are two arrivers

(3-a) and (3-b) differ with respect to the scope of distributivity: distributivity takes scope above the verb and its participants in (3-a), but only above the numeral in (3-b). These two alternatives don't render distinguishable truth conditions for a sentence like (1), but when investigating other sentences, we see that describing the scope of DistNum's distributivity as in (3-b) is on the right track.

The first piece of evidence that DistNums involve very local distributivity is that they can modify clauses that describe a collective event, as shown in (4) for both

³Mandarin DistNums, contrary to Donazzan & Müller's (2015) claim, only allow for a *temporal key reading*, i.e., they only involve distribution across occasions, not across other participants.

adverbial and adnominal DistNums.⁴ If *liang-ge-liang-ge-de* ‘in twos’ took scope above the verb phrase, this sentence would only be true if the topical event of the clause was composed of subevents of two children building a house. This reading is unavailable, however. (4) can only mean that the children built a single house together, and each subevent involves two children contributing to the building of this house.

- (4) a. Haizi-men **liang-ge-liang-ge-de** jianqi le yi-dong fangzi.
 child-PL two-CL-two-CL-DE build-up PERF one-CL house
 ‘The children built a house in twos/two by two.’
 b. **Liang-ge-liang-ge-de** haizi-men jianqi le yi-dong fangzi.
 two-CL-two-CL-DE child-PL build-up PERF one-CL house
 ‘The children built a house in twos/two by two.’

Another piece of evidence against having the distributivity associated with DistNums take scope over VPs comes from their interaction with verbal classifiers.⁵ As shown in (5), verbal classifiers cannot be interpreted under the scope of DistNums: (5) can only be true if there was a total of six explosions by all relevant firework-pairs.⁶ This contrasts with how these adverbials behave when an overt distributor, such as *dou*, is present in the sentence: in these cases, verbal classifiers are obligatorily interpreted under the scope of this operator, as shown in (6).

- (5) a. Yanhua **liang-duo-liang-duo-de** zhan-fang le liu-xia.
 firework two-CL-two-CL-DE explode PERF six-CL
 ‘The fireworks exploded in twos six times.’
 b. **Liang-duo-liang-duo-de** yanhua zhan-fang le liu-xia.
 two-CL-two-CL-DE firework explode PERF six-CL
 ‘The fireworks exploded in twos six times.’
 \rightsquigarrow there were a total of six jumps by children-pairs
 \nrightarrow there were six jumps for each children-pair
 (6) Haizi-men **dou** tiao le liu-xia.
 child-PL DOU jump PERF six-CL
 ‘The children each jumped six times.’
 \nrightarrow there were a total of six jumps by children
 \rightsquigarrow there were six jumps for each child

2.2 Framework & a working denotation for Mandarin DistNums

The analysis developed here is couched within the framework of algebraic event semantics. We assume that the domain of individuals D_e and the domain of events D_v are composed of singularities and pluralities (i.e, sums of singularities). These two domains are closed under sum formation and are partially ordered by a ‘plural-part’ relation (\sqsubseteq_{PL}), induced by the sum formation operation (defined in (7)). We

⁴Brasoveanu & Henderson (2009) use a similar test for English *one by one* (p.15-16).

⁵A verbal classifier is an event-modifying classifier that associates with a verbal phrase.

⁶It is nonetheless interesting that verbal classifiers count the explosion of a pair of fireworks as one event rather than two. Our analysis of DistNums presented in Section 4 accounts for this fact.

define in (8) two handy definitions for the discussion to follow: generalized sum formation and Link’s (1983) $*$ -operator.

$$(7) \quad \forall x \forall y (x \sqsubseteq_{\text{PL}} y \leftrightarrow x \oplus y = y)$$

$$(8) \quad \begin{aligned} \text{a.} \quad \oplus P &:= \iota x [(\forall y : P(y) \rightarrow y \sqsubseteq_{\text{PL}} x) \wedge \\ &\quad \forall x' [(\forall y : P(y) \rightarrow y \sqsubseteq_{\text{PL}} x') \rightarrow x \sqsubseteq_{\text{PL}} x']] \\ \text{b.} \quad *P &:= \lambda x. \exists P' \subseteq P : \oplus P' = x \end{aligned}$$

