On the semantics of verbal classifiers

Ang Li
Rutgers University

1 Introduction

As far as the verbal domain is concerned, a lot of languages seem to be *classifier* languages; that is, strict counting in their verbal domain requires an extra element other than the numeral. Often times this extra element is the word *time* (see Doetjes (2008) for this kind of use of *time* in various languages):

(1)   John fixed the car *three **times***.

It could also be some more dedicated, abstract morpheme, such as *ci* in Chinese[1]:

(2)   Yuehan xiu le   na   liang che *san*   ***ci***
      John   fix Asp that CL_N car three CL_V
      "John fixed that car three times."

The semantics of these verbal classifiers is relatively understudied. In the face of simple sentences like (1), even the label "verbal classifiers" calls for justification: why can't we interpret "three times" as normal adverbs such as "on Thursday"? In this paper, I'll provide data from both Mandarin Chinese and English to argue that those verbal classifiers are indeed counters. This agrees with Landman's (2006) work on English *time*. What I differ from Landman is I take a theory of pluralization, when defined properly, enough to explain the semantic contribution of these counters, thus making an attempt to situate these items under the more general topic of verbal pluralization. In this respect I echo Yang (2001), while extending the empirical and theoretical scope of this association.

In what follows, I first introduce the core data that any semantic theory of verbal classifier phrases need to account for – that they behave like quantified expressions, scoping over quantified DPs. Then, in section 3, I propose this can be naturally explained if the verbal classifier marks pluralization of a non-nominal property. In section 4, I give arguments on how this makes better predictions on the empirical pattern than its theoretical alternatives. Section 5 closes the paper.

2 Verbal classifiers are scope-takers

Let's start from an "obvious", naive analysis. For all we know from (1) and (2), the classifier phrase *san ci* ("three times") combines with an event and yields the cardinality of that event. That seems to be all there is; the semantic contribution of the classifier phrase is equivalent to that of English bare numerals. They only differ from English bare numerals, perhaps, in that they exclusively count *events* but not

---

[1]Abbreviations: I use CL_N for nominal classifiers, CL_V for verbal classifiers, Asp for Aspect.

individuals. In type-theoretical semantics, this is easy to implement by choosing the right type.[2]:

(3) The naive analysis:
$[\![\text{three } \mathrm{CL_V}]\!]_{v \to t} = \lambda e_v |e| = 3$

As the verbal classifier phrase in definition (3) now looks for a type v argument, it can only combine with events. In (1) and (2), it takes the event of John fixing the car as its argument; this gives us the following interpretation of the whole sentence: an event of John fixing the car, which contains three parts.

Is this the correct interpretation of the sentence? I'm doubtful, since there might be a lot of ways to verify this truth condition. An event of John fixing that car that takes place in three different locations, or goes on for three days, might be considered as having three parts; it is, however, not clear that it suffices to say "John fixed the car three times" in those situations. The original sentences in (1) and (2) make a somewhat stronger claim.

The worry becomes more obvious when we observe sentences containing an indefinite noun phrase[3]:

(4) (You) san ci, Yuehan ban tian zhinei jian le liang ge xuesheng.
have three $\mathrm{CL_V}$ John half day inside meet Asp two $\mathrm{CL_N}$ student

$\approx$ "There are three times John met with two students within half of a day."

In (4), clearly we are counting meeting events that range over groups of two students. That's not the meaning we can get from the naive analysis: composing the meaning for *san ci* in (3) with the event representation of "John met with two students", we get a meaning that roughly says that there is an event of John meeting with two students, which contains three parts. We are somehow forcing John to meet with two students *in total*!

What went wrong? The way the verbal classifier phrase interacts with indefinite noun phrases in (4) – the interpretation of the verbal classifier phrase affects the interpretation of other quantified expressions, by forcing a "distributive reading" – suggests that it is a mistake treating them as scopeless, intersective modifiers. Normal adverbs such as "on Thursday" and "in the garden" are indeed scopeless, intersective modifiers (cf. Parsons (1990)); verbal classifier phrases have to take scope.

