## The compositional morphosemantics of pluractionality

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Jan 2023

# The plan for the week

This week, in this course, I would like to introduce you all to the morphosemantics of pluractionality. We will not only focus on compositional issues, but I would like to think about composition as much as we can because it is the area of pluractionality that is least understood.

- Day 1: A general introduction to pluractionality, its common typological manifestations, as well as some very basic initial compositional issues we could consider.
- Day 2: We will focus on dependent indefinites and dependent pluractionality, which exhibit what looks like "split scope" (pre-theoretically speaking). We will consider how various authors have tried to deal with the complex scopal phenomena.
- Day 3: We will take a deep dive into the incredibly complex morphological system of plural agreement / pluractionality we see in the language Seri, spoken in the Mexican state of Sonora. Seri pluractionality presents major hurdles for compositionality. We will consider how we might overcome these hurdles.

# How to identify pluractional morphology

#### Pluractionality

A pluractional verb is a derived verb that denotes a predicate which cannot be satisfied by an atomic event

### Some examples

We will return to the definition, but sometimes it is more easy to start with some examples.

- X-i-tzuy-e'.
  CP-A1s-sit-P.ITV
  '1 sat.'
- (2) a. X-i-tzuy-**ulöj**. CP-A1s-sit-ulöj *'I sat various times.'* 
  - b. X-in-Ø-tzuy-utzu'

CP-E1s-A3s-sit-utzu'

'I made the motion of sitting there many times.'

c. X-in-Ø-tzuy-ula'

CP-E1s-A3s-sit-ula'

'I sat in various places.'

In each example from the Kaqchikel language we have a verbal derivation that produces a verb, a predicate of events, which cannot be satisfied by an atomic event. For this reason, they satisfy the definition.

- I will call this morphology "pluractional"
- Verbs derived by a pluractional are called "pluractional verbs"

Why should we focus on verbal derviation?

Doesn't it seem that inflection can also "pluralize" verbs?

(3)

- a. ¿Que pasó? Mur**ió**.
- b. ¿Que pasó? Murieron.

If (3a) is true, there is just a single event. But, if (3b) is true there must be a plurality of events—one for each participant (everyone dies alone).

The problem is that plural agreement does not always require a plural event (we will some special cases of inflection in Seri later this week, which tell a more complex story). With many verbs, plural agreement is consistent with an atomic event.

- (4) Jorge levantó una mesa una vez.
- (5) Supose that a the children are working in a group and they lift a table together just once.
  - a. Levantaron una mesa.

For this reason we don't wnat to say that plural inflection is a pluractional morpheme. (Also, this does not accord with our idea that pluractionality is a verbal category.)

Why should we focus on verbal derviation?

It seems that adverbials can also "pluralize" verbs.

### (6)

- a. Levantaron la mesa uno por uno.
- b. Levantaron la mesa individualmente.
- c. Levanté la mesa muchas veces.
- d. Levanto la mesa cada dia.
- e. ...y más
- f. ...y más y más

Sometimes these adverbials are called "pluractional adverbials"

- I do not challenge that these adverbs produce verbs that cannot be satisified by adomic events...
- ...but I don't think that we want to say that these adverbials are pluractional morphemes in the same sense as the affices that we have seen in languages like Kaqchikel.

There are some reasons:

- Languages with pluractional affixes also have these kinds of adverbials—that is to say, these adverbials do not compete with pluractional affixes for lexicalization.
- There are many languages with pluractional affixes, so we should want to talk about pluractional affixes as a distinct phenomenon with respect to the typology.
- Finally, the contrast between pluractional adverbials and bona fide pluractionality is similar to what we see in other more familiar domains, in particular, with nominals.
  - Nominals have morphology that derive predicates that cannot be satisfied by atomic individuals—árbol / árboles
  - Also there are modifiers that require plural individuals—dos, cada, muchos, etc.

My point of view is that we want to explore these analogies between plural nominals and plural verbs, and for this reason it would be best to focus on these intriguing verbal derivations.

Also, for this course, we can think about the composition of nominal plural derivations along with plural nominal modifiers, and then ask whether verbal plurationals and verbal modifiers have the same structure. Thus, I think my core definition is a good place to start our investigation—again:

#### Pluractionality

A pluractional verb is a derived verb that denotes a predicate which cannot be satisfied by an atomic event

There are cases about which I am still not decided. These tend to involve suppletion and are especially common in the indigenous languages of North America. Usually they are called "plural agreement verbs" or "participant-numbered verbs". Here are some examples from South Paiute discussed by Sapir.

(7)

- a. watcï- "place (an objet)"
- b. yuna- "place (various objets)"

(8)

- a. pitcï- "arrive (one entity)"
- b. ïmwii- "arrive (various entities)"

### (9)

- a. qarï- "sit, inhabit (one entity)"
- b. yu $\gamma$ wi- "sit, inhabit (various entities)"

What do we want to say about these examples?

- Well, suppletion can be a form of derivation, so I am happy to say that these cases involve verbal derivation.
- But, I think that there is not sufficient data to confirm that these verbs always require plural events
  - for verbs like *ïmwii* "arrive", I think so
  - for verbs like  $yu\gamma wi$  "inhabit", I don't know

The truth is that we don't know much about "participant-numbered verbs", but I think they are probably more like semantically contentful verbal agreement, and so bypass pluralizing the event argument.

# Typology of Pluractionality

### Which languages have pluractionality?

Now that we have a definition of pluractionality, we can explore its typology. Wood 2007 considers a sample of 43 languages that come from a variety of families and regions.

<sup>‡</sup> Hoan, Luvale, Ewe
Hausa, Syrian Arabic, Lango
Chechen, Georgian
Russian, Finnish, Basque
Korean, Turkmen, Evenki
Kannada, Burushaski
Mandarin, Thai, Vietnamese
Fijian
Yimas, Amele, Kobon, Daga
Nunggubuyu, Kayardild, Wardaman
Central Alaskan Yup'ik, Thompson River Salish,
Slave
S. Sierra Miwok, Yurok
Kiowa, Koasati, Wichita, S. Paiute
Tuscarora
Chalcatongo Mixtec, Tzutujil
Imbabura Quechua, Guaraní, Hixkaryana, Yagua

In this sample, 36 of the 43 languaes have some form of pluractionality.

- The sample is small, but the number of languages with pluractionality is notable.
- Generally, there is agreement that the languages of Africa and the Americas commonly have pluractional morphemes.
- Also, generally pluractional affixes are less common in the languages of Europe (especially western Europe)
- ▶ I think that crosslinguistically, pluractionality is extremely common.

# How many pluractional morphemes does a language usually have?

No pluractionality	Basque, Burushaski, Guaraní, Hixkaryana, Imbabura Quechua,
	Lango, Mandarin Chinese (7)
Marginal	Finnish, Syrian Arabic, Korean, Chalcatongo Mixtec, Turkmen,
pluractionality	Russian, Vietnamese (7)
1 or 2 pluractionals	Georgian, Ewe, Kiowa, Hausa, Chechen, Yimas, Kayardild,
	Fijian, Kannada, Nunggubuyu, Thai, Yagua, Wardaman, Daga,
	Tzutujil, Yurok, Amele, Southern Sierra Miwok, Wichita,
	Kobon, Tuscarora, Thompson River Salish, Koasati (27)
>2 pluractionals	Central Alaskan Yup'ik, Evenki, #Hoan, Slave, Southern Paiute,
	Luvale (6)

Woods does not have a single Mayan language in her sample. My experience with these languages is that they all have three more more. For Kaqchikel, I have found 5 or 6 verbal pluractional affixes.

I think we need more more descriptive and theoretical work on these languages, so please...join me! Usually, many people assume that these is a connection between pluractionality and reduplication. Yes, there are a fair few cased marked in this way, but is not the rule.

We find languages with reduplicative pluractional morphemes. Consider Karitiana, which is spoken in Brazil.

(10) Öwä naka-kot-kot sypomp opokakosypi. kid 3.DECL-break-break.NFUT two.OBL egg 'The child broke two eggs.' Also we find languages that mark pluractionality with partial reduplication. Consider the Yurok language.

syaahlk- to kick sya'syaahlk- to kick (more than once) kwryrch- to (give a) whistle kwrykwryrch to whistle 2/3 times, be whistling (EW 2:22) Finally, there are langauges, like Finnish, which use non-reduplicative affixes. Finnish frequentative verbs (Sulkala & Karjalainen 1992:312)<sup>±</sup>

aja 'drive' ajella 'drive around'

kysy/ä 'ask' kysellä 'ask repeatedly'

When we take a typological point of view, we see that, usually, pluractional verbs are not marked via reduplication.