We take verbs to denote predicates of events, and verbal arguments to be stitched together in the sentence via thematic role introducing functional heads, as exemplified in (9) and (10), respectively (*th* and *ag* are shorthand for ‘theme’ and ‘agent’).

$$(9) \quad \llbracket \text{explode} \rrbracket = \lambda e_v. \mathbf{explode}(e) \quad (10) \quad \llbracket \text{TH} \rrbracket = \lambda x_e \lambda e_v. \mathbf{th}(e) = x$$

Following Krifka (1989), Kratzer (2007), and Champollion (2017), we take both verbs and thematic roles to be lexically cumulative:

$$(11) \quad \begin{aligned} &\mathbf{Cumulativity\ assumption\ for\ thematic\ roles} \\ &\text{For any thematic role } \theta \text{ and any subset } E \text{ of its domain:} \\ &\theta(\oplus E) = \oplus(\lambda x. \exists e \in E : \theta(e) = x) \quad (\text{Champollion 2017: 34}) \end{aligned}$$

$$(12) \quad \begin{aligned} &\mathbf{Cumulativity\ assumption\ for\ verbs} \\ &\text{For any verb } V: \llbracket V \rrbracket = * \llbracket V \rrbracket \end{aligned}$$

Following Kratzer (2007) and most subsequent literature, we indicate this by having a $*$ attached to the meta-language predicates that are cumulative as a reminder of this assumption:

$$(13) \quad \llbracket \text{explode} \rrbracket = \lambda e_v. * \mathbf{explode}(e) \quad (14) \quad \llbracket \text{TH} \rrbracket = \lambda x_e \lambda e_v. * \mathbf{th}(e) = x$$

Putting all these pieces together, our working analysis of DistNums is presented in (15). First, note that DistNums are syntactically indexed with a thematic role: we follow Champollion (2017) in assuming that distance distributivity items associate with their target DP by being indexed with the DP’s thematic role (*theta-indexing*). We furthermore assume that DistNums take as their first argument a covert pronoun of type *vt* to serve as its restrictor. We encode a presupposition that this pronoun must cover the topical event (i.e. its sum must be equal to the main event). Finally, we model the semantic restriction imposed by the classifier as a presupposition.

$$(15) \quad \llbracket \text{DistNum}_\theta \rrbracket = \lambda C_{vt} \lambda e_v : e \in * \lambda e' (\text{CL}(\theta(e')) \wedge C(e')) \wedge \mathbf{Cov}(C, e). \\ e \in * \lambda e' (|\theta(e')| = n \wedge C(e'))$$

Given that the sentences in (1) have equivalent truth conditions, we assign the meaning above for both adverbial and adnominal DistNums. The sentences in (1) are thus given the LFs in (16), which are both mapped to the truth conditions in (17). Note that, at this point, the only difference between adnominal and adverbial DistNums that we are assuming is the position in the sentence to which they are attached.

liang-kuai liang-kuai de_{theme} “in twos” (19-a). Our toy analysis for DistNums can handle these cases by assigning different values for the covers of the DistNums, as underlined in (18-b) and (19-b).

