Distributive Reduplication in Telugu[*]

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1. Introduction

In Telugu, as in some of the other Dravidian languages like Kannada, Tamil and Malayalam, reduplication of numerals gives rise to distributive readings. This is shown in (1) with the three kinds of distributive readings that are possible for this sentence given in (2).

(1) ii pilla-lu renDu renDu kootu-lu-ni cuus-ee-ru
these kid-Pl 2 2 monkey-Pl-Acc see-Past-3PPl
lit. 'these kids saw 2 2 monkeys'

(2) a. These kids each saw 2 monkeys. Participant key reading
b. These kids saw 2 monkeys in each time interval. Temporal key reading
c. These kids saw 2 monkeys in each location. Spatial key reading

The sentence in (1) contrasts with a similar sentence without the reduplicated numeral as shown in (3) with the possible interpretations in (4).

(3) ii pilla-lu renDu kootu-lu-ni cuus-ee-ru
these kid-Pl 2 monkey-Pl-Acc see-Past-3PPl
These kids saw 2 monkeys.

(4) a. These kids saw 2 monkeys. (collective)
b. These kids saw 2 monkeys each. (distributive)

The above examples show that the reduplicated numeral construction always gives rise to distributive readings, there are no collective readings of a reduplicated numeral

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construction like in (4a) and that it gives rise to two additional distributive interpretations that are not present in the non reduplicated construction. The focus of this paper will be to explain the obligatory distributivity that is associated with the reduplicated numeral ((henceforth *RedNum*) construction and to account for the various additional distributive readings that are possible in such constructions.

This paper shows that the reduplicated numeral is associated with a distributive operator whose sorting key (Choe 1987) is always an event or an event aspect, i.e. that not only the temporal and spatial but the participant key readings are also event key readings. Moreover I propose that the construction is associated with a plurality requirement. This links the proposal to the semantics of plurality as presented in Zweig (this volume). This is a natural connection for two reasons. One is that reduplication as is known in the literature has the semantic effects of pluralization and distributivity. The other reason is that the formal semantics literature often describes the distributive readings of a predicate as the pluralization of the predicate (Landman 1989, 2000). I propose that numeral reduplication pluralizes the numeral phrase (5). The singular *child* in Malay and the numeral phrase *2 monkeys* in Telugu undergo reduplication to form their respective plurals.

(5)	*Malay*		*Telugu*	
	anak	'child	renDu koolutu	'2 monkeys'
	anak anak	plural of 'child'	renDu renDu kootulu	plural of '2 monkeys'

2. Terminology

Choe (1987) basically assumes that a distributive operator is a universal quantifier and has a sorting key, i.e. the quantifier's restriction, over which the distribution takes place and a distributive share, i.e. the quantifier's scope, that which is distributed. This is the definition of the D-operator that is followed in this paper (6).

(6)	D-operator	sorting key	distributive share
	∀	set in restriction	entities in scope

The members of the distributive share need not be exhaustively used up when being distributed whereas the members of the sorting key need to exhaustively used up in being distributed over. This is a key difference between the distributive share and the sorting key that will be used in this paper to diagnose whether a particular DP contributes a sorting key or is rather a distributive share that is distributed over some covert key.

As regards sorting keys, since events are always located in time and space, it is not surprising that these two aspects or dimensions of the event are encoded in the semantics of the event variable. As Link (1998) puts it "time stretches are assigned to events, and also certain regions in space". Link (1998) makes use of the temporal and spatial traces of events. The temporal trace is the time period in which the event happens and the spatial trace is the spatial region where the event happens.

3. The Data and the Properties of *RedNum*

3.1 Intransitive constructions

The DP containing *RedNum* can be the only DP in the sentence (7).

(7) renDu renDu kootu-lu egir-i-niyyi
2 2 monkey-Pl jump-Past-3PPl
lit. '2 2 monkeys jumped'

This sentence can have one of the two interpretations (8).

(8) a. 2 monkeys jumped in each time interval. Temporal key reading
b. 2 monkeys jumped in each location. Spatial key reading

In (8a) there are 2 monkeys jumping each time, i.e. the monkeys are distributed in 2's over the temporal aspect of the event. Using the terminology of Choe (1987), the DP '2 2 monkeys' is the distributive share. The temporal aspect of the event is the sorting key. I'll name this the 'temporal key reading'. In (8b) there are 2 monkeys in each location, i.e. the monkeys are distributed in 2's over the spatial aspect of the event. Here again, the DP '2 2 monkeys' is the distributive share. The sorting key in this reading is the spatial aspect of the event; I'll name it the 'spatial key reading'.