3 Scope-taking via event pluralization

Observing English facts that are similar to what we see in section 2, Landman (2006) proposes that the so-called verbal classifiers are overt grouping operators: they parcel a set of non-countable sums into a set of countable atoms. Landman describes this grouping process as "intensionalization" triggered by a type mismatch

---

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

[3]For the example below, most (but not all) native speakers I surveyed find the presence of the verb *you* (meaning "have/exist") is obligatory or strongly preferred. This might have to do with a general requirement for indefinite expressions on the sentence initial position: individual-denoting indefinites have long been observed to require a preceding *you* in this position. I'll leave the complications made by *you*, if any, to future work.

between the verbal classifier (i.e. English *time*), which bears an intensional type, and its extensional complement. The notion of "intensionality" in his proposal involves abstraction but not possible world alternatives.

While I'm sympathetic to the intuition, I think there's a much less complex way to get the desired interaction with quantified DPs: it is a natural by-product of predicate pluralization.

To see this, recall in the classic theory of pluralization introduced in Link (1983), the denotation for plural noun phrases is achieved by the use of a pluralizing operator $*$ such that $*$P is the closure of P under the sum operation. Importantly, this in effect introduces a universal quantification over the members in the plural set. In functional notation, we can rewrite the $*$ operator as the following:

(5) *operator introduces a universal quantification:
$*_{et \to et \to t}: \lambda P_{et} \lambda X_{et} \forall X \in X[P(x)]$ de Vries (2015: 11)

Pluralizing a nominal property **boy** (i.e. $\lambda x \, \textbf{boy}(x)$) would yield a plurality of individuals that contains one or more boys:

(6) $*(\textbf{boy}) = \lambda X \forall x \in X[\textbf{boy}(x)]$

It turns out the only move we need to make is to extend the definition in (5) to non-nominal properties. In other words, I'll admit that plurals and pluralization are not restricted to nouns or individuals; events (and time periods, as we'll see) can be treated as entities in natural language ontology, and we can have pluralization on these abstract entities. Once we do that, the formal work is just to relax the type requirement on the * operator:

(7) *operator applied to event pluralization:
$*_{vt \to vt \to t}: \lambda P_{vt} \lambda E_{vt} \forall e \in E[P(e)]$

Applying this event pluralizing operator to an event property **meet** (i.e. $\lambda e \, \textbf{meet}(e)$), it yields a plural event containing one or more meeting events:

(8) $*(\textbf{meet}) = \lambda E \forall e \in E[\textbf{boy}(e)]$

The trick crucial to us is that this operator can combine with an event property of **meet-2-students** (i.e. $\lambda e \, \textbf{meet}e \wedge \textbf{student}(\textbf{Theme})(e) \wedge |\textbf{Theme}(e)| = 2$) too, yielding a plurality of events such that each member living in that set is some event of meeting with two students:

(9) $*(\textbf{meet-2-students}) = \lambda E \forall e \in E[\textbf{meet-2-students}(e)]$

In effect, the quantificational layer of the * operator wraps around the whole event and turns it into an atomic property. Whatever quantified expression inside of it is going to scope lower.

Now it's almost trivial to test that adding pluralization gives us the correct interpretation: each of the atomic parts in (11a) is an event of the car being fixed; similarly, each of atomic parts in (11b) has two students.

(10) verbal classifier introduces pluralization[4]:
$[\![\text{three } \text{CL}_\text{V}]\!]_{vt \to vt}: \lambda E \lambda e * \lambda E(e) \wedge |e| = 3$

---

[4]It's easy to see how this meaning can be compositionally derived by composing the meaning of the numeral (the cardinality check) and the meaning of the classifier (the pluralization).

(11)   a. $[\![(2)]\!]$
           $= [\![\text{three CL}_V]\!](\lambda e \ \textbf{j-fix-the-car}(e))$
           $= \lambda e \ ^*\textbf{j-fix-the-car}(e) \wedge |e| = 3$
       b. $[\![(4)]\!]$
           $= [\![\text{three CL}_V]\!](\lambda e \ \textbf{j-meet-2-students}(e))$
           $= \lambda e \ ^*\textbf{j-meet-2-students}(e) \wedge |e| = 3$

4   Polymorphic plural marker

I show in the last section that the scope-taking – or "grouping" effects – can be formalized by extending Link's (1983) to non-nominal domains. So far this doesn't get us obvious advantages over its theoretical alternatives: Landman's overt grouping operator, of course, obtains the same results; another salient candidate is in Ionin & Matushansky (2006), where simplex numerals effectively group their complement by existentially introducing a partition.