- (18) a. Zhu **san-tou-san-tou-de** ba xigua chi-wan le.
 pig three-CL-three-CL_{AG}-DE BA watermelon eat-finish PERF
 ‘The pigs, three by three, ate up the watermelons.’ (True)
- b. $\exists e(*\mathbf{ag}(e) = \oplus \mathbf{pig} \wedge * \mathbf{eat}(e) \wedge * \mathbf{th}(e) = \oplus \mathbf{wtml}$
 $\wedge e \in * \lambda e'(|* \mathbf{ag}(e')| = 3 \wedge \underline{\mathbf{day}(e')}))$
- (19) a. Zhu ba xigua **liang-kuai-liang-kuai-de** chi-wan le.
 pig BA watermelon two-CL-two-CL_{TH}-DE eat-finish PERF
 ‘The pigs ate up the watermelons, two pieces at a time.’ (True)
- b. $\exists e(*\mathbf{ag}(e) = \oplus \mathbf{pig} \wedge * \mathbf{eat}(e) \wedge * \mathbf{th}(e) = \oplus \mathbf{wtml}$
 $\wedge e \in * \lambda e'(|* \mathbf{th}(e')| = 3 \wedge \underline{\mathbf{meal}(e')}))$

Now, our next move is to describe the very same scenario using *two* adverbial DistNums simultaneously. Given that there are two salient ways of partitioning the festival event, one could expect that two DistNums in the same sentence would be able to slice up the event in different ways, since each DistNum is constrained by its own cover restrictor. That is to say, we would expect to be able to put the two DistNums in (18-a) and (19-a) together in the same sentence, and it would still be acceptable in the above scenario.

This prediction, however, is not borne out, as shown in (20-a). (20-b) illustrates that under the assumption that each DistNum can have a restrictor with a different value, our working analysis predicts (20-a) to be true, an unwelcome result.

- (20) a. Zhu **san-tou-san-tou-de** ba xigua **liang-kuai.liang-kuai-de**
 pig three-CL-three-CL_{AG}-DE BA wtml two-CL-two-CL_{TH}-DE
 chi-wan le.
 eat-finish PERF
 ‘The pigs, in threes, ate up the watermelons, two pieces at a time.’
 (False)
- b. $\exists e(*\mathbf{ag}(e) = \oplus \mathbf{pig} \wedge * \mathbf{eat}(e) \wedge * \mathbf{th}(e) = \oplus \mathbf{wtml} \wedge e \in$
 $* \lambda e'(|* \mathbf{ag}(e')| = 3 \wedge \underline{\mathbf{day}(e')}) \wedge e \in * \lambda e'(|* \mathbf{th}(e')| = 2 \wedge \underline{\mathbf{meal}(e')}))$

Furthermore, we observe a contrast between (20-a) and (21-a), the latter of which also features two adverbial DistNums, the agent-associated *yi-tou yi-tou de* “one by one” and the theme-associated *liang-kuai liang-kuai de* “in twos”. Contrary to (20-a), (21-a) is judged to be true in the provided scenario. Crucially, in this case, the two DistNums are decomposing the festival event in the same way, i.e. into subevents of “meals”.

- (21) a. Zhu **yi-tou-yi-tou-de** ba xigua **liang-kuai-liang-kuai-de**
 pig one-CL-one-CL_{AG}-DE BA watermelon two-CL-two-CL_{TH}-DE

chi-wan le.
eat-finish PERF
‘The pigs, one by one, ate up the watermelons, two pieces at a time.’
(True)

- b. $\exists e(*\mathbf{ag}(e) = \bigoplus \mathbf{pig} \wedge * \mathbf{eat}(e) \wedge * \mathbf{th}(e) = \bigoplus \mathbf{wtml} \wedge e \in$
 $*\lambda e'(|*\mathbf{ag}(e')| = 1 \wedge \mathbf{meal}(e')) \wedge e \in * \lambda e'(|*\mathbf{th}(e')| = 2 \wedge \mathbf{meal}(e'))))$

The contrast between (20-a) and (21-a) indicates that our working analysis over-generates. The reason why this contrast is unexpected under our assumptions is the following: DistNums are themselves responsible for decomposing the topical event, and the distributivity associated with them doesn’t take scope above their complement. As such, nothing should prevent the two DistNums from slicing up the same event in their own distinct ways. This very problem is also faced by the analyses developed in Cable (2014) and Donazzan & Müller (2015).