Form of pluractional	Number of pluractionals
Full reduplication	6
Partial reduplication	10
Full or partial reduplication <sup>6</sup>	2
Non-reduplicative affixes	55
Other <sup>7</sup>	10
Total	83

TABLE 2.3: Forms of pluractional categories

We have seen that a plural argument can (but not always), indicate a plurality of events.

- For the same reason, a pluractional verb can indicate that an argument is plural.
- Thus, perhaps there is a connection between nominal plurality and pluractionality.

That is to say, perhaps languages that have pluractionality don't mark plurality on nominals because it is redundent. Is this the case?

#### The answer is no!

Nominal number	No pluractionality	Marginal pluractionality	1-2 pluractionals	>2 pluractionals
1 (Most)	2	4	6	3
2 (Some)	3	1	7	2
3 (Few)	1	0	6	1
4 (None)	1	2	4	0

The facts indicate that pluractionality, while able to indicate that an argument is plural, has other function, and for this reason, they are not in competition.

- Later we will see that pluractional morphemes do not just pluralize an argument, but also act over this plural argument:
  - usually these argument receive a distributive interpretation, but also there are other interpretations.

#### Argument plural only: Yup'ik distributive postbase (Jacobson 1984:542)

tekite- 'to arrive' tekitequut 'they are leaving one after another'

nere- 'to eat' ner'qui 'he is eating them one after another'

While we want to discuss the semantics of these pluractional morphemes, also I want to raise another typological question.

# Which arguments can be "pluralized" by a pluractional morpheme?

Pluralised argument	Number of languages
O only	10
S only	4
	(2 of which pluralise only S of stative)
A only	0
S/O	12
S/A	4
S/A/O	5

# Variation in the meaning of pluractionality

Up to this point, we have focused on the morphosyntactic typology of pluractionality.

- How to define a pluractional
- Which languages have pluractional morphemes
- How many do they have
- etc.

Now we should consider their semantics. The question is "what semantic notions are lexified by pluractional morphemes"

In this section I would like to identify the semantic parameters along which pluractional morphemes vary.

We will see that this question reduces to anothe question—in particular, When can we say that we have a single event and when can we say we have more? Sometimes it can be difficult. Kratzer presents a case like the following

My friend and I plant a rosebush. I dig a hole. My friend puts it inside. I cover it with soil. He waters it a bit from the hose, but then he hands the hose to me in order to finish watering.

How many events are there?

- One? The planting of a rosebush?
- Four? Each step in the proessing of planting a rosebush?
- Five? Each thing that we did between us?

In this question we have the seeds of a theory of the semantics of pluractionality

- A pluractional morpheme does two things:
  - It says how to count events—that is, it says when we have events that are distinct.
  - It says that we have a plurality of events that we can ditinguish by the method of counting.

What we will see is that pluractional morphemes distinguish pluralities of events (most centrally) through the route of time, space, and thematic participants.

We can distinguish events via their location in time. There are three features that interest us (but there are also some sub-features).

- multiple occasions / just one occasion
- continous repetition / intermitent repetition
- numer of reptitions

When the plurality of events occurs in a manner that suggests that they are part of the same macroevent, we say that they occur on the same occasion.

- (11) Luvale extensive suffix
  - a. -jingumuka "turn energetically"
  - b. -jínwomwoka "oscillate"
- (12) Luvale extensive suffix
  - a. -telemuka "turn to the side"
  - b. -telwomwoka "wobble"

That is to say, the character of the macroevent is a plural event.
In contrast, when the events occur independently and with more time between them, we say that occur on multiple occasions.

(13) yurok "repetitive" kipun kwegeskwes-ek winter have.a.cold.ITR-1SG 'I get colds in the winter.'

In many cases these pluractional morphemes have a habitual meaning.

Continuous repetition is very simple. It is when there is no time (or minimal time) between the events that satisfy the non-pluractional verb.

- (14) Yup'ik reversativo
  - a. ane- "leave"
  - b. angetaartug "enter and leave"
- (15) Ruso po + -va
  - a. blestat "glow"
  - b. pobleskivat "flicker"
  - c. smotret' "look at"
  - d. posmtrivat' "shoot glances"

Intermittent repetition is more complex because there are many ways in which a repetition can be intermittent. There are two ways that I would like to focus on.

- Aperiodic repetitions—the time between the events is unpredictable or varies.
- (16) Northern Paiute "heggwi"
  - a. Paumawünü "rain"
  - b. Paumawünüheggwi "rain every once and awhile"

This type is very common.

We also find pluractional morphemes that prefer periodic repetitions—the time between the events is uniform.

(17) X-Ø-chin-**ilöj** ri kanpana.

COM-A3s-ring-löj the bell

'The bell repeatedly sounded.' (Speaker Comment: like on the hour)

In her study, Woods found that pluractionals that prefer continuous repetitions are more common

- + continuous 50
- continuous  $11\,$
- **+/- continuous** 16

Usually, pluractionality does not signify that there is a simple plurality (more than 2).

- Instead, pluractional verbs require a plurality that is "sufficiently large".
- The context says what is "sufficiently large"

(18) Yup'ik +a-postbase

- a. igar- "write"
- b. igarauq "write various people"
- c. atur- "sing"
- d. aturauq "sing various songs"

What is "various"? Well, it is more than 2, but the context decides.

Sometimes the pluractional morpheme requires that the plurality of events is large.

- it is like the contrast between "various" and "a lot"
- The two are sensitive to the context, but also there is a semantic difference in their cardinality.

#### (19) Hausa intensive

- a. maaree "hit"
- b. mammaaree "hit a lot"

What does not often exist are languages with pluractional morphemes that require a simple plurality. I know of only one case—Karitiana, which requires the pluractional form for all verbs that are satisfied by more than one event.

(20) Öwä naka-**kot-kot** sypomp opokakosypi. kid 3.DECL-**break-break**.NFUT two.OBL egg 'The kid broke two eggs.'

I do not know why this type of pluractionality is so uncommon, but it is a critical difference between verbal and nominal plurality and should have important consequences for how we think of verbal plurality (based on what we know from the nominal domain).

We can also distinguish events by their location in space.

- There are fewer types of this kind of spatial variation—I think there are more or less three.
- There are pluractionals that only have spatial readings are uncommon, and usually we only see these readings with verbs of motion.

These use a type of plural existential quantification over a contextually apportioned bit of space.

Spatial plural only: #Hoan "Verb-ing around" suffix (Collins 2001:466)

Titi 'a-kí 'am-q∥o

Titi PROG kí[PL] eat-around

'Titi is eating around (e.g. in several places in one day)'

These use a type of universal quantification over a contextually apportioned bit of space.

Amele distributive (Roberts 1987:313)

- Uqa sab eu cawal-ade-i-a
- 3s food that grab-dist.-3s-tod.p

'He grabbed all of that food'

Uqa maha cunug wal-ade-i-a

3s land all search-dist.-3s-tod.p

'He searched the whole land'

The events must occur, more or less, at the same time, but in various locations.

- Koasati has this morpheme -ci.
- (21) a. pá $\lambda\lambda$ in 'split'
  - b. pá $\lambda\lambda$ í:**ci**n 'splinter'
- (22) a. ta $\lambda$ abanápkan 'jump'
  - b. ta $\lambda$ abanáplí:**ci**n 'overflow'

### Thematic variation

Thematic variation is how I want to describe pluractionality that involves an argument of the verb.

- The canonical way that we can distinguish events by way of their arguments is to distribute the participants over a plural event.
- For this reason, there is a connection between pluractionality and distributivity (which we will explore more tomorrow)

Each individual in a plural argument has its own event (but there are no other conditions over those events)—e.g., The students **each** left.

(23) Slave distributive

a. ?óné**yá**godéla 'I gave them individually.'

This kind of pluractionality is not very common, but it exists. More common is distributivity over a plural argument, but also the events are ordered in time (or space).

Each individual in a plural argument has its own event, and the events are distinguished in time (or space).

- (24) Slave seriative
  - a. yáíhtsin 'do it one by one.'
- (25) Yup'ik distributive postbase
  - a. tekite- 'arrive'
  - b. tekitequut 'arrive one by one'
  - c. nere- 'to eat'
  - d. ner'qui 'eat one by one'

It is infrequent, but pluractional morphemes exist which involve mixed distributivity where the events must occur in different locations.

(26) Evenki

- a. lo:van- 'hang (meat or fish to dry)'
- b. lo:vat- 'hang (pieces of meat or fish to dry) here and there'

# Grouping Properties

We have discussed a large number of semantic properties of pluractional morphemes.