3.2 Transitive construction with singular subjects

The DP containing *RedNum* can occur in a transitive construction with a singular DP as the other argument (9).

(9) Raamu renDu renDu kootu-lu-ni cuus-ee-Du
Ram 2 2 monkey-Pl-Acc see-Past-3PSg
lit. 'Ram saw 2 2 monkeys'

This sentence has two interpretations (10).

(10) a. Ram saw 2 monkeys in each time interval. Temporal key reading
b. Ram saw 2 monkeys in each location. Spatial key reading

Like the intransitive construction, the transitive construction with a singular DP has two possible readings, the temporal key reading (10a), and the spatial key reading (10b).

3.3 Transitive construction with plural subjects

The reduplicated numeral can occur in a transitive construction with a plural DP as the other argument (11).

(11) pilla-lu[1] renDu renDu kootu-lu-ni cuus-ee-ru
kid-Pl 2 2 monkey-Pl-Acc see-Past-3PPl
lit. '[the] kids saw 2 2 monkeys'

This sentence has three possible interpretations (12).

(12) a. The kids each saw 2 monkeys. Participant key reading
b. The kids saw 2 monkeys in each time interval. Temporal key reading
c. The kids saw 2 monkeys in each location. Spatial key reading

Along with the temporal key reading (12b) and the spatial key reading (12c) that exist for the intransitive construction and the transitive constructions with a singular DP, the transitive construction with a plural DP has an additional reading (12a) not seen in the earlier two constructions, which I'll name the 'participant key reading'. In this reading, the DP containing the plural acts as the sorting key, over which the *RedNum* phrase '2 2 monkeys' is distributed. Here a 'participant' in the event is acting as the sorting key, hence the term 'participant key reading'.

3.4 Transitive construction with universal QP subjects

The *RedNum* DP can also occur in a construction with a universal quantifier (13).

(13) Prati pillavaaDu renDu renDu kootu-lu-ni cuus-ee-Du
Every kid 2 2 monkey-Pl-Acc see-Past-3PSg
lit. 'Every kid saw 2 2 monkeys'

The sentence in (13) has three possible interpretations (14).

(14) a. Every kid saw 2 monkeys. Participant key reading
b. Every kid saw 2 monkeys in each time interval. Temporal key reading
c. Every kid saw 2 monkeys in each location. Spatial key reading

The readings in (14) are similar to the readings that exist for the construction with plural DPs in (12) in that they have the same types of sorting keys.

3.5 Transitive construction with two *RedNum* phrases as subject and object

The two arguments in a transitive construction can both be *RedNum* phrases (15).

(15) iddaru iddaru pilla-lu naalugu naalugu kootu-lu-ni cuus-ee-ru
2 2 kid-Pl 4 4 monkey-Pl-Acc see-Past-3PPl
lit. '2 2 kids saw 4 4 monkeys'

[1] Definite plurals in Telugu are not morphologically definite, i.e. there is nothing corresponding to a definite article in the morphosyntax of the noun phrase. The indefinite and definite interpretations of the noun phrase depend on the context. In a sentence like this the noun phrase is always interpreted as definite.

The interpretations that are possible for such a construction are given in (16).

(16) a. 2 kids in each time interval saw 4 monkeys in each location.
Temporal & Spatial keys
b. 2 kids in each time interval saw 4 monkeys in each time interval.
Temporal & Temporal keys
c. 2 kids in each location saw 4 monkeys in each time interval.
Spatial & Temporal keys
d. 2 kids in each location saw 4 monkeys in each location.
Spatial & Spatial keys

Here there is no 'participant key' reading. This can be ascertained by checking whether the members of either DP need to be exhaustively used up in the distributive relation. Native speakers report that in none of the readings in (16) do either of the DPs have to be exhaustively used up in the distributive relation. Therefore it can be concluded that neither of them is the sorting key in any of the readings, and that the sentence does not have a participant key reading. As there are two *RedNum* phrases, 2 distributions are possible. The sorting keys are always either the temporal aspects of the event or the spatial aspects of the event.