A possible way to account for the data while maintaining our working analysis of DistNums is to stipulate a constraint like the one in (22). This would rule out the truth conditions in (20-b) while still allowing for the one in (21-b).

- (22) CONSTRAINT ON DISTNUM COVERS (to be revised)
Multiple DistNums must share the same cover.

However, further observations suggest that such a constraint, if it exists at all, is not even descriptively accurate. Recall that DistNums may also be adnominal, despite their relatively restricted distribution. We can also describe the festival scenario using one adnominal plus one adverbial DistNum, as in (23), where the first DistNum is adnominal and the second one adverbial. (23) constitutes a minimal pair with (20-a): the only difference between them is that *san-tou san-tou de_{agent}* “in threes” is adverbial in (20-a) but adnominal in (23). Nonetheless, contrary to (20-a), (23) is judged as true.

- (23) **San-tou-san-tou-de** zhu ba xigua **liang-kuai-liang-kuai-de**
three-CL-three-CL_{AG}-DE pig BA wtml two-CL-two-CL_{TH}-DE
chi-wan le.
eat-finish PERF
‘The pigs in threes ate up the watermelons, two pieces at a time.’ (True)

Thus, a constraint as formulated in (22) would still fail to capture the empirical data we have presented so far. A revision of (22) to accommodate (23) could go along the following lines:

- (24) CONSTRAINT ON DISTNUM COVERS
The covers of adverbial DistNums have to match, but the covers of an adnominal and an adverbial DistNum don’t.

While this constraint appears to be descriptively accurate, it is merely a stipulation. In the next section, we’ll argue in favor of an analysis in which (24) follows directly from the grammar.

4 Analysis

We will break down the puzzle presented in the last section into two: first, we will offer an account as to why adverbial DistNums must have matching covers; we then move on to explaining why adnominal DistNums are not subject to the same condition.

4.1 Sentences with two adverbial DistNums

We frame the core issue in the following way: when two adverbial DistNums modify the same event, they have to decompose it into subevents with the same *granularity*. Rather than assuming that this is achieved via a constraint on covers, we propose that DistNums break down the topical event into *subevents that are singularities*, where a singularity is defined as in (26) (for ease of exposition, we suppress from (25) the semantic restrictions imposed by classifiers).⁷

$$(25) \quad \llbracket \text{DistNum}_\theta \rrbracket = \lambda e. e \in * \lambda e' (|\theta(e')| = n \wedge \text{SG}(e'))$$

$$(26) \quad \forall e (\text{SG}(e) \leftrightarrow \neg \exists e' (e' \neq e \wedge e' \sqsubseteq_{\text{PL}} e))$$

Some remarks about event singularities are underway. The definition of a singularity is defined in terms of the plural-part relation (i.e., the relation induced by sum formation). Such relation is not to be confused with the mereological part relation. In other words, nothing in definition in (26) implies that event singularities don't mereologically overlap with each other or do not have mereological event parts. Thus, the singular event e' of John moving his right leg is a mereological part – but not a plural part – of the singular event e of John running. In what follows, we do not touch on the matter of how event singularities are conceptualized: we just assume that these are given and a part of our domain.

In light of these assumption, we argue that in our festival scenario, there are in fact 9 salient *singular* events: 6 meals, 2 days, and 1 festival. To the extent that certain nouns can denote predicates events, this assumption is supported by the fact that singular descriptions like *the meal* and *the day* can refer to singular events that temporally overlap.⁸

We can now account for the falsity of (20-a) as a description of our festival scenario. The relevant sentence is repeated below in (27-a), and in (27-b) we can see the truth conditions we now assign to it.