- But we have discussed them as if they were independent
  - That is to say, can we find pluractional morphemes that mix these properties in any manner?
  - Or, do these properties clump, forming distinct types of pluractional morphemes?

We shall see that the latter can be answered affirmatively.

### Grouping Properties

In particular, there are two types of pluractional morphemes that appear time and time again combining the properties we have seen in this section in a particular way. Yurok presents an example of these two.

- An event-internal pluractional
- (27) Ko'moy-o' 'o prkwprkwr hear-SG LOC REP.knock 'I hear knocking.' (someone's at the door)
  - An event-external pluractional
- (28) kipun kwegeskwes-ek winter have.a.cold.ITR-1SG 'I get colds in the winter.'

The central idea is that with "event-internal" pluractionals, the repetitions occur inside of a macroevent with its own identity or character. The "event-external" pluractionals involve a plurality of events that are more independent.

The characteristics of "event-internal" pluractionality

- (29) a. preference for "semelfactive" and "achievement" verbs
  - b. contiguous repetition (en space or time)
  - c. single occasion
  - d. large cardinality
  - e. same theme or telos
  - f. does not entail the base-predicate

The characteristics of "event-external" pluractionality

- (30) a. applies to all verbs ignoring aktionsart (except maybe statives)
  - b. allows intermittent repetition
  - c. multiple occasions or habitual readings
  - d. tolerates smaller cardinalities
  - e. does license entailments to the base-predicate

## How do we analyze all of this?

At the end, what most interests us is an analysis of the patterns that we have seen. We can't analyze everything but I want to focus on a few questions.

- How do we explain the "event internal" / "event external" contrast? That is to say, can we provide an analysis that can explain the grouping of properties that we see.
- How does distributivity function in the pluractional domain and is it similar to quantifiers and other markers of distributivity?
- How similar is pluractionality and plurality (in the nominal domain).

Each of these questions has a compositional partner:

- Do event-internal and event-external pluractionals have different compositional properties. (I think yes! Involving how close to the root they apply)
- Is pluractional distributivity compositionally like other kinds of distributive markers in other domains (Yes! Though, I think there are different kinds of distributive pluractionality. Tomorrow we will see a particular beautiful case of symmetry)
- Does pluractionality compose differently than plurality in the nominal domain? (Here I don't know, but I think it does. We will dig more into this on day three).

In answering these questions I constantly want to look for parallels between plurality and pluractionality. I think this is the null hypothesis.

I want to say, as much as possible, things like: "Ahhh, event-internal pluractionals are no more than [mass nouns / group nouns / bare plurals / etc.] in the domain of events."

Where there are differences between pluractionality and plurality, I hope we can attribute them to ontological differences between events and individuals, and syntactic differences between nouns and verbs.

- For instance, events are defined by their temporal properties but individuals are usually not defined this way.
- Or, for example, verbs have argument structure (mirrored by their events having thematic roles), but individuals normally do not.

An analysis of the semantics of the internal / external distinction

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## Introduction

### Introduction

Mayan languages have a variety of pluractional affixes—morphology deriving verb stems that cannot be satisfied in single-event scenarios.

A pluractional near-minimal pair (Cutzal Chacach et al. 1999: p. 58)

 (i) Ri ajch'olöy wakx, n-Ø-u-chuq'-ij ru-qül ri wakx The butcher cow ICP-A3s-E3s-pierce-SS E3s-neck the cow r-ichin ni-Ø-käm. E3s-reason ICP-A3s-die

'The cow-butcher pierces the cow's neck to kill it.'

 (ii) Ri ajch'olonel n-Ø-u-chuq'-cha' ru-qül ri mama' wakx. the butcher ICP-A3s-E3s-pierce-Ca' E3s-neck the big cow
'The butcher keeps stabbing at the big cow's neck.' There is a persistent intuition in the literature that pluractionality can be analyzed by taking some type of individual reference familiar from the nominal domain and importing it into the event domain.

- Pluractionals treated like plural count nouns (Lasersohn 1995)
- Pluractionals treated like group nouns (Wood 2007, Tovena & Kihm 2008)
- Pluractionals treated like mass nouns (van Geenhoven 2004)

#### Goal 1

We must recognize a new kind of collective noun-swarm nouns

(i) team, family vs. swarm, grove

#### Goal 2

So-called event-internal pluractional verbs are just swarm verbs

(ii) Ri ajch'olonel n-Ø-u-chuq'-cha' ru-qül ri mama' wakx. the butcher ICP-A3s-E3s-pierce-Ca' E3s-neck the big cow

'The butcher keeps stabbing at the big cow's neck.'

#### Result 1

There are even fine-grained cross-domain similarities between subtypes of nouns and subtypes of verbs

#### Result 2

Pluractionality is reducible to plural event reference broadly construed

### Groups vs. Swarms

A quick note on terminology.

- I use group noun to refer to canonical group nouns. I call the kind of entities they denote groups.
- I use collective noun as the supercategory containing both group nouns and swarm nouns.

#### (i) GROUP NOUNS

- a. committee
- b. team
- c. squad
- d. group
- (ii) SWARM NOUNS
  - a. grove
  - b. bouquet
  - c. horde
  - d. swarm

Barker 1992 classifies collective nouns as those that can take a bare plural *of*-complement, but not a bare singular one.

#### Groups with *of*-complements

- (i) a. a team of players
  - b. \*a team of player
  - c. an army of children
  - d. \*an army of child
  - e. a committee of scholars
  - f. \*a committee of scholar

Barker 1992 classifies collective nouns as those that can take a bare plural *of*-complement, but not a bare singular one.

#### Singular non-collectives with *of*-complements

- (ii) a. \*a piece of cookies
  - b. a piece of cookie
  - c. \*a slice of pizzas
  - d. a slice of pizza
  - e. \*a table of woods
  - f. a table of wood
Barker 1992 classifies collective nouns as those that can take a bare plural *of*-complement, but not a bare singular one.

#### Swarms with *of*-complements

- (iii) a. a grove of trees
  - b. \*a grove of tree
  - c. a horde of barbarians
  - d. \*a horde of barbarian
  - e. a bouquet of flowers
  - f. \*a bouquet of flower

Collective nouns are felicitous with collective predicates, which require plural arguments.

### Collective predicates 1

(i)	a.	The soldiers gathered in the valley.	(PL)
	b.	The platoon gathered in the valley.	(GROUP)
	C.	The horde gathered in the valley.	(SWARM)
	d.	*The soldier gathered in the valley.	(SG)

Collective nouns are felicitous with collective predicates, which require plural arguments.

### Collective predicates 2

(ii)	a.	The students encircled a camp fire.	(PL)
	b.	The team encircled the ball.	(GROUP)
	c.	The grove encircled a small spring.	(SWARM)
	d.	*The student encircled a camp fire.	(SG)

Separation with collective predicates that do not piggyback on notions of spatial arrangement

## Non-spatial collective predicates 1

(1)	a.	Those trees look alike.	(PL)
	b.	That family looks alike.	(GROUP)
	c.	*That grove looks alike.	(SWARM)
	d.	*That tree looks alike.	(SG)

Separation with collective predicates that do not piggyback on notions of spatial arrangement

### Non-spatial collective predicates 2

(2)	a.	Those flowers looks good together.	(PL)
	b.	That family looks good together.	(GROUP)
	c.	*That bouquet looks good together.	(SWARM)
	d.	*That flower looks good together.	(SG)

# Swarms *≠* Groups

### Separation under one by one-style distributivity

one	by	one modification	
(i)	a.	The students voted one by one.	(PL)
	b.	The students walked onto the field one by one.	
	c.	The committee voted one by one.	(GROUP)
	d.	The team walked onto the field one by one.	
Opa	que	eness to one by one modification	
(ii)	a.	*I chopped down the grove one by one.	(SWARM)
	b.	*Mary smelled the bouquet one by one.	
	c.	*George voted one by one.	(SG)
	d.	*George walked onto the field one by one.	

Separation under stubbornly distributive predication (Schwarzschild, 2009).

# Stubborn distributivity

- (i) Suppose that the players on a team are standing around in a circle.
  - a. #The players are circular.(PL)b. #The team is circular.(GROUP)
- (ii) Suppose that the soldiers in an platoon are standing in middle of a hotel lobby and you have to walk quite a ways to get around them.
  - a. #Wow, these soldiers are wide!(PL)b. #Wow, this platoon is wide!(GROUP)

Separation under stubbornly distributive predication (Schwarzschild, 2009).