But there is indeed a difference: iteration of groupings is expected, even common, whereas iterated pluralization seems strange or at least unattested. For Ionin & Matushansky, they crucially rely on iterated groupings to explain complex numerals such as *two hundred*, *two hundred million*, etc.[5]. The question is, do we want this extra expressive power for verbal classifier phrases?

Landman (2006), (2008) answered positively. He gave sentences like the one below as evidence that we allow stacked counting using verbal classifier phrases:

(12)   Twice, Dafna kissed Susan twice.   Landman (2006: 13)

For him, (12) is interpretable because the two *twice*s introduce two levels of groupings: we first group a set of events into a set of Dafna-kissing-Susan events, and then group that set into a set of Dafna-kissing-Susan-twice events. The result is similar to the interpretation of *two hundred books* in Ionin & Matushansky (2006). Indeed, if *time* is a grouping operator and grouping can turn any sums into atoms, there is no reason to doubt that a verbal classifier phrase can scope over another verbal classifier phrase, in exactly the way it is able to scope over indefinite noun phrases.

4.1   High and low verbal classifier phrases

But something in (12) cautions us to rethink about this empirical claim. It seems that the first *twice* is in a position much higher up (on the syntax tree) than the second one. To see this, let's look at their scope interactions with quantified DPs, again.

---

[5]Here's the meaning they derive for complex numerals:

(1)   a. $[\![\text{hundred books}]\!] \approx \lambda x \in D_e.x$ is a plural individual divisible into 100-overlapping individuals p_i such that their sum is x and each p_i is a book

       b. $[\![\text{two hundred books}]\!] \approx \lambda x \in D_e.x$ is a plural individual divisible into 2 non-overlapping individuals p_i such that their sum is x and each p_i is divisible into 100-overlapping individuals p_i such that their sum is x and each p_i is a book

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

   b. John met with every students three times.   ($\forall > \exists\, 3$)

(14) a. Yuehan jian le yi ge xuesheng san ci.
     John meet Asp one CL_N student three CL_V
     "Three times, John met with a student."   ($\exists\, 1 > \exists\, 3$)

   b. Three times, John met with a student.   ($\exists\, 1 > \exists\, 3$)

(15) a. #Yuehan chi le yi wan fan liang ci.
     John eat Asp one bowl rice two CL_V
     Intended meaning: "John ate a bowl of rice twice."

   b. #John finished a bowl of rice twice.

Chinese and English pattern exactly the same in examples (13) to (15): whether the quantifier in the sentence is universal or existential, it always scopes higher than the plural event. Therefore, both (13a) and (13b) mean John met with the *same* set of students repeatedly in three occasions, similarly sentences in (14) force the wide-scope, specific reading of the indefinites, and (15) shows that when the wide-scope reading is not available because the predicate indicates the consumption of the object, the sentence simply becomes infelicitous[6].

Things are drastically different with the verbal classifier phrase in the front position. There, the plural event clearly scopes higher than quantifiers in the sentence:

(16) a. (You) san ci Yuehan jian le mei ge xuesheng.
     have three CL_V John meet Asp every CL_N student
     "Three times, John met with every student."   ($\exists\, 3 > \forall$)

   b. Three times, John met with every student   ($\exists\, 3 > \forall$)

(17) a. (You) san ci Yuehan jian le yi ge xuesheng.
     have three CL_V John meet Asp one CL_N student
     "Three times, John met with a student."   ($\exists\, 3 > \exists\, 1$)

   b. John met with a student three times.   ($\exists\, 3 > \exists\, 1$)

(18) a. (You) liang ci, Yuehan chi le yi wan fan.
     have two CL_V John eat Asp one bowl rice
     Intended: "John ate a bowl of rice twice."

   b. Twice, John finished a bowl of rice.

As indicated in the scope orderings on the right-hand side of the glossing, we can see the pattern is reversed. With the verbal classifier in the front position, we can have different sets of students in (16): the sentences can describe a situation where, say, John has been teaching for three semesters and each semester he met with all the enrolled students to discuss their final project. Similarly, in (16) the sentences

---

[6]Some native speakers may find (15a) acceptable, but only in a marginal reading that John didn't finish the bowl of rice in the first time, so that he gets to eat the same bowl of rice in the second time.

allow the meeting events to range over different students and sentences with verbs of consumption (in (18)) are OK now because this variation is allowed.

