Counting events:

on the semantics of verbal classifiers in Mandarin Chinese

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Today's goals

- convince you that verbal classifiers indicate verbal plurality

- suggest how this can potentially relate to nominal classifiers

Introduction

Strict counting in the verbal domain

English: John went to the movies **three** *times*.

French: Jean est allé *trois* **fois** au cinéma.

Dutch: Jean is **drie** *keer* naar de bioscoop gegaan.

(Doetjes (2008))

"... *time* is a counting classifier." (Landman (2008))

"Verbal classifiers" in Mandarin Chinese

    (1)   Yuehan xiu le   san   ci   che.

          John   fix Asp three CL_V car

          $\approx$ "John did car-fixing three times."

- We'll use the Mandarin data as a window to study what the semantics of a *verbal classifier* (CL_V) could look like

Scope-taking counters

Let's start with an "obvious" analysis:[1].

$$\llbracket san\ ci \rrbracket : \lambda e |e| = 3$$

In other words, a verbal classifier - numeral phrase[2]

- ▶ is semantically similar to the meaning of bare numerals

- ▶ but it shifts the counting to the event (or, a non-nominal) domain

    (after all, does it *mean* anything?)

This doesn't seem to work, because...

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[1] I use e for the type of individuals, v for the type of events, i for the type of time intervals

[2] The syntactic assumption here is that the verbal classifier and the numeral forms a constituent; but in fact nothing in our semantics hinges on this assumption.

Scope-taking counters

CL$_V$s "take scope": (first observed by Landman (2008))

when there's another quantity expression in the sentence, its relation with the CL$_V$
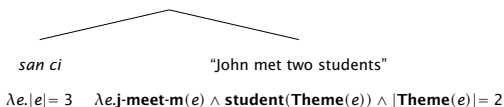
doesn't seem to be intersective

(2) [You[3] san ci], Yuehan ban tian zhinei jian le [liang ge xuesheng].
have three CL$_V$ John half day inside meet Asp two CL$_N$ student
≈ "Three times, John met with two students within half day."

_____

[3]Most (but not all) native speakers find the abstract verb _you_ (meaning "have/exist") is obligatory here. This constraint is also observed in Mandarin when individual denoting indefinites show up in the beginining of a sentence. I'll leave the complication made by _you_, if there ever is, to future work.

Scope-taking counters

See what meaning the obvious analysis gives us:

$[\![(2)]\!]$: $\lambda e.\textbf{j-meet-m}(e) \wedge \textbf{student}(\textbf{Theme}(e)) \wedge |\textbf{Theme}(e)| = 2 \wedge |e| = 3$

san ci   "John met two students"

$\lambda e.|e| = 3$ $\lambda e.\textbf{j-meet-m}(e) \wedge \textbf{student}(\textbf{Theme}(e)) \wedge |\textbf{Theme}(e)| = 2$

- This wrongly assigns a meaning to (2) that says the meeting events only involves two students *in total*

    (expected as the CL_V is treated scopeless!)

- What this sentence actually means is that the meeting events range over groups of two students

Scope-taking counters

In contrast, true adverbs are intersective

- Adverbs are scopeless, and can be permuted while preserving the truth value. (Parsons (1990))

  (3) ⟦ John ran a 5K [in New Brunswick] [on Sunday] ⟧

  ≡ (truth-conditionally)

  ⟦ John ran a 5K [on Sunday] [in New Brunswick] ⟧

- That's why Davidsonian event semantics usually treats the composition of adverbs as all via predicate modification.

Scope-taking counters

CL$_V$s are a different being

- ▶ Landman (2008): (a verbal classifier) parcels a set of non-countable sums into a set of countable atoms

    Other overt group formations in natural language:

    three **boxes** of apples, **every** three lions, ...

- ▶ While I'm sympathetic to this intuition, my formal approach is going to be different than his

    group formation is readily supplied in the Link-tradition of pluralization

Pluralization and grouping

Main proposal:

- $[\![san\ ci]\!]$: $\lambda E \lambda e.\ ^*E(e) \wedge |e| = 3 \wedge \mathbf{ci}(e)$

  This CL_V-numeral phrase pluralizes the given event property and requires the

  resulting plural event to be a **ci** event (for now, whatever that means)

- $^*_{vt \to vt \to t} := \lambda P_{vt} \lambda E_{vt}. \forall e \in E[P(e)]$ (adapted from de Vries (2015))

  This is simply a function notation for event pluralization, representing Link's 1983

  * operator with universal quantification.