Opaqueness to stubborn distributivity

- (iii) Suppose a large number of pine trees are standing close together in a circle.
  - a. That pine grove is circular. (SWARM)
- (iv) Imagine you are walking around pine grove and it is taking quite awhile to get around.
  - a. Wow, this pine grove is wide.

(SWARM)

# Swarms *≠* Groups

### Separation under cardinality considerations

### Swarms resist mere non-atomicity

- (i) a. John planted a grove of thirty redbud trees.
  - b. # John planted a grove of two redbud trees.
  - c. A horde of five-hundred undead attacked.
  - d. # A horde of two undead attacked.

## Groups tolerance mere non-atomicity (attested examples from Google)

- (ii) a. Doubles tennis pits one team of two players against another.
  - b. They appointed a committee of two lawmakers.
  - c. He needs to learn to cook for a family of two.

	SWARMS	GROUPS
plural pseudopartitives	1	1
spatial collective predicates	1	1
non-spatial collective predicates	X	1
one-by-one distributivity	X	1
stubborn distributivity	X	1
simple plurality	X	1

# Analyzing Groups and Swarms

# Groups a la Barker 1992

A partial membership function f



Once we have access to f mapping each individual to its members we can account for the dual nature of group nouns.

- Grammatical phenomena that treat groups like atomic individuals target whatever individual the group denotes—say a
- Grammatical phenomena that treat groups like plural individuals target f(a).

For example, bona fide collective predicates under Barker's account are translated as follows:

(i) looks alike  $\rightsquigarrow \lambda x [LOOK.ALIKE(f(x))]$ 

- f([[singular]]) = atom
- f([[plural]]) = plurality
- f([[group]]) = plurality
- f([[swarm]]) = atom

# The meaning of grove

(i) grove  $\rightsquigarrow \lambda x \exists P[atom(x) \land part(P, \varsigma(x)) \land contiguous(\varsigma(x)) \land fine_{\mu=area}(P) \land \forall s \in P \exists y[\varsigma(y) = s \land TREE(y)]]$ 

"Grove is true of an individual if its contiguous spatial extent can be partitioned into many parts, each of which is the spatial extent of a tree."

- non-spatial collective predicates
- spatial collective predicates
- opaqueness to distributivity
- high cardinality
- general spatial entailments

Warning: This denotation is probably still too strong. See the formal appendix for how to substitute lexically specified **cluster** predicates for the **contiguous** predicate above.

# **Event-internal Pluractionality**

# Turning toward pluractionals

Consider Yurok, which has two pluractional morphemes that have been traditionally called the *iterative* and the *repetitive* (Garrett, 2001).

#### An event-internal pluractional

(i) Ko'moy-o' ('o) prkwprkwr hear-SG (LOC) REP.knock

'I hear knocking.' (someone's at the door)

#### An event-external pluractional

- (ii) kipun kwegeskwes-ek winter have.a.cold.ITR-1SG
  - 'I get colds in the winter.'

### Characteristics of Event-Internal Pluractionality

(1)

- a. aspectual selection for semelfactives and achievements
- b. contiguous repetition
- c. one occasion
- d. high cardinality
- e. shared telos or theme
- f. failed entailments to the base predicate

# Characteristics of Event-External Pluractionality

(2)

- a. aspectually promiscuous
- b. non-contiguous repetitions
- c. habitual (occasion) readings
- d. low cardinality
- e. entailments to the base predicate

# Naturally-occuring -Ca' pluractionals

- (i) Jun ak'wal yalan n-Ø-u-qeb'-eqa' r-i' pan ulew.
  a child much ICP-A3s-E3s-rub-Ca' E3s-REFL P earth
  'A child is rubbing himself on the ground.'
- (ii) Jun xti moy r-onojel q'ij n-Ø-u-tzin-itza' ri ru-q'ojon pa a DIM blind E3s-all day ICP-A3s-E3s-strum-Ca' the E3s-guitar P k'ayb'äl. market
  - 'A blind person strums his guitar all day in the market.'

#### Semelfactives

- (i) a. X-Ø-u-chap-acha' ri ch'atäl. CP-A3s-E3s-touch-Ca' the table
   'He kept tapping the table.'
  - b. X-Ø-u-k'oj-ok'a' ru-chi' ri jay.
    CP-A3s-E3s-knock-Ca' E3s-mouth the house

'He kept knocking at the door.'

c. X-Ø-u-t'in-it'a' ri kem. CP-A3s-E3s-hammer(weft)-Ca' the weaving

'He kept hammering the weft of the weaving.'

#### Accomplishments

- (i) a. #X-Ø-u-b'an-ab'a' ri jay. CP-A3s-E3s-build-Ca' the house 'He kept building the house.'
  - #X-Ø-u-tz'ib'a-tz'a' ru-b'i.
    CP-A3s-E3s-wrote-Ca' E3s-name

'He kept writing his name.'

c. #X-Ø-u-kem-eka' ri po't. CP-A3s-E3s-weave-Ca' the blouse

'He kept weaving the blouse.'

#### Achievements

(i) a. X-Ø-in-ch'ar-ach'a' ri tros. CP-A3s-E3s-split-Ca' the stump

> 'I kept chopping at the stump.' Comment: It's like if your axe is really dull.

b. X-Ø-in-tzuy-utza'. CP-A3s-E3s-sit-Ca'

> 'I kept (making the motion of) sitting there.' Comment: Your bottom doesn't really hit the chair.

c. X-Ø-u-yuch'-uya' ri su't. CP-A3s-E3s-double.over-Ca' ri wrap

'I kept folding over the wrap.' Comment: Like if you can't get it lined up even.

### Activities

(i) a. X-Ø-u-chok-ocha' ri ch'ich'. CP-A3s-E3s-push-Ca' ri car

> *'He kept pushing on the car.' Comment: It's like it's stuck and keeps rocking back into place.*

b. X-Ø-u-sir-isa' ri koloch'. CP-A3s-E3s-roll-Ca' ri ball

'I kept rolling the ball (back and forth in place).'

c. X-i-ru-tz'et-etz'a'. CP-A1s-E3s-look.at-Ca'

'He kept glancing at me.'

#### Every so once and awhile

- (i) Suppose Juan has a rash on his arm and every so often it itches so he scratches it.
  - #A Xwan x-Ø-u-roch-ora' r-aq'a.
  - CLF Juan CP-A3s-E3s-scratch-Ca' E3s-hand

'Juan kept scratching his arm.'

Comment: No, it would be like this: [scratches vigorously back and forth on her arm].

### Once a day

(ii) Suppose you see Juan every day and he gives you a dirty look.
 #A Xwan x-i-ru-tz'et-etz'a'.
 CLF Juan CP-A1s-E3s-look.at-Ca'

'Juan keeps looking at me.'

Comment: No, it would have to be like this: [speaker turns his head a bit and shoots a glance over and over].

# Restriction to high cardinality

#### Low cardinalities

(i) Suppose Juan looks over at you twice.
 #A Xwan x-i-ru-tz'et-etz'a'.
 CLF Juan CP-A1s-E3s-look.at-Ca'

'Juan keeps looking at me.'

(ii) Suppose Juan taps the table 4 or 5 times.
 #A Xwan x-Ø-u-chap-acha' ri ch'atäl.
 CLF Juan CP-A3s-E3s-touch-Ca' the table

'Juan keeps touching the table.'

## High cardinalities

(iii) Suppose Juan taps the table 15 or 20 times.
 A Xwan x-Ø-u-chap-acha' ri ch'atäl.
 CLF Juan CP-A3s-E3s-touch-Ca' the table

'Juan keeps touching the table.'

## No distribution over pluractional subevents

(i) Suppose there is a large group of people across the street and they each turn and glance at me once.
 #X-i-ki-tz'et-etz'a' ri winaq-i'.
 CP-A1s-E3p-look.at-Ca' the person-PL

'The people kept glancing at me.'

- (ii) Suppose a bunch of people come by my market and pick up a particular tomato, squeeze it once, and put it down.
  #X-Ø-ki-pitz'-ipa' la jun xkoya' la'.
  CP-A3s-E3p-squeeze-Ca' that one tomato there
  - 'They kept squeezing that tomato.'

# Swarm-based Analysis of Event-Internal Pluractionality

### The meaning of -Ca'

(i) 
$$-Ca' \rightsquigarrow \lambda V_{\varepsilon t} \lambda e \exists P[atom(e) \land Part(P, \tau(e)) \land contiguous(\tau(e)) \land fine_{\mu=length}(P) \land \forall t \in P \exists e'[\tau(e') = t \land V(e') \land e[\tau]e']]$$

"Given a verb stem V, an event-internal pluractional event is an atomic event whose contiguous temporal trace can be divided into many small parts, each of which is the temporal trace of an event satisfying V."