3.6 Constructions with *RedNum* in the subject position

In (17) is a sentence with the *RedNum* DP in subject position.

(17) iddaru iddaru pilla-lu kootu-lu-ni cuus-ee-ru
2 2 kid-Pl monkey-Pl-Acc see-Past-3PPl
lit. '2 2 kids saw [the] monkeys'

It can have three possible interpretations (18).

(18) a. Each of the monkeys was seen by 2 kids. Participant key reading
b. The monkeys were seen by 2 kids in each time interval. Temporal key reading
c. The monkeys were seen by 2 kids in each location. Spatial key reading

Like in (11), where *RedNum* was in the object position, there exist three readings, the participant key reading (18a), the temporal key reading (18b), and the spatial key reading (18c).

3.7 Descriptive generalizations

The descriptive generalizations that can be made from the above examples about the behavior of *RedNum* are the following (19):

(19) a. In a transitive construction with a singular subject or when both the DPs in a transitive construction have *RedNum*, and in the intransitive *RedNum*

construction, only the spatial and temporal key readings are possible.
b. In a transitive construction with a plural or universal, along with the spatial and temporal key readings, the participant key reading is available.
c. The *RedNum* DP can never be the sorting key.
d. *RedNum* can occur in both subject and object positions, and there is no obvious subject/object asymmetry with respect to the possible range of readings.

The task of the analysis in this paper is to produce a unified account of this diverse group of constructions involving *RedNum*, and to account for the readings that are possible with each kind of construction.

3.8 *RedNum* vs. Binominal *Each*

As RedNum always forces a distributive interpretation, it is reminiscent of binominal *each* in English. But there are major differences between them.

RedNum can occur with a singular DP, whereas binominal *each* cannot (20) (From here on I will drop the actual Telugu sentences and just give the literal English glosses).

(20) a. 'RAM SAW 2 2 MONKEYS' = (9)
b.*John saw 2 monkeys each

RedNum can occur in a construction with a distributive universal but binominal *each* cannot (21).

(21) a. 'EVERY KID SAW 2 2 MONKEYS' = (13)
b.*Every kid saw 2 monkeys each

The sorting key can be covert as in the temporal and spatial key readings or overt as in the participant key reading in a *RedNum* construction with plurals and universals, as shown earlier, whereas a binominal *each* construction only allows the participant key reading (22).

(22) a. '[THE] KIDS SAW 2 2 MONKEYS' = (11)

The kids each saw 2 monkeys.	Participant key reading
The kids saw 2 monkeys in each time interval.	Temporal key reading
The kids saw 2 monkeys in each location.	Spatial key reading

b.The kids saw 2 monkeys each.

The kids each saw 2 monkeys.	Participant key reading
*The kids saw 2 monkeys in each time interval.	Temporal key reading
*The kids saw 2 monkeys in each location.	Spatial key reading

As a result of these differences the analyses for binominal *each* won't carry over to *RedNum*. The analysis I propose for *RedNum* might be restricted to describe binominal *each*.

4. Analysis

4.1 The analysis of Spatial and Temporal key readings

I'll begin the analysis with the *RedNum* constructions that only have the temporal and spatial key readings, the intransitive construction and the singular subject construction, repeated here as (23) and (25).

(23) '2 2 MONKEYS JUMPED' = (7)

(24) a. 2 monkeys jumped in each time interval. Temporal key reading
b. 2 monkeys jumped in each location. Spatial key reading

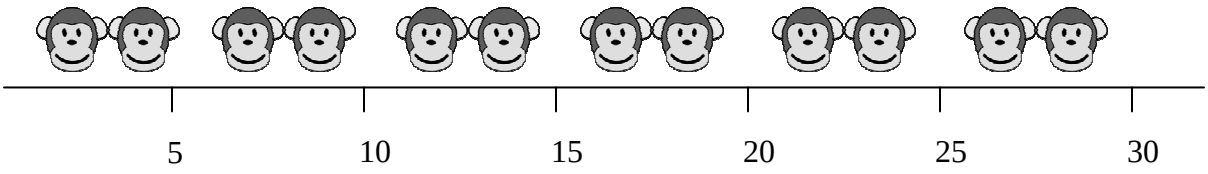
(25) 'RAM SAW 2 2 MONKEYS' = (9)