- (27) a. Zhu **san-tou.san-tou-de** ba xigua **liang-kuai.liang-kuai-de**
 pig three-CL-three-CL_{AG}-DE BA wtml two-CL-two-CL_{TH}-DE
 chi-wan le.
 eat-finish PERF
 'The pigs, in threes, ate up the watermelons, two pieces at a time.'
 (False)
- b. $\exists e (*\mathbf{ag}(e) = \bigoplus \mathbf{pig} \wedge * \mathbf{eat}(e) \wedge * \mathbf{th}(e) = \bigoplus \mathbf{wtml}$
 $\wedge e \in * \lambda e' (|\mathbf{ag}(e')| = 3 \wedge \text{SG}(e')) \wedge e \in * \lambda e' (|\mathbf{th}(e')| = 2 \wedge \text{SG}(e'))$)

⁷This new entry for DistNums is very similar to Brasoveanu & Henderson's (2009) entry for English adverbial *one by one*.

⁸Thanks to Roger Schwarzschild for discussing this matter with us.

The agent DistNum is true of the sum of the days, but the theme DistNum isn't: the atomic parts of the days are singular days, and therefore the cardinality of its agent is three, and that of its theme is six.

- (28) a. $\bigoplus \text{day} \in * \lambda e' (|\text{agent}(e')| = 3 \wedge \text{SG}(e'))$
b. $\bigoplus \text{day} \notin * \lambda e' (|\text{theme}(e')| = 2 \wedge \text{SG}(e'))$

On the other hand, the theme DistNum is true of the sum of the meals, but the agent DistNum isn't: the atomic parts of the meals are singular meals, and, therefore, the cardinality of its agent is one and that of its theme is two.

- (29) a. $\bigoplus \text{meal} \in * \lambda e' (|\text{theme}(e')| = 2 \wedge \text{SG}(e'))$
b. $\bigoplus \text{meal} \notin * \lambda e' (|\text{agent}(e')| = 3 \wedge \text{SG}(e'))$

Thus, (28) is false because there is no single witness to both DistNums.⁹

4.2 Adnominal DistNums

As it is, our analysis also predicts adnominal and adverbial DistNums to match in granularity, contrary to fact. A possible solution would be to give adnominal DistNums a different denotation from adverbial DistNums. However, we will pursue a different route.

Schein (1993), for independent reasons, suggested to take Neo-Davidsonian event semantics even further: not only should the verb and its arguments be separated into different predicates of events, each of these predicates should be true of its own event argument. Each conjunct of a Neo-Davidsonian logical form should thus be true of a different event, and these events are later glued together via the relation of complete *mereological* overlap O . Our implementation of this idea is shown in (30):

- (30) a. The boys arrived.
b. $\exists e_1 \exists e_2 (*\mathbf{ag}(e_1) = \bigoplus \mathbf{boy} \wedge * \mathbf{arrive}(e_2) \wedge O(e_1, e_2))$
- (31) $O(e_1, e_2) \Leftrightarrow \forall e (e \circ_m e_1 \leftrightarrow e \circ_m e_2)$

A crucial property of this new architecture is that the different events in the logical form of the clause in (31-b) are not necessarily related by the plural part relation. It is this property that we will exploit to account for the difference between adnominal and adverbial DistNums.

Our proposal thus involves assigning the same denotation for adverbial and adnominal DistNums: the only difference between them concerns the event they modify. Given that adverbial NumNums are attached to the verbal clausal spine, we will assume that they modify the verb event. Adnominal DistNums, on the other hand, modify the event of the argument of the thematic role of the nominal they adjoin

⁹In a previous instantiation of our analysis, we accounted for this fact by having clauses to involve existential quantification over sets of events rather than of events. As far as we are aware, this previous analysis makes the same predictions as the current one but it involves more radical changes to the architecture of the clause. We also believe that analyses of DistNums within the framework of Plural Dynamic Semantics, such as Kuhn (2017) can also account for sentences with two adverbial DistNums.

to. Given that adverbial DistNums modify the same event, it follows from their semantics that they should match in terms of granularity. Adnominal and adverbial DistNums, however, do not have to mismatch, given that they do not modify the same event.