There are only two differences between the denotation of event-internal pluractional verbs and swarm nouns:

- Trace equivalence condition— $e[\tau]e'$
- We have used a temporal, not a spatial trace.

There are clear cases of space-based event-internal pluractionality.

- (i) =Hoan (Collins, 2001)
  - a. ciu 'dig'  $\rightarrow ki'$ -ciu-q o 'dig around'
  - b. 'am 'eat'  $\rightarrow ki'$ -'am-q o 'eat around'

# The meaning of -Ca'

(i)  $-Ca' \rightsquigarrow \lambda V_{\varepsilon t} \lambda e \exists P[atom(e) \land Part(P, \tau(e)) \land contiguous(\tau(e)) \land fine_{\mu=length}(P) \land \forall t \in P \exists e'[\tau(e') = t \land V(e') \land e[\tau]e']]$ 

We immediately capture all of the generalizations.

- Contiguity
- High cardinality
- Aspectual selection for semelfactives
- Opaqueness to distributive operators

# A closer look at distributivity

Distributors like *one by one* cut across the event–individual divide (e.g., Brasoveanu & Henderson 2010).

#### Cross-domain distributivity

- (i) Pa ju-jun ri moläj x-Ø-ki-mol ki' pa k'ayb'äl.
  P one-RED the group/team CP-A3s-E3p-gather REFL P market
  'The group/team arrived in the market one by one.'
- Pa ju-jun x-Ø-ki-k'uy-uk'a' pa jay.
  P one-RED CP-A3s-E3s-knock-Ca' P house

'One by one they kept knocking at the door (#each person knocks once / each person knocks many times)'.

But we can show that this isn't just a fact about pluractionality in general

## X-by-X adverbials distinguish pluractional stems

(iii) Ri aj x-e-b'oj-löj pa ka-ka. The fireworks CP-A3p-explode-löj P two-RED

'The fireworks kept exploding two by two.'
## A Comparison with Previous Approaches

The first formal account (Lasersohn, 1995)

- (i) verb-plrc  $\rightsquigarrow \lambda E \forall e \in E[P(e) \land card(E) \ge n]$ , where  $P \neq VERB$ 
  - Pluractional events are assimilated to count pluralities
  - ► Event-internal pluractional derivations say P ≠ verb'

## Problems

- Fails to predict opaqueness to distributivity
- The fact that the observed properties cluster is accidental

Group-based accounts: Wood 2007 and Tovena & Kihm 2008

- (i) a. jump  $\rightsquigarrow \lambda e[\text{JUMP}(e)]$ 
  - b. jump-plrc  $\rightsquigarrow \lambda e \exists e' [*JUMP(e') \land e = \uparrow e']$

## Problems

- Predicts opaqueness to some distributors
- Fails to predict opacity to one by one modification
- Fails to account for other facts, like high cardinality, spatial entailments, aspectual properties, etc.

The \* is cumulative closure (i.e., if P(a) and P(b), then  $*P(a \oplus b)$ ). The  $\uparrow$  is Landman's (2000) groupification operator.

Finally, there are approaches, like Xrakovskij 1997 and van Geenhoven 2004, which take event-internal pluractionals to have mass reference.

## Problems

- Predicts opaqueness to distributors, including one by one modification.
- Accounts for aspectual facts
- Fails to account for the cardinality facts
- Fails to account for spatial entailments

## Improvements over previous approaches

## Mass nouns tolerate low cardinality

- (i) A plate comes out of the dishwasher with a single grain of rice still stuck to it.
  - a. This dish isn't clean! There is still rice on it.
- (ii) Your friend wants to return the truck you rented, but there is a still a single couch inside.
  - a. Don't take it back, yet! We still have furniture to move.

### Mass nouns tolerate spatiotemporal distance

- (iii) a. I kept finding that rice for weeks all over the kitchen.
  - b. #I kept finding that bouquet for weeks all over the kitchen.

#### In sum

Event-internal pluractional verbs cannot have

- plural count reference
- group reference
- mass reference

Their properties instead receive a unified account if they have swarm reference.

# **Event-external Pluractionality**

Recall that event-external pluractionals have the following properties:

(3)

- a. aspectually promiscuous
- b. non-contiguous repetitions
- c. habitual (occasion) readings
- d. low cardinality
- e. entailments to the base predicate

This section provides an analysis of the Kaqchikel pluractional *–löj*, illustrated below, which is argued to instantiate event-external pluractionality.

(4) X-Ø-chin-**ilöj** ri kanpana. COM-A3s-ring-**löj** the bell

'The bell rang repeatedly.'

- (5) Ri ak'wal x-Ø-jil-ilöj r-oma ri yab'il. The child COM-A3s-complain-löj E3s-because the illness 'The child complained every little bit because of the illness.'
- (6) K'o w-äk' yïn n-Ø-qer-elöj pa toq'a.
  exist E1s-chicken I COM-A3s-cluck-löj at night
  'A chicken of mine clucks a lot at night.'

It is clear from the translations above that  $-l\ddot{o}j$  derives predicates of plural events, but we want to know what kind of plural predicates they are and whether their interpretation can be assimilated to a species of nominal plurality.

- I argue that the properties of *löj*-marked predicates follow if *-löj* is an event-external pluractional.
- Furthermore, I argue that event-external pluractionals in Kaqchikel are similar, though not identical to bare plurals in English.
- Like bare plurals, *löj*-marked predicates have both dependent and distributive readings in the appropriate environments.
- They also have the habitual/generic readings that first motivated the special treatment of bare plurals (Carlson, 1977).

- Where they are different is that -löj has a nontrivial temporal component, which is not surprising given the importance of time for individuating events.
- The idea is that -löj does not generate plural event predicates directly, i.e., by placing a sum requirement on a predicate's argument, but by placing conditions on an event's temporal trace that could only be satisfied by non-atomic events.
- The resulting predicates will be satisfied by events with the same part-whole structure as those in the denotation of bare plurals larger than two.

Before building an analysis of  $-l\ddot{o}j$  I present the generalizations that the analysis must account for. In particular, we are interested in those properties that follow if it is an event-external pluractional. I also highlight the aspects of its meaning that show its similarity to bare plurals.

First, like event-external pluractionals crosslinguistically,  $-l\ddot{o}j$  can target predicates of most aktionsart classes. Only stative predicates are ungrammatical with  $-l\ddot{o}j$ .

(7) ACCOMPLISHMENT
 X-Ø-ban-alöj ri jäy.
 COM-A3s-do.PAS-löj the house

'The houses were built over time.'

(8) Achievement
 X-Ø-b'os-löj.
 COM-A3s-arrive-löj

'He kept showing up (and leaving and showing up again).'

- (9) SEMELFACTIVEX-i-tix-alöj.COM-A1s-sneeze-löj
  - 'I sneezed repeatedly.'
- (10) ACTIVITYX-i-b'iyin-ilöj.COM-A1s-walk-löj
  - 'I kept having to walk.'

 $\ensuremath{\operatorname{SPEAKER}}$  COMMENT: Like if you have fields all over the place and you had to do work at every one.

Non-verbal stative predicates with *-löj* are clearly infelicitous.

(11) #Kaq-alöj ri ixtän.red-löj the girl

'The girl got red various times.'

(12) #W-etama-löj ru-wäch. E1s-know-löj E3s-face

'I knew him various times.'

Second, as expected with pluractionals of both the event-internal and event-external types, the resulting predicates are always atelic.

(13) #X-Ø-b'os jun ramäj. COM-A3s-arrive one hour 'He arrived for an hour.'

(14) X-Ø-b'os-löj jun ramäj. COM-A3s-arrive-löj one hour

'He arriving (showing up) for an hour.'

Given these facts, an analysis of *-löj* should predict:

- The low degree of selection between the pluractional and the predicate it targets,
- while predicting its ungrammaticality with stative predicates,
- Moreover, it should predict that the resulting predicates are uniformly atelic.

The second property characteristic of event-external pluractionality is that it does not require contiguous repetition. If  $-l\ddot{o}j$  falls into this class, it should allow non-trivial downtime between the pluractional subevents and this downtime should be variable.

First, I show that downtime between the pluractional subevents is required. It is an important consideration because some VP intensifiers only require event pluralities for verbs of certain aspectual classes (e.g. Doetjes 2007).

(15) a. He sneezed a lot.