(26) a. Ram saw 2 monkeys in each time interval. Temporal key reading
b. Ram saw 2 monkeys in each location. Spatial key reading

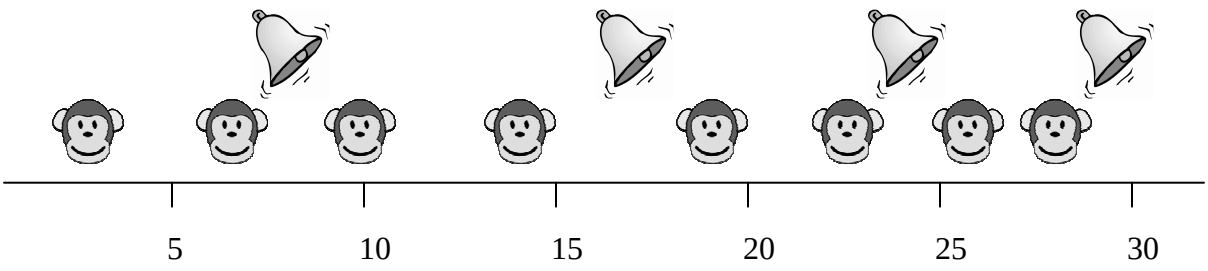
I propose that *RedNum* has a D(istributivity)-operator associated with it and that takes an event, or event-aspect as its argument. The temporal and the spatial key readings are special cases of the event key reading.

But what do 'each time interval' and 'each location' refer to? After all time and space are not atomic, they are not inherently chunked out into minimal units. They are mass-like. The division of the spatial and temporal regions into units happens according to the context. The units need not be of equal duration in the case of temporal regions or of equal dimensions in the case of spatial regions (27).

(27) a. *Temporal Division I*



b. *Temporal Division II*

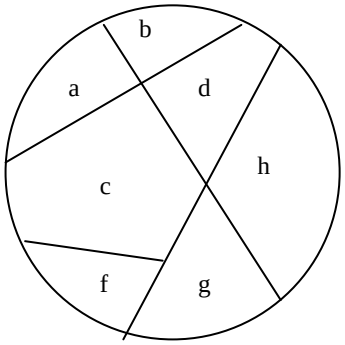


Imagine a situation where there are a number of monkeys in the monkey pavilion at a zoo. Suppose every 5 minutes, there are 2 monkeys that jump (27a); and they can be next to one another or very far from one another. Then a kid observing these monkeys can say '2 2 monkeys jumped'. He is chunking the temporal continuum into 5 minute intervals and it is true that for each of these intervals there were 2 monkeys in it that jumped. Therefore the sentence is felicitous. Now suppose that 2 monkeys jump up not at regular intervals but every time that a bell is rung and the bell is rung irregularly (27b). In this situation too a kid watching the monkeys could say '2 2 monkeys jumped', this time chunking the temporal region into intervals delineated by the ringing of the bell. So the measure using which the temporal region is divided is based on some contextually salient parameter, and as long as there are 2 monkeys that jumped in each interval of the time region divided up in this fashion, the sentence is felicitous. The situation is similar for the spatial division as well.

Now suppose that all the monkeys' foreheads were colored, such that for each color there were 2 monkey of that color that jumped. A kid observing these monkeys could not felicitously say '2 2 monkeys jumped' by which he meant that 2 monkeys of each color jumped. So a division of the jumping event based on kind or type is not possible. It is only along the spatial or temporal dimensions that the event can be divided into intervals over which the 'monkey jumpings' can be distributed.

According to the analysis so far the sentence in (23) '2 2 monkeys jumped' will have the interpretation of the form: There was an event *e* such that for every relevant part *e'* of *e*, two monkeys jumped in *e'*. Now what is every relevant part? I'll be using the notion of a partition (a set of non-overlapping subsets or parts) to model the relevant parts of *e*. The figure in (28) is an example of a partition. The circle is the event *e* that is partitioned along the spatial or the temporal dimension into a set of non-overlapping parts by a contextually salient method of division as we just saw. Here *a, b, c, d, f, g* and *h* are the non-overlapping parts or cells of the partition.