In short, what we observe in (13) - (18) is that verbal classifier phrases in the front position scope higher than quantified DPs while those appear in the back position have to scope lower than quantified DPs. Why does this matter? Because it's a well-established fact that quantified DPs *always* scope higher than the existential force of the VP *event* (cf. Parsons (1990), Beaver & Condoravdi (2007), among many many others). For example, "John met every student" can't mean a (single) event of John meeting all the students, and "John didn't laugh" can't just mean an event of John not laughing – the truth condition would be too weak. Then the fact that we can have a verbal classifier phrase scoping higher than these quantifiers is rather striking. It can only make sense if the upfront verbal classifier phrases are in fact in a position outside of VP-level event composition; its scope is thus separated from – and higher than – the existential force of the event variable. In other words, this verbal classifier phrase should be located as least as high as above the head introducing the existential closure of the event. Now here's the interesting bit: In a Krazterian system of Aspect (Kratzer (1998)), the head responsible for introducing the event existential closure (i.e. v or Aspect) also anchors the VP event to some time period. In this higher domain, whatever being counted is not, strictly speaking, *event* anymore. It is time – the time periods that contain a certain kind of event.

So based on the scoping interactions, I claim that we do have (at least) two kinds of verbal classifier phrases[7]. The tree below illustrates this division: one that is low on the tree, a plain frequentative adverb in a VP adjunct position; and one that is located high, above the v/Aspect head.

(19)   High and low verbal classifier phrases
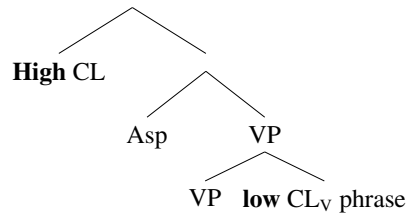
4.2 Restricted stacking

With the distinction of high and low verbal classifier phrases established, I argue the "stacking" of verbal classifiers (e.g. example (12)) is only superficial, created by having counters on different levels of the syntactic spine.

If we truly have stacked verbal classifiers, made possible by iterated groupings, the syntactic position shouldn't matter. However, stacking two high or two low classifier phrases together seems to be simply bad:

(20)   a. *(You) liang ci, (you) san ci, Yuehan jian le   liang ge xuesheng.
            have   two CL_V have three $_V$ John   meet Asp two $_N$ student

---

[7]I say at least because Chinese in fact has a third kind of verbal classifier phrases, one that shows up between the verb and an internal argument. This is beyond the scope of this paper so I'll leave it aside.

Intended meaning ≈ "There are two occasions, each time there are three times where John met with two students."

b. *Twice, three times, John met with two students.

(21) a. *Yuehan jian le liang ge xuesheng liang ci san ci.
John meet Asp two CL$_N$ student two CL$_V$ three CL$_V$

Intended meaning: "John met with two students twice three times."

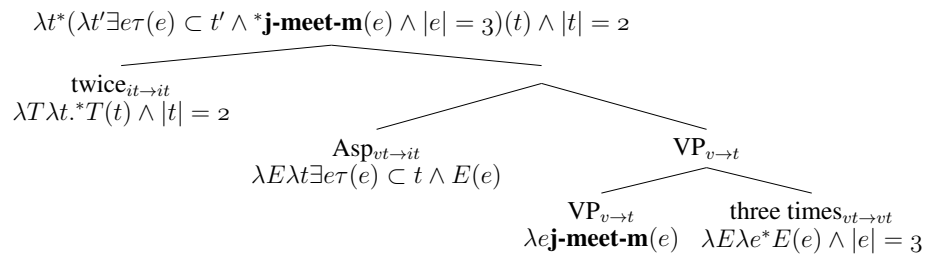b. ?? John met with two students twice three times.

Again, Chinese and English pattern alike in (20) - (21)[8]. Indeed in both languages we can only have a high verbal classifier "stacked" on top of a low one:

(22) a. (You) liang ci, Yuehan jian le liang ge xuesheng san ci.
have two CL$_V$ John meet Asp two CL$_N$ student three CL$_V$

"Twice, John met with two students three times."

b. Twice, John met with two students three times.