- b. He kept sneezing.
- c. He summited the mountain a lot.
- d. He kept summiting the mountain.
- (16) a. He walked a lot.
  - b. He kept walking.
  - c. He stirred the soup a lot.
  - d. He kept stirring the soup.

If this were the case for *löj*-marked predicates, an analysis in terms of plurality would not be appropriate.

- But, this is not the case. Speakers reject activities with -*löj* in situations where the activity lasted a long time.
- Instead, there must be starts and stops (see [big-downtime] as well).
- (17) X-Ø-b'ixan-ilöj. COM-A3s-sing-löj

'She sang many times.'

- FALSE if she sang a really really long song.
- SPEAKER COMMENT: It's like if you went to a concert and they kept singing more and more songs.

Given that repetition is required, we can ask how much downtime between pluractional subevents is necessary or allowed. What we find is that the amount of time between events is quite variable.

(18) X-Ø-tzeb-elöj nu-buküt. COM-A3s-stick-löj E1s-shoe

'My shoe kept sticking.'

In this situation the sticking events reoccur with every step, which come at a high frequency and on one occasion.

The same speaker, though, said she would use the sentence below to describe fireworks that went off every few minutes for a couple of hours, like on a holiday.

(19) X-e-b'oj-löj ri aj. COM-A3p-explode-löj the fireworks

'The fireworks kept exploding.'

Here there is much more time between explosions than between steps in the previous example.

Finally, below, repeated from before, we find large amounts of downtime between repeated events of walking.

- In the scenario produced by a speaker (different from above), the downtime has to be at least as long as it takes to get some work done in your fields.
- (20) X-i-b'iyin-ilöj. COM-A1s-walk-löj

'I kept having to walk.'

► SPEAKER COMMENT: Like if you have fields all over the place and you had to do work at every one.

This series of examples provides further evidence that  $-l\ddot{o}j$  is an event-external pluractional. Like similar morphemes crosslinguistically, the amount of downtime between repeated events is variable and can be quite large.

Recall that in opposition to event-internal pluractionals, event-external pluractionals build predicates that can describe events that repeat across occasions.

- While it is difficult to state in a rigorous way what an occasion is, it is easier to describe the relevant readings, which are mostly habitual.
- The -löj pluractional in Kaqchikel allows these readings. For instance, speakers say that it is possible to use -löj to describe people's professions or hobbies.
- This reading is especially salient with the optional adverbials ojër/ojër kan 'some/a long time ago'.

In examples below, the suffix *-löj* distributes events over longer periods of time. This contrasts with the previous examples, which distributed events over bounded intervals such as some stretch of walking over a day's work.

- $\blacktriangleright$  Speaker Comment: like as a profession
- (22) (Ojër) x-Ø-b'ixan-ilöj. (before) COM-A3s-sing-löj
  - 'He used to sing.'
  - ▶ SPEAKER COMMENT: like in a choir

Imperfective *löj*-marked verbs have similar readings, and not surprisingly, they are more salient than with verbs in completive aspect.

(23) La achin la' n-Ø-xub'an-alöj. DEM man DEM ICP-A3s-whistle-löj

'That man is always whistling.'

- (24) La jun achin la' n-Ø-chan-alöj pa r-ochoch. DEM a man DEM ICP-A3s-naked-löj P E3s-house 'That man is always naked around his house.'
  - SPEAKER COMMENT: Like a neighbor who is always working naked in his patio and he doesn't realize you can see him.

In virtue of having both habitual and bounded readings, *löj*-marked predicates are like bare plurals, which have two types of similar readings, shown below.

- (25) a. Whenever I walk by that house, **dogs** bark.
  - b. Cab drivers are available.
  - c. John bought guitars
- (26) a. Dogs bark.
  - b. Cab drivers drive too fast.
  - c. Guitars sound nice accompanying piano.
  - The bare plurals in (25) are existential, and are intuitively similar to the single occasion plural readings. They make reference to a bounded plurality and are paraphrasable by some X.
  - In contrast, the bare plurals in (26) has a generic or habitual reading, which is paraphrasable by all normal X or all normal X in relevant situations s. This makes them similar to löj-pluractionals.

We turn now to the interaction of *-löj* and distributivity. In pairing individual arguments with events, distributivity can control whether one or many events take place.

(27) The students lifted the box (collectively / individually).

- Under the collective interpretation (27) is compatible with a scenario in which the box is lifted only once, that is, in a single event scenario.
- In contrast, (27) entails a plurality of events took place under its distributive reading.

When looking at the behavior of event-external pluractionals across subtypes of distributivity, the following generalizations emerge:

- (28) a. Individuals distributively predicated of an event-external pluractional need not participate in a plural event.
  - b. Individuals applied to an event-external pluractional under distributive quantification must participate in a plural event.

I will argue based on similar Kaqchikel data that these facts should be assimilated to dependent readings of bare plurals under certain distributively interpreted subjects. First, Kaqchikel has predicates like *lift* in English, which are ambiguous between collective and distributive readings.

(29) Ri ixoq-i' x-Ø-ki-jot-ob'a ri caxa. The woman-PL COM-A3s-E3p-elevated-tv the box

'The women lifted the box (together).'  ${\rm OR}\,$  'The women (each) lifted the box.'

Example (29) can describe situations where each woman is the agent of her own event of lifting the box, but it can also describe a situation where there is only one event of lifting the box in which all of the women participated.

Contrast this example with what we have below, which has the quantifier *chikijujunal* 'each' and can only describe a situation where each woman is the agent of her own event of lifting the box.

(30) Chikijujunal ri ixoq-i' x-Ø-ki-jot-ob'a ri caxa. Each the woman-PL COM-A3s-E3p-elevated-tv the box 'The women each lifted the box.'

The distributive reading of (30) arises under distributive quantification.

As presented in the generalizations in (28), the readings of *löj*-marked predicates available under distributive predication and distributive quantification are different.

(31) Y-e'-ajmaj-löj. COM-A3s-flee-löj

'They go fleeing, one after another.'

(32) X-e-kam-alöj. COM-A3p-die-löj

'They died over time.'

 SPEAKER COMMENT: Could be used to describe how people die during a plague. In contrast, quantificational distributivity with *löj*-marked predicates of creation / destruction are odd.

(33) #Chikijujunal ri jay x-Ø-ban-alöj. each the house COM-A3s-do.PAS-löj

'The houses were each built many times.'

(34) #Chikijujunal x-e-kam-alöj each COM-A3p-die-löj

'They each died many times.'

If the predicate denotes events that are in principle repeatable by the same participants, the use of *chikijujunal* 'each' is perfectly grammatical.

But unlike with predicative distributivity, each individual must participate in an event satisfying the pluractional predicate separately, as examples below show.

(35) Chikijujunal x-e-b'ixan-ilöj. each COM-A3p-sing-löj

'Each of them kept singing (more and more songs).'

(36) Chikijujunal x-e-b'e-löj. each COM-A3p-go-löj

'Each of them dilly-dallied.' (i.e., went here and there)

Finally, while all of the examples with  $-l\ddot{o}j$  in this section have distributive readings, the pluractional itself does not require distributivity.

- For instance, without the overt distributive quantifier, (35) permits a collective 'choir' reading.
- (37) X-e-b'ixan-ilöj. COM-A3p-sing-löj

'They kept singing (more and more songs together).'

Summarizing, the data support the two generalization in (28).

- Individuals applied to an event-external pluractional under distributive quantification must participate in a plural event,
- while individuals distributively predicated of an event-external pluractional do not.
By obeying these two generalizations, event-external pluractionals behave like existential bare plurals with respect to distributivity.

The example below shows that bare plurals with singular subjects license a more-than-one inference. John must have ridden more than one horse.

(38) John rode horses.

The same inference is found with collectively interpreted plural subjects.

- (39) a. The students lifted boxes (together).
  - b. The students built rafts (together).

These facts are not surprising if bare plurals are, in fact, plural. What *is* surprising is that plural subjects under distributive predication need not satisfy a predicate with a plural object.

- (40) a. The students flew kites.
  - b. The students read books.

If bare plurals and event-external pluractionals have similar dependent readings, the prediction is that the more-than-one inference should return in the scope of a distributive quantifier. Example ([no-dep]) shows that this is the case.

- (41) a. The students each flew kites.
  - b. Every student read books.

Once again, the bare plurals behave like event-external pluractionals, in particular (34), where the quantifier *chikijujunal* 'each' requires each student atom to participate in an event plurality satisfying the pluractional predicate.

Given these similarities between event-external pluractionals and bare plurals, an adequate analysis should capture the generalizations in (28) and extend to predict the distribution of dependent readings of bare plurals.