(28) $\pi(e) = \{a,b,c,d,f,g,h\}$



The sentence in (23) is then given the (preliminary) form (29):

(29) $\exists e\, \exists \pi(e)\, [\, \forall e' \in \pi(e)\, \exists X[\text{two\_monkeys}(X) \wedge \text{jumped}(X, e')\,]]$

There exists an *e* such that there is a partition π of *e* such that 2 monkeys jumped in each cell of the partition. Here *e* is a particular set of events. It is the parthood of the events that I'm concerned with but I'll be modeling it with a set. π is a contextually salient partition of *e*. For the purposes of this paper I will not explicitly distinguish between the spatial and temporal aspects.

4.2 Plurality requirement

The question arises whether the 2 monkeys that jump up per cell have to be different or not, i.e. could the same 2 monkeys be doing the jumping every time.

Suppose there are 3 monkeys in the pavilion, but it is always the same 2 monkeys which jump up when the bell rings. A kid observing the monkeys cannot felicitously say '2 2 monkeys jumped' with the temporal key reading in mind, because it is the same 2 monkeys that jumped up every time. But suppose there was a rule that if every time the bell rang, 2 monkeys jump up, then the kid can feed the monkeys. In such a case the kid can say to the zoo keeper '2 2 monkeys jumped' intending the temporal key reading, even in the above situation when it was the same 2 monkeys that jumped each time that the bell rang. In this context the identity of the monkeys is not relevant. This is similar to the felicity conditions of the Event-related Reading (ER) of sentences like 'Last year, 4000 ships passed through the lock' that Doetjes and Honcoop (1997) discuss. They suggest that a necessary condition for the felicity of ER is that the identity of the ships be both irrelevant and easy to ignore.

Thus, I assume that the pairs of monkeys must be distinct or if not, their identity must be irrelevant and easy to ignore. I will call this the plurality requirement: there needs to be more than one pair of monkeys jumping in e. But the formula in (29) does not capture this.

The plurality requirement that we want to add should not be a conjunct because if the same two monkeys jumped in every cell of the partition, (23) is not false, but is rather infelicitous in some way. The plurality requirement is either a presupposition or an implicature, it is clearly not a conjunct in the assertion. Zweig (this volume) argues that the plurality requirement in English plurals is a conversational implicature. In this paper I will not take a stand. I simply formulate the plurality requirement as an added condition. The logical form of the sentence in (23) '2 2 monkeys jumped' will now be (30):

(30) a. $\exists e\, \exists \pi(e)\, [\, \forall e' \in \pi(e)\, \exists X[\text{two\_monkeys}(X) \wedge \text{jumped}(X, e')]]$
b. $|\{X: \text{two\_monkeys}(X) \wedge \text{jumped}(X, e)\}| > 1$

The content of (30b) is reminiscent of the implicature in Zweig's proposal that uses E-type anaphora to events: the cardinality of monkey pairs jumping in e is greater than one.

As will be shown the plurality requirement will also block the participant key reading in a *RedNum* construction with a singular subject.

4.3 The readings with Universals

4.3.1 Temporal and Spatial key readings - Easy

The *RedNum* construction with a universal quantifier is repeated in (31) with the possible readings given in (32):

(31) 'EVERY KID SAW 2 2 MONKEYS' = (13)

(32) a. Every kid saw 2 monkeys. Participant key reading
b. Every kid saw 2 monkeys in each time interval. Temporal key reading
c. Every kid saw 2 monkeys in each location. Spatial key reading

In (32b) and in (32c), the temporal and the spatial key readings, there are two distributions going on, one associated with the distributive universal quantifier 'every kid' and the other with the *RedNum* DP, with the temporal and spatial aspects of the event as the sorting keys for the D-operator associated with *RedNum* in (32b) and (32c) respectively.

These readings can be analyzed like the earlier temporal and spatial key readings, by using a partition of some event *e* for every kid. This is shown in (33):

(33) a. $\exists E[\forall y[kid(y) \rightarrow \exists e \in E \ \exists \pi(e) [\forall e' \in \pi(e) [\exists X[two\_monkeys(X) \wedge saw(y, X, e')]]]]]$
b. $|\{X: two\_monkeys(X) \wedge \exists y[kid(y)[saw(y, X, E)\}| > 1$

There is an event *E* such that for each of the kids there is an event *e* which is a part of *E* such that there is a partition of *e* such that the kid saw 2 monkeys in each cell of the partition associated with him/her. When the partition is of the spatial domain, the spatial key reading arises and when the partition is of the temporal domain the temporal key reading arises. This analysis is able to account for the double distribution that we find in the temporal key reading and the spatial key reading.