Pluralization and grouping

What does $*$ do, exactly?

- Out of any given property P, It yields a plurality which is closed under summation:

  $*(\lambda x.\mathbf{boy}x) = \lambda X.\forall x \in X[\mathbf{boy}(x)]$:

  any plural individual that contains one or more boys

  $*(\lambda e.\mathbf{meet}e) = \lambda E.\forall e \in E[\mathbf{meet}(e)]$

  any plural *event* entity containing one or more meeting events

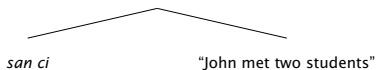- In this respect, there's no obvious reason to think pluralization has to *base on* atoms; rather, it effectively *turns* any given property to be *atomic*.

Pluralization and grouping

Deriving the "scope-taking" case: 2nd try

$[\![$ (2) $]\!]$: $\lambda e.*(\lambda e'.\text{j-meet-m}(e') \wedge \text{student}(\text{Theme}(e')) \wedge |\text{Theme}(e')| = 2)(e) \wedge |e| = 3$

a plural **j-meet-2-students** event which contains three parts

san ci   "John met two students"

$\lambda e.|e| = 3$ $\lambda e.\text{j-meet-m}(e) \wedge \text{student}(\text{Theme}(e)) \wedge |\text{Theme}(e)| = 2$

- As expected, this derives the correct counting reading of the sentence.

Pluralization and grouping

Note that stacking is also made possible:

$[\![(2)]\!]$: $\lambda e.^*(\lambda e'.^*(\lambda e''.\textbf{j-meet-m}(e''))(e')) \wedge |e'| = 2 \wedge \textbf{ci}(e'))(e) \wedge |e| = 3 \wedge \textbf{ci}(e)$

a plural **j-meet-m-twice** event that contains three parts

san ci $\qquad\qquad$ $\lambda e.^*(\lambda e'.\textbf{j-meet-m}(e'))(e)) \wedge |e| = 2 \wedge \textbf{ci}(e)$

$\lambda E \lambda e.^* E(e) \wedge |e| = 3 \wedge \textbf{ci}(e)$ $\quad$ a plural **j-meet-m** event that contains two parts

$\lambda e.\textbf{j-meet-m}(e)$ $\qquad$ *liang ci*

$\lambda E \lambda e.^* E(e) \wedge |e| = 2 \wedge \textbf{ci}(e)$

Pluralization and grouping

- So we offer one (more) way to formalize the grouping effect.

    Just as a side note, the existential quantification over partition in Ionin &
    Matushansky (2006) is another way to do it.

- However, just like its alternatives, the grouping power becomes unconstrained.

    In principle it predicts we can stack such counting constructions for as long as
    possible.

    But can we, really?

Restricted iterations

Unfotunately, this overgenerates:

(4) *Yuehan kan le   [liang chang] dianying [san   ci].
    John   see Asp two CL_v film   three CL_v
    Intended: ≈ "John watched two movies three times."

(5) *Yuehan yi   tian zhinei pengjian le   Mali [liang ci]   [san   ci].
    John   one day inside run-into Mary Asp two CL_v three CL_v
    Intended: ≈ "Within one day, John ran into Mary twice, three times."

(6) *Yuehan yi   tian zhinei pengjian le   Mali [liang hui] [san   ci].
    John   one day inside run-into Mary Asp two CL_v three CL_v
    Intended: ≈ "Within one day, John ran into Mary twice, three times."

Restricted iterations

- The data suggests plausible iterations are highly restricted.

- *Pragmatics?* Unlikely.

    Note that the plausible and implausible cases differ in the positioning of the CL_v
    phrases systematically.

    Comparing them, it seems iterations are *only* possible when it is a *high* CL_v phrase
    stacked on a *low* CL_v phrase.

Syntactic distribution and scopal behaviors

Let's be more accurate about *high* and *low*.