In (32), we present the truth conditions we now assign for sentences with two adverbial DistNums. As it can be seen, they both modify the same events e_3 .

$$(32) \quad \exists e_1 \exists e_2 \exists e_3 (*\mathbf{ag}(e_1) = \bigoplus \mathbf{pig} \wedge \mathbf{O}(e_1, e_3) \wedge *th(e_2) = \bigoplus \mathbf{wtml} \wedge \mathbf{O}(e_2, e_3) \\ \wedge *eat(e_3) \wedge \underline{e_3} \in * \lambda e'_3 (|*ag(e'_3)| = 3 \wedge SG(e'_3)) \wedge \\ \underline{e_3} \in * \lambda e'_3 (|*th(e'_3)| = 2 \wedge SG(e'_3)))$$

In (33), we present the truth conditions we assign for the sentence in (23): although the adverbial DistNum modifies the verbal event e_3 , the adnominal DistNum modifies the agent event e_1 .

$$(33) \quad \exists e_1 \exists e_2 \exists e_3 (*\mathbf{ag}(e_1) = \bigoplus \mathbf{pig} \wedge \mathbf{O}(e_1, e_3) \wedge *th(e_2) = \bigoplus \mathbf{wtml} \wedge \mathbf{O}(e_2, e_3) \\ \wedge *eat(e_3) \wedge \underline{e_1} \in * \lambda e'_1 (|*ag(e'_1)| = 3 \wedge SG(e'_1)) \wedge \\ \underline{e_3} \in * \lambda e'_3 (|*th(e'_3)| = 2 \wedge SG(e'_3)))$$

5 Closing remarks

To summarize, in this paper we have presented a new puzzle concerning the interpretation of distributive numerals in Mandarin Chinese, which could suggest that their adnominal and adverbial uses have different meanings. We have pursued a different explanation, arguing that the differences in the interpretation of sentences with adnominal and adverbial DistNums are due to the structural position to which these items are attached to.

Our analysis makes some desirable predictions. The two sentences below, which involves a DistNum and distributive *dou*, have different truth conditions: while (34) is false if describing the festival event, (35) is true.

- (34) Zhu **san-tou-san-tou-de** dou ba liang-kuai xigua chi-wan le.
 pig three-CL-three-CL_{AG-DE} DOU BA two-CL wtml eat-finish PERF
 ‘The pigs in threes ate up the watermelons, two pieces at a time.’ (False)
- (35) **San-tou-san-tou-de** zhu dou ba liang-kuai xigua chi-wan le.
 three-CL-three-CL_{AG-DE} pig DOU BA two-CL wtml eat-finish PERF
 ‘The pigs in threes ate up the watermelons, two pieces at a time.’ (True)

This contrast is correctly predicted if we assume the distributivity found in sentences with *dou* also involves distributivity down to atomic events. (34) is false because the distributor in the sentence and the adverbial DistNum must decompose the topical event into events with same granularity. However, (35) is true because the distributor in the sentence and the adnominal DistNum are modifying different events.

Our account, however, fails to explain why (36) is judged to be false in the festival scenario:

- (36) **Yi-tou-yi-tou-de** zhu ba xigua **liu-kuai-liu-kuai-de** chi-wan le.
 one-CL-one-CL_{AG}-DE pig BA wtml six-CL-six-CL_{TH}-DE eat-finish PERF
 ‘The pigs, one by one, ate up the watermelons in sixs.’ (False)

Given that one DistNum is adnominal and the other is adverbial, we expect them to freely decompose the main event in different ways. However, (36) is showing that either c-command or precedence also seems to play a role in this issue. One could argue that in our key sentence (23) the adnominal DistNum is in fact a distributor, taking its complement in its scope (giving rise to a meaning similar to *for each occasion with three pigs, the watermelons were eaten in twos*). However, the data discussed in Section 2.1 indicates that, just like their adverbial counterparts, adnominal DistNums’ distributivity does not take scope over other items in the sentence. We leave this as a challenge for future research.

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