4.3.2 Participant key reading - A Problem: Redundancy of distribution

In (32a), the participant key reading, the universal QP, 'every kid' is apparently acting as the sorting key. It was shown for the temporal and spatial key readings with a universal that an additional distributive mechanism is contributed by the universal distributive quantifier 'every' besides the distribution associated with *RedNum*. But in (32a), there is only one distribution going on. So for the participant key reading with universals there is a certain redundancy of distribution.

What is puzzling is how the universal quantifier can act as the sorting key. The universal quantifier already associates with its own distributive operator. This is a problem if we take the view that the quantifier phrase 'every kid' is contributing the sorting key for the D-operator associated with *RedNum*.

4.3.3 Participant key reading - Changing the perspective on the sorting key

I propose is that the participant key readings are also event key readings. In these readings also there is a partition, but the partition is a trivial partition where the whole event is the single cell in the partition.

(34) The trivial partition: $\pi(e) = \{e\}$

Notice that a partition of a set A is a set B that contains non-overlapping subsets of A and exhausts A. A is a subset of itself. Thus the trivial partition, with the whole event as the single cell is as good as a partition which is non-trivial.

To analyze the participant key readings I'll start with the construction with the universal 'every kid saw 2 2 monkeys'. This now gets the same interpretation as the temporal and spatial key readings, (33), repeated here as (35):

(35) a. $\exists E[\forall y[kid(y) \rightarrow \exists e \in E\ \exists \pi(e)\ [\forall e' \in \pi(e)\ [\exists X[two\_monkeys(X) \wedge saw(y, X, e')\ ]]]]]$

b. $|\{X: two\_monkeys(X) \wedge \exists y[kid(y)[saw(y, X, E)\}| > 1$

The only difference between the event key readings and the participant key reading is that for the temporal and spatial key readings the partitions are non-trivial. If the partition is trivial, i.e $\pi(e) = \{e\}$, then all the monkey-sighting events by an individual kid are lumped together. Thus, for every kid there will be just 2 monkeys that he or she saw. The plurality condition then says that altogether there have to be more than two monkey pairs. The interpretation in (35) then gives us all the three readings, the participant key reading, the temporal key reading and the spatial key reading.

But does the postulation of the trivial partition in (34) bring about any unwanted readings in the construction with the singular DP? I'll show that it does not, in the next section.

4.4 Lack of Participant key reading in the Singular DP construction

It was shown the *RedNum* construction with a singular DP has only the temporal key reading and the spatial key reading, A participant key reading, with the distributive share, '2 2 monkeys' trivially distributing over the 'participant', the subject DP 'Ram', is not possible (36).

(36) 'RAM SAW 2 2 MONKEYS' = (9)

*Ram saw 2 monkeys.	Participant key reading
Ram saw 2 monkeys in each time interval.	Temporal key reading
Ram saw 2 monkeys in each location.	Spatial key reading

According to the analysis that I have built up so far, the interpretation for this sentence 'Ram saw 2 2 monkeys' will be (37).

(37) a. $\exists e\, \exists \pi(e)\, [\forall e' \in \pi(e)\, \exists X[\text{two\_monkeys}(X) \wedge \text{saw}(\text{ram}, X, e')]]$
b. $|\{X: \text{two\_monkeys}(X) \wedge \text{saw}(\text{ram}, X, e)\}| > 1$

There exists an event *e* and such a partition of *e* such that 2 monkeys were seen by Ram in each of the cells of the partition. The number of monkeys seen by Ram in that *e* is greater than 2. The plurality requirement in (37b) blocks the participant key reading, because in the participant key reading there will be only two monkeys such that Ram saw them, and the condition in (37b) requires that the number of monkeys seen by Ram be greater than 2. This is a welcome result of the analysis. So in the cases where there is no plurality as a 'participant' (as in the plural and universal constructions), the trivial partition will not deliver a participant key reading because of the plurality requirement. The plurality condition takes care of this problem because it requires there to be more than one member of the distributive share.