A closer look at the syntactic distribution: Mandarin CL_Vs show up in three kinds of positions [4]

(7) You san ci Yuehan pengjian le Mali
    have three CL_V John run-into Asp Mary
    ≈ "Three times, John ran into Mary." (Topical CL_V)

(8) Yuehan pengjian le Mali san ci
    John run-into Asp Mary three CL_V
    ≈ "John ran into Mary three times." (Adverbial CL_V)

(9) Yuehan pengjian le san ci Mali
    John run-into Asp three CL_V Mary
    ≈ "John ran into Mary three times." (Adnominal CL_V)

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[4]I'm glossing over variants of these forms created by movement.

Syntactic distribution and scopal behaviors

The classification is based on their (scopal) interactions with quantified arguments.

- Topical CL_Vs scope high:

    (10)   You san ci Yuehan jian le   mei ge xuesheng

             have three CL_V John   meet Asp every CL_N student

             $\approx$ "Three times, John met with every students."   ($\exists\ 3 > \forall$)

Syntactic distribution and scopal behaviors

- Adverbial and prenominal CL_Vs scope low:

  (11) Yuehan jian le mei ge xuesheng san ci
       John meet Asp every CL_N student three CL_V
       ≈ "John met with every students three times."   (∀ > ∃ 3)

  (12) Yuehan gei mei ge xuesheng fuxi le san ci gongke
       John give every CL_N student review Asp three CL_V homework
       ≈ "John helped every students with their homework three times ." (∀ > ∃ 3)

Syntactic distribution and scopal behaviors

- Adnominal CL_Vs can't even directly precede a quantified argument:

  (13) Yuehan jian le san ci   mei ge xuesheng
       John   meet Asp every three CL_V CL_N student
       ≈ "John met with every students three times."   ($\forall > \exists$ 3)

Syntactic distribution and scopal behaviors

This is intriguing because

- The existential scope of an event is *always* lower than any other scope-taking elements (Parsons (1990)):

  (14) a. John kissed every girl.   ($\forall > \exists e$)

         b. John didn't laugh.   ($\neg > \exists e$)

         c. Yuehan qin le mei ge guniang
             John   kiss Asp every CL_N girl
             "John kissed every girl."   ($\forall > \exists e$)

         d. Yuehan meiyou xiao.
             John   NEG   laugh
             "John didn't laugh."   ($\neg > \exists e$)

Syntactic distribution and scopal behaviors

- No event modifier (type *vt* or *vt → vt*) should be able to *lift* the existential scope of events (as it is introduced by an independent exisntential closure)

- Also, no event modifier should be sensitive to the type of an adjacent NP.

- Therefore, topical and adnominal CL$_N$s must be different.

Modified proposal

Main proposal modified:

- $[\![san\ ci\ _{adverbial}]\!]$: $\lambda E_{vt} \lambda e_v.^* E(e) \wedge |e| = 3 \wedge \mathbf{ci}(e)$

  $[\![san\ ci\ _{topical}]\!]$: $\lambda T_{it} \lambda t_i.^* T(t) \wedge |t| = 3 \wedge \mathbf{ci}(t)$

  Located above the Aspect head (Kratzer 1998)

  $[\![san\ ci\ _{adnominal}]\!]$: $\lambda P_{et} \lambda e_v.^* P(\Theta(e)) \wedge |e| = 3 \wedge \mathbf{ci}(e)$

  Subsuming thematic heads

  Θ: a variable for any thematic role

Modified proposal

- $*_{\tau t \to \tau t} := \lambda P_{\tau t} \lambda X_\tau. \forall x \in X.P(x)$ (for any non-plural P)/ $\lambda P_{\tau t} P$ (for any plural P)

    This guarantees no property will be doubly pluralized.

    Conceptually, this formalization suggests CL_Vs can be understood as pluralization markers: they indicate a pluralization process has been applied.
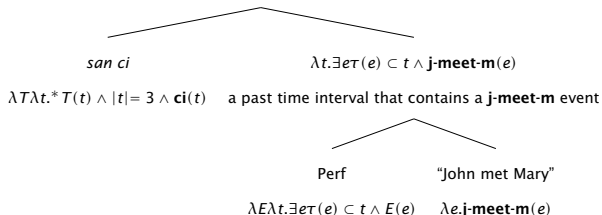
    This may seem ad-hoc, but see Jemery Khun and Robert Henderson's work for similar ideas for plurationals and dependent indefinites.