- -löj targets predicates of any aktionsart class (excluding statives).
- The resulting predicates are uniformly atelic
- They denote event pluralities with a vague cardinality greater than several.
- The amount of downtime between the events in these pluralities is variable.
- *löj*-marked predicates have habitual readings, i.e., the repetition need not be confined to a single occasion.
- *löj*-marked predicates have dependent readings under distributive predication, but not distributive quantification.

My analysis treats *-löj* as an eventive modifier that places conditions on the event argument's temporal trace that can only be met by non-atomic events.

- ► This is how it unites the temporal and plural aspects of *-löj*'s meaning.
- Below gives the denotation of -löj.

(42) 
$$-l\ddot{o}j = \lambda V_{et}\lambda e[V(e) \land \exists P[Part(P, \tau(e)) \land \forall t \in P \exists e'[$$
  
i.  $\tau(e') = t \land$ 

iv.  $\epsilon(\tau(e))(t)$ 



The denotation for  $-l\ddot{o}j$  given above establishes a connection between the pluractional's temporal properties and it's bare-plural-like denotation.

- Predicates bearing –*löj* will only apply to non-atomic events, because only non-atomic events can have parts whose temporal traces partition temporal trace of the main event.
- Thus, -löj-marked predicates will be predicates of sum events with atomic parts, just like bare plurals are predicates of sum individuals with atomic parts.
- The rest of this section is devoted to showing how the temporal partition and the non-atomicity condition explain the behavior of *-löj*, while assimilating *löj*-marked predicates to bare plurals as much as possible.

The *-löj* pluractional entail corresponding sentences without *-löj*, which is a property of event-external pluractionals crosslinguistically.

(43) Xch'analöj.  $\Rightarrow$  Xch'ane.

Where:

(44) X-Ø-ch'an-alöj. COM-A3s-naked-löj

'He got naked repeatedly.'

(45) X-Ø-ch'an-e'. COM-A3s-naked-iv

'He got naked.'

The entailment between *löj*-marked sentences and their non-pluractional counterparts follows immediately from the denotation above and provides a parallel with bare plurals.

- It is the eventive equivalent of entailment that holds between plural and singular count nouns in ([ent1]-[ent2]) under the non-specific reading of the indefinite.
- (46) a. John played guitars.  $\Rightarrow$ 
  - b. John played a guitar.
- (47) a. John ate sandwiches.  $\Rightarrow$ 
  - b. John ate a sandwhich.

The reason that existential bare plural and event-internal pluractionals behave the same here is that both denote existentially bound, cumulatively closed predicates of pluralities.

We have seen how  $-l\ddot{o}j$  derives predicates of non-atomic events, but notice that the way that non-atomicity is enforced makes additional claims about the cardinality of pluractional events.

- The formula in (42) requires that the events that partition the pluractional event's temporal trace be short relative to that event.
- The prediction is that *löj*-marked predicates should denote events that have more than a few parts, but since *short-relative-to* is a vague predicate, their exactly cardinality should be vague.
- This is borne out in the data, and once again makes –*löj* like event-external pluractionals crosslinguistically, which are satisfied by events of at least paucal number.

First, if  $-l\ddot{o}j$  derives predicates of paucal cardinality, we expect that it should not accept events of cardinality two. Example ([two-die]) shows that this is the case.

(48) #X-e-kam-alöj ri ka'i'. COM-A3p-die-löj the two

'The two died over time.'

Clearly events of cardinality two cannot satisfy *löj*-marked predicates, but determining a fixed minimum cardinality is no easier. The number varies by predicate and context.

In many cases, though, *löj*-marked predicates can be satisfied by events with a few to several atomic parts.

(49) X-Ø-chin-ilöj. COM-A3s-ring-löj

'It rang repeatedly.'

- For instance, speakers say that (49) can be used to describe a clock tower going off on the hour.
- For this to be the case, not more than 12 rings.
- Pressed further, speakers say there need to be several rings, but are reluctant to give an exact number.

Based on these data the analysis must capture two generalizations:

- The cardinality of the events that *löj*-marked predicates denote resists quantification, but
- (ii) it must be at least above some vague paucal range.

In my account, these facts follow from the way  $-l\ddot{o}j$  partitions the event argument and is closely related to the fact that  $-l\ddot{o}j$  derives atelic verbs.

My account individuates the events that constitute a pluractional event based on on their temporal traces. This allows the generalization to be captured naturally.

- The reason is that temporal intervals are unique.
- If I walked from 4:00pm to 5:00pm, and you did too, the temporal trace of the sum of our walkings is just 4:00pm to 5:00pm.
- Thus, if all the pluractional subevents in the denotation of a *löj*-marked predicate happen over the same interval, then they cannot be very short relative to the interval of their sum, failing a crucial condition in the denotation of *löj*.
- The result is that the subparts of a plural event satisfying a *löj*-marked predicate are correctly predicted to be spread out over time.

Finally, the  $\tau$ -based account of  $-l\ddot{o}j$  also correctly predicts that the amount of downtime between repeated events is variable, which is one of the characteristic properties of event-external pluractionality.

- The reason is that sum events can have discontinuous temporal traces. The pluractional requires a partition of the event's temporal trace, but it does not require the cells of the partition to be temporally connected.
- As illustrated in the following figures, the pluractional takes no stand on the amount of downtime between cells of the partition.



Figure 3.5: Non-contiguous plural events

The fact that gappy events can satisfy a *löj*-marked predicate accounts for the wide variety of scenarios these predicates can be used to describe.

- if there is not much time between the first and last event, then the many events required by -löj will have to be close together (up to contiguity).
- This would correspond to the single occasion reading, like the example of the shoe sticking in (18), repeated below.
- (50) X-Ø-tzeb-elöj nu-buküt. COM-A3s-stick-löj E1s-shoe

'My shoe kept sticking.' X-Ø-tzeb-elöj nu-buküt. COM-A3s-stick-löj E1s-shoe

SPEAKER COMMENT: Like if your shoe had gum on it.

Here we have to squeeze many *sticking* events into a short period of time, hence the shoe sticking on every step.

In contrast, if the perspective is a whole day, then there can be large amounts of downtime between pluractional subevents, as below.

(51) X-i-b'iyin-ilöj. COM-A1s-walk-löj

'I kept having to walk.'

• SPEAKER COMMENT: Like if you have fields all over the place and you had to do work at every one.

Finally, we established that *löj*-marked predicates can have habitual readings, which we can account for by allowing arbitrary gaps in the partition.

(52) (Ojër kan) x-i-ch'ar-alöj. (before DIR) COM-A1s-split.wood-löj

> 'I used to split wood a lot.' (Ojër kan) x-i-ch'ar-alöj. (before DIR) COM-A1s-split.wood-löj

SPEAKER COMMENT: *like as a profession* 

In this way, *löj*-marked predicates behave like bare plurals, which also have both bounded existential readings, as well as habitual readings.

(53) a. **Dogs** bark.

- b. Cab drivers drive too fast.
- c. Guitars sound nice accompanying piano.

Finally, the analysis of *-löj* correctly predicts that *löj*-marked predicates should pattern like bare plurals when interacting with different subtypes of distributivity. Recall that:

- (54) a. Individuals distributively predicated of an event-external pluractional need not participate in a plural event.
  - b. Individuals applied to an event-external pluractional under distributive quantification must participate in an plural event.

The first generalization follows immediately given that theta-roles are sum-homomorphisms and that only non-atomic events can be in the denotation of *löj*-marked predicates.

(55) X-e-kam-alöj COM-A3p-die-löj

'They died over time.'

Example (55) has the truth conditions below.

(56)  $\exists e[*DIE(e) \land ag(e) = x \land \neg atom(x) \land \exists P[Part(P, \tau(e)) \land \forall t \in P \exists e'[\tau(e') = t \land e' \le e \land atom(e') \land \epsilon(\tau(e))(t)]]$ 



While the agent of the sum event *e* is the plural individual  $x_1 \oplus x_2 \oplus x_3$ , nothing stops the agent role, indicated in red, from mapping the atomic events that constitute *e* to atomic individuals.

The core idea is that the pluractional builds predicates with only non-atomic events in their denotations.

- Given that both verbal predicates and theta-role functions are cumulatively closed, there are few constraints on how participants are mapped to events.
- The only constant is that the event argument must be mapped to the maximal sum of all of the participants of its subevents.
- In this way, the pluractional, in virtue of building predicates of pluralities, creates the substrate from which distributive dependencies based on thematic assignment can arise.