4.5 The readings with Plurals

Finally, I analyze the participant key reading in a *RedNum* construction with plurals, repeated in (38) with the possible interpretations in (39).

(38) '[THE] KIDS SAW 2 2 MONKEYS' = (11)

(39) a. The kids each saw 2 monkeys. Participant key reading
b. The kids saw 2 monkeys in each time interval. Temporal key reading
c. The kids saw 2 monkeys in each location. Spatial key reading

Along the lines of my analysis, the temporal key and spatial key readings come about from the partitioning of the event into parts such that in each cell of the partition the kids saw 2 monkeys. The interpretation of these readings would be (40):

(40) a. $\exists e\, \exists \pi(e)\, [\forall e' \in \pi(e)\, \exists X[\text{two\_monkeys}(X) \wedge \text{saw}(\text{the kids}, X, e')]]$
b. $|\{X: \text{two\_monkeys}(X) \wedge \text{saw (the kids}, X, e)\}| > 1$

There exists an *e* such that there is a partition of *e* in which 2 monkeys were seen by the kids in each of the cells of the partition. The number of monkeys cumulatively seen by the kids is greater than 2.

So how does the participant key reading arise? I propose that when predication with a plural subject is interpreted as collective or cumulative, the construction with *RedNum* will have the temporal key and the spatial key readings. When the predication is interpreted as distributive, the participant key reading arises when the partition is construed as trivial. The interpretation that we then get is (41):

(41) a. $\exists E[\forall y \in \text{ the kids}[\exists e \in E[\forall e' \in \pi(e)\, [\exists X[\text{two\_monkeys}(X) \wedge \text{saw}(y, X, e')\,]]]]]$

b. $|\{X: \text{two\_monkeys}(X) \wedge \exists y[y \in \text{the kids} \wedge \text{saw}(y, X, E)\}|>1$

There is an event *E* such that for each of the kids there is an event *e* which is a part of *E* such that there is a partition of *e* such that the kid saw 2 monkeys in every cell of e. Altogether more than one monkey-pair was seen by the kids in E.

Note that there are four logical possibilities. We saw that the collective or cumulative predication + non-trivial partition gives rise to the temporal and spatial key readings, the distributive predication + trivial partition gives rise to the participant key reading. The collective or cumulative predication + trivial partition combination will be ruled out by the plurality requirement. The distributive predication + non-trivial partition combination gives rise to readings that are parallel to the temporal and spatial key readings with the universal.

The participant key reading with plurals then arises because of two factors. (i) The predicate 'saw two-two monkeys' is distributive with respect to the subject 'the kids', i.e. the sentence has two D-operators: one coming from the predicate and one coming from *RedNum*. (ii) There is just one cell in the partition of *e* for each kid – one that comprises all his/her two-monkey sightings in *e*, i.e. the distribution associated with *RedNum* is redundant, the partition is trivial.

The generalization about *RedNum* is now the following:

(42) The D-operator contributed by *RedNum* only takes events (event-aspects) as its sorting key. A set of individuals is not accepted as its sorting key.

The so called "participant key" reading is also, according to this analysis, an event-key reading, but with a trivial partition of the event.

4.6 The main features of the proposal

The analysis that I have elaborated so far can be summed up as follows:

(43) (i) *RedNum* has a D-operator associated with it.
(ii) The D-operator takes an event or event-aspect as its sorting key
(iii) The event structure can be fine grained (non-trivial partition of *e*) or coarse grained (trivial partition of *e*).
(iv) *RedNum* is associated with a plurality requirement.

5. Conclusion

In this paper I have proposed that *RedNum* is/has a D(istributivity)-operator which takes an event or an event-aspect as its argument, and that it is associated with a plurality requirement. This accounts for the temporal key readings and spatial key readings. I argue that the "participant-key" reading is in fact also an event-key reading. The extra D-operator comes from the predicate in the case of plural DP constructions or from the universal quantifier in the construction with a universal QP. In these cases the action of the D-operator

associated with *RedNum* is invisible because the event structure is coarse grained for these cases, i.e. there is a trivial partition of the event associated with each participant. The analysis is also able to correctly predict the multiple readings that are possible in constructions involving more than one distributive numeral.

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