Modified proposal

Indirect event-counting with topical CL$_V$s

$$\lambda t^* (\lambda t'. \exists e \tau(e) \subset t' \land \text{j-meet-m}(e))(t) \land |t| = 3$$

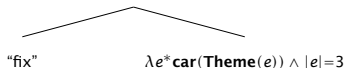a plural time interval that contains three parts[5]; each of which contains a **j-meet-m** event

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              _____/_____
             /                                  \
        san ci                          λt.∃eτ(e) ⊂ t ∧ j-meet-m(e)
λTλt.* T(t) ∧ |t|= 3 ∧ ci(t)      a past time interval that contains a j-meet-m event
                                        _____/_____
                                       /                \
                                     Perf            "John met Mary"
                          λEλt.∃eτ(e) ⊂ t ∧ E(e)      λe.j-meet-m(e)
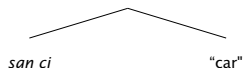```

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# Modified proposal

**Indirect event-counting with adnominal $CL_V$s**

$\lambda e.\mathbf{fix}(e) \wedge^* \mathbf{car}(\mathbf{Theme}(e)) \wedge |e|=3$

a car-fixing event which contains three parts



"fix"          $\lambda e^* \mathbf{car}(\mathbf{Theme}(e)) \wedge |e|=3$

$\lambda e.\mathbf{fix}(e)$     a car-themed event which contains three parts



*san ci*                              "car"

$\lambda P \lambda e.^* P(\mathbf{Theme}(e)) \wedge |e'| = 3 \wedge \mathbf{ci}(e)$     $\lambda x.\mathbf{car}(x)$[6]

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[6]Note that this works even if the object is a proper name, which some may think denotes individuals of type $e$. Partee's **BE** operator can shift an individual-denoting meaning to this property-denoting meaning freely.

## Modified proposal

**Stacking two adverbial CL$_V$s will crash:**

$\lambda e.*(\lambda e'.*(\lambda e''.\textbf{j-meet-m}(e''))(e') \wedge |e'| = 2 \wedge \textbf{ci}(e'))(e) \wedge |e| = 3 \wedge \textbf{ci}(e)$

$= \lambda e.(\lambda e'.*(\lambda e''.\textbf{j-meet-m}(e''))(e') \wedge |e'| = 2 \wedge \textbf{ci}(e'))(e) \wedge |e| = 3 \wedge \textbf{ci}(e)$

$= \lambda e.*(\lambda e''.\textbf{j-meet-m}(e''))(e) \wedge |e| = 2 \wedge \textbf{ci}(e) \wedge |e| = 3 \wedge \textbf{ci}(e)$

A plural **j-meet-m** event that contains two parts **and** three parts ???

*san ci*                    $\lambda e.*(\lambda e'.\textbf{j-meet-m}(e'))(e) \wedge |e| = 2 \wedge \textbf{ci}(e)$

$\lambda E \lambda e.*E(e) \wedge |e| = 3 \wedge \textbf{ci}(e)$     a plural **j-meet-m** event that contains two parts

$\lambda e.\textbf{j-meet-m}(e)$                    *liang ci*
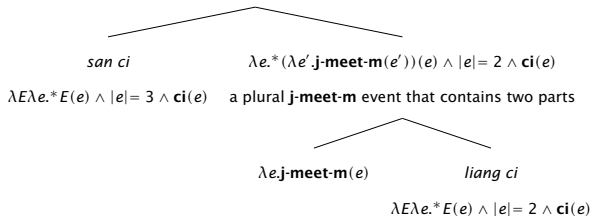
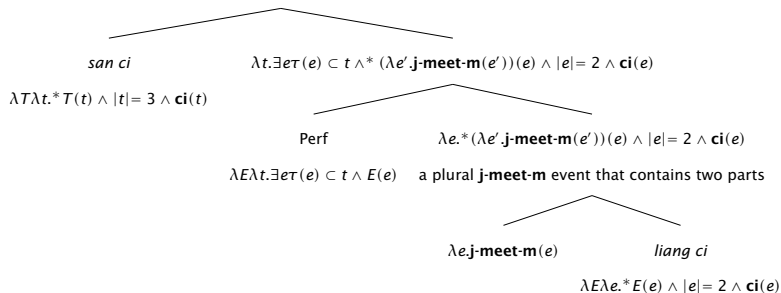$\lambda E \lambda e.*E(e) \wedge |e| = 2 \wedge \textbf{ci}(e)$