The situation is different when a distributive quantifier like *chikijujunal* 'each' takes scope over the verb phrase, as below.

- Unlike before, each individual in the domain of the quantifier below must participate in an event that satisfies the pluractional predicate.
- For instance, it is false if each of the individuals retrieved by the anaphoric subject only sings once.
- (57) Chi-ki-ju-jun-al x-e-b'ixan-ilöj. P-E3p-one-RED-NOM COM-A3p-sing-löj

'Each of them kept singing (more and more songs).'

First, it is clear that *chikijujunal* should be treated like a strong distributive quantifier because it exhibits all of the characteristic properties.

(58) \*Chi-ru-ju-jun-al a' Xwan x-Ø-el. P-E3s-one-RED-NOM CLF Juan COM-A3s-leave 'Each of Juan left.'

(59) \*Chi-ki-ju-jun-al ri ixoq-i' x-Ø-ki-möl
P-E3s-one-RED-NOM the woman-PL COM-A3s-E3p-gather
k-i' pa k'ayb'äl.
E3p-REFL in market

'The women each gathered in the market.'

I think what we want to say for *chikijujunal* is that given a sentence of the form:

(60) chikijujunal NP VP

The semantics should look like:

(61) 
$$\forall x NP(x) \rightarrow \exists x VP(e) \land ag(e) = x$$

But now if the VP is pluractional, this semantics will require each individual to participate in a pluractional event. This is exactly what we see in:

(62) Chi-ki-ju-jun-al x-e-b'ixan-ilöj. P-E3p-one-RED-NOM COM-A3p-sing-löj

'Each of them kept singing (more and more songs).'

Looking at the big picture, the preceding discussions shows that there are two ways an argument can be interpreted distributively with respect to a pluractional predicate.

- In the first case, the atomic parts of an individual argument need only participate in the parts of a pluractional event. This type of distributivity is mediated by theta-roles.
- In the second case, the atomic parts of an individual argument need to participate in a pluractional event. This type of distributivity arises in the presences of a scope-taking distributive operator like *chikijujunal*.

As noted before, the facts are similar to the behavior of bare plurals. For example, the first entails that each of the boys flew more than one kite, while the second does not, even under a distributive interpretation of the plural subject.

- (63) a. The boys each flew kites.
  - b. The boys flew kites.
  - These facts support an analysis of event-external pluractionality in which pluractional events are structurally similar to plural individuals in the domain of individuals.
  - The account of -löj makes this connection, while accounting for important differences.

This section has been an extended argument for two proposals.

- The first is that -löj in Kaqchikel instantiates a specific subtype of pluractionality that has been uncovered in previous typological investigations, the event-external sort.
- The second is that -löj places conditions on an event's temporal trace that can only be satisfied by non-atomic events.
- In this way, the analysis explains two facets of *löj*-marked predicates. On one hand they behave like bare plural nominals, which also denote non-atomic individuals.

The analysis thus argues for a separation of the type of plural reference a pluractional has from how that plural reference comes about, but these two types of plural reference can converge and lead to similar behaviors.

The composition of of the internal / external distinction

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## Introduction

We have explored the meaning of two kinds of pluractionals in Kaqchikel—an event-internal and an event-external pluractional.

Now I would like to consider their composition. What can we figure out about the internal / external composition in the verb stem. Following Landman 1996, Kratzer 2005, Krifka 1989, Krifka 1992 verbal predicates are cumulatively closed by default. Pluractionals give us evidence that this cumulative closure should be syntactically represented—i.e., verbs are not cumulatively closed in the lexicon:

- First, there are languages like Karitiana where pluractionality seems to be overt cumulative closure!
- Second, I propose that event-external pluractionals composes after cumulative closure, but event-internal pluractionals compose before cumulative closure.

## The analyses

Are their semantic reason to think that these two kinds of pluractionals compose differently? Yes! The event internal pluractional requires that the verbal predicate (V) that it composes with is cumulatively closed already.

## The meaning of -löj

(1) 
$$-l\ddot{o}j = \lambda V_{et}\lambda e[V(e) \land \exists P[Part(P, \tau(e)) \land \forall t \in P \exists e'[\tau(e') = t \land e' \leq e \land atom(e') \epsilon(\tau(e))(t)]]]$$

While not ruled out in the formula, applying the swarm-denotation to non-atomated predicates can produce aberrant outcomes—(swarms composed of swarms.) We could rule this out with a presupposition.

## The meaning of -Ca'

(i) 
$$-Ca' \rightsquigarrow \lambda V_{\varepsilon t} \lambda e \exists P[atom(e) \land Part(P, \tau(e)) \land contiguous(\tau(e)) \land fine_{\mu=length}(P) \land \forall t \in P \exists e'[\tau(e') = t \land V(e') \land e[\tau]e']]$$

The fact that we cannot get distribution over the pluractional subevents supports this conclusion. Consider this kind of example again. Clearly, (3) is more parsimonious.

(2) X-i-ki-tz'et-etz'a'. COM-A1s-E3p-look.at-Ca'

'They (each) kept glancing at me.'



A second strong argument that event-internal pluractionals occur before cumulative closure and event-external pluractionals after cumulative closure is that (i) the event-externals must occur after cumulative closure, (ii) they can co-occur and when they do, the event-internal pluractional comes first!

(5) X-Ø-u-chap-acha-la'. COM-A3s-E3s-handle-Ca'-la'

'He tapped on each of them.'

(6) X-Ø-u-pitz'-ipa-la'. ICP-A3s-E1s-squeeze-Ca'-la'

'She squeezed each of them rapidly many times.'

(8) \*N-Ø-i-pitz'-la'-(i)pa'.
This syntactic behavior, as well as the interpretation, is immediately predicated if the event-internal pluractional applies directly to the root to produce a set of atomic event (but with plural character), while the event-external pluractional pluralizes (or further constrains) this event predicate.



Further evidence for this analysis comes from the morphosyntax and morphophonology of the pluractional suffixes themselves.

- (10) a. chapacha', from chäp 'handle'
  - b. tz'etetz'a, from tz'ët 'look at'
  - c. qumuqa', from qum 'drink'
  - ▶ the event-internal pluractional –*Ca*' partially reduplicates root material,
  - ▶ *—la'* and *—löj* do not.
  - In this way, the event-internal pluractionality is more morphophonologically dependent on CVC roots than *-löj* and *-la'*, which we might expect to reflect how they compose.

Moreover, -Ca' must be adjacent to verb roots, and cannot affix after other derivational morphology, while  $-l\ddot{o}j$  can.

- (11) a. \*kamisaka', from kamisaj 'kill'
  - b. \*chojmirisa**cha'**, from *chojmirisaj* 'make straight'
- (12) a. \*rochob'a**ra'**, from *rochob'a* 'scratch'
  - b. \*jupub'aja', from jupub'a 'smell'
- (13) X-Ø-kaq-ir-**ilöj**. COM-A3s-red-ITR-**löj**

'It kept getting red.'

In my analysis, the morphosyntax and semantics come together. -Ca' always composes with the root directly, while  $-l\ddot{o}j$  cannot, instead composing with stems after cumulative closure.

But what are the syntactic categories of these expression?

- At least in Mayan, pluractionals are fairly wrapped up in transitivity.
  - Ca'-marked verbs are always transitive
  - löj-marked verbs are always intransitive
  - Ia'-marked verbs require a theme (e.g., transitive and passives)

I think Ca' is pretty clearly a transitive little-v. It can act to transitivize roots.

- (14) a. Nin-ch'um-ij. 'I drink water little by little.'
  - b. \*nin-ch'um
  - c. Ninch'umuch'a'. 'I keep drinking at it little by little.'
- (15) a. Nin-k'ux-ij. 'I hit it with small sticks / stones.'
  - b. \*nin-k'ux
  - c. Nink'uxk'a'. 'I hit it constantly with small sticks / stones'

The fact that -löj can occur on already-derived intransitive stems to me suggests it is not doing the deriving. It is a flavor little-v that selects for intransitive little-VPs.

(16) X-Ø-kaq-ir-**ilöj**. COM-A3s-red-ITR-**löj** 

'It kept getting red.'

Not sure exactly how to deal with selection like this in modern semantic theories. Perhaps you all have ideas.

In sum, the following picture, I think is well-supported, in Kaqchikel.



How well supported it is other languages?

- This is an open question, but I would expect that it holds. In particular, event-internal pluractionals are much more highly constrained (recall their typological properties).
- This suggests to me they apply close to verb roots and have the idiosyncrasies we expect from "root"-phenomena.
- clearly, though, much more work needs to be done!