# Modified proposal

**Stacking a topical CL$_V$ on a non-topical one is fine:**

$\lambda t^* (\lambda t'.\exists e\tau(e) \subset t' \wedge^* (\lambda e'.\textbf{j-meet-m}(e'))(e) \wedge |e| = 2 \wedge \textbf{ci}(e))(t) \wedge |t| = 3$

a plural **j-meet-m-twice** time interval that contains three parts

*san ci*        $\lambda t.\exists e\tau(e) \subset t \wedge^* (\lambda e'.\textbf{j-meet-m}(e'))(e) \wedge |e| = 2 \wedge \textbf{ci}(e)$

$\lambda T\lambda t.^* T(t) \wedge |t| = 3 \wedge \textbf{ci}(t)$

Perf        $\lambda e.^* (\lambda e'.\textbf{j-meet-m}(e'))(e) \wedge |e| = 2 \wedge \textbf{ci}(e)$

$\lambda E\lambda t.\exists e\tau(e) \subset t \wedge E(e)$      a plural **j-meet-m** event that contains two parts

$\lambda e.\textbf{j-meet-m}(e)$        *liang ci*

$\lambda E\lambda e.^* E(e) \wedge |e| = 2 \wedge \textbf{ci}(e)$

# Summarizing conclusions

- CL$_V$s are direct counters, not intersective modifiers

- The obvious complexity of event-counting can sometimes be attributed to structural reasons

- Formally, we can treat verbal classifiers as plural markers, operating on different positions in the syntactic spine

# Why marking plurals?

**Overt plural marking is a long-standing puzzle**:

(15)  *Do you have children?*

      a.  Yes, I have one child.

      b.  Yes, I have two children.

- The fact that (15a) is an acceptable answer to this question has been taken to indicate that plurals are semantically unmarked. So why do we morphologically mark plurals?

- Our account of $CL_V$s extends this puzzle to non-nominal domains.

# Why marking plurals?

**A possible theory: plurals are about dividing**

- A growing body of work in syntax and semantics started to notice that the role of the plural is in fact to portion out divided undivided mass (Borer (2005), originally from Krifka (1989) )

- Here I suggest Mandarin CL$_V$s offer an argument for this theory: they encode an individualization criterion in the lexical entry.

**A $CL_V$ provides an individualization criterion**

It is impossible to use *ci* when the events are temporally completely overlapping:

- ► Suppose people in five American cities marched in exactly the same time period.

  (16)  *Zuotian shangwu meiguoren gao le  wu  ci  youxing.
        yesterday morning American  do  Asp five $CL_V$ march
        Intended ≈ "Yesterday morning, Americans marched five times."

# Why marking plurals?

Note that this is not because *ci* is incompatible with collective readings:

- Suppose three of my students came to looking for me, **in different times**, this morning.

  (17)  Jintian shangwu wo xuesheng lai    zhao    le   wo san  ci.
        today  morning I   student   come look-for Asp I    three CL$_V$
        ≈ "This morning my students came to looking for me three times."

Moreover, the marching example *can* be counted using another, presumably

spatial-oriented, CL$_V$: *chang*

- ▶ Suppose people in five American cities marched in exactly the same time period.

   (18)   Zuotian    shangwu meiguoren gao le   wu  chang youxing.

                yesterday morning  American   do   Asp five CL$_V$    march

                ≈ "Yesterday morning, Americans did five marchings."

**How to account for these contrasts?**

- We may take **ci**(e) to be the a lexically endowed criterion, filtering out events that are non-divisable on the temporal dimension:

  (19)  **ci**(e): $\forall e', e'' \in e[e' \neq e'' \rightarrow \tau(e') \neq \tau(e'')]$

  Then the result of applying "five *ci*" to the counting case will simply be undefined.

# Why marking plurals?

**Seriously a classifier?**

- Alternatively, if we take the un-marked event/time property to be denoting kinds, we may arrive at a radically simple picture.

  Borrowing the ∪ operators from Chierchia (1998):

  $\llbracket$ " $ci$" $\rrbracket$ = ∪$_{ci}$ : a function from kinds to a set of event entities, provided that they are temporally distinguishable.

  In other words, CL$_V$s individualize a non-nominal kind.

- We end at this sketchy idea, but the parallel between the nominal and the verbal domain is obvious.

**Thank you!**

Special thanks to my advisors:

Simon Charlow, Veneeta Dayal, and Mark Baker.

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