The fact that these sentences in (22) are perfectly natural stands against potential worries that the badness in (20) - (21) is due to some pragmatic or processing constraints. All in all, the data here says while we are capable of interpreting more than one counting in one sentence, the two levels of counting occur in different structural positions.

For our current account of verbal classifiers as plural markers, the structurally restricted stacking pattern is in fact expected. Stacking two high or two low verbal classifier phrases is, of course, prohibited, as pluralization of a plural individual is not possible. The high-low combination, on the other hand, requires nothing like double pluralization. By the time the high verbal classifier comes into composition, the plural event we get at the VP level has already been mapped to a time variable. In other words, just like the low verbal classifier phrase combines with a *singular* event property, the high verbal classifier phrase combines with a *singular* time property. The tree below demonstrates the composition in more details, using the sentence "Twice, John met Mary three times".

(23) Composing high and low verbal classifier phrases

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

twice$_{it \to it}$
$\lambda T \lambda t.^*T(t) \wedge |t| = 2$

Asp$_{vt \to it}$
$\lambda E \lambda t \exists e \tau(e) \subset t \wedge E(e)$

VP$_{v \to t}$

VP$_{v \to t}$
$\lambda e \textbf{j-meet-m}(e)$

three times$_{vt \to vt}$
$\lambda E \lambda e ^*E(e) \wedge |e| = 3$

---

[8]A possible confusion arises with (21b), though. Some native speakers find this one acceptable, especially when inserting a pause between *twice* and *three times*. Pending future investigation, I suggest these speakers analyze the second verbal classifier phrase *three times* as a right-dislocated phrase, so it's structurally a high verbal classifier phrase. Similar sentences show up in Chinese too, where it is obviously a right-discolation because of the *you*-marking of the high verbal classifier phrase (e.g. *Yuehan jian le xuesheng [liang ci], [you san ci].*). A prediction of this is that "John met with two students twice three times" can mean John meeting different groups of two students in three occasions, and indeed this variation seems to be allowed.

⟦Twice, John met Mary three times⟧
≈ A plural time interval that contains two parts, each of which is an interval that contains some plural event of John meeting Mary three times.

As indicated in the subscripts, the high verbal classifier has to have a different type now, but it preserves the core denotation defined in (10). In this sense high and low verbal classifiers are polymorphic, only differing in the syntactic and semantic types they apply to.

5 Closing remarks

In closing, I want to first reiterate the points made in above. A distinctive feature of verbal classifier phrases, compared to normal adverbs, is that they are not intersective modifiers. I have showed that once we admit pluralization applies to domains of non-nominal, abstract entities, scoping over quantified DP can be achieved as a by-product of pluralization. I also have recognized that these non-nominal counters show up on different levels of the structure, thus stacking of classifiers is possible, but only when they are counters on different levels.

I have spent a large portion of this paper to compare this approach with Landman's "intensional" grouping operator approach and I believe this plural marking proposal has some major benefits, including making more accurate predictions of the empirical pattern, and situating these understudied lexical items in the familiar, widespread phenomenon of pluralization. Nevertheless, none of these is to rule out the possibility that "grouping", or the abstraction-based intensionality plays a role in non-nominal counting. In fact it's quite likely that pluralization inherently encodes a "grouping" condition, if you follow the line of research that takes pluralization to be about portioning out divided undivided mass (cf. Borer (2005), Krifka (1989)) – then pluralization and individuation (or, "grouping") are really two sides of the same coin. This will be the starting point of a new project, so I'll end the paper here.

References

Beaver, D., & C. Condoravdi. 2007. On the logic of verbal modification. In *Proceedings of the 16th Amsterdam Colloquium*, 3–9. University of Amsterdam Amsterdam.

Borer, H. 2005. Structuring sense, vol. 1. *name only* 2.

Doetjes, J. 2008. Counting and degree modification. *Recherches linguistiques de Vincennes* 139–161.

Ionin, T., & O. Matushansky. 2006. The composition of complex cardinals. *Journal of semantics* 23.315–360.

Kratzer, A. 1998. More structural analogies between pronouns and tenses. In *Semantics and linguistic theory*, volume 8, 92–110.

Krifka, M. 1989. Nominal reference, temporal constitution and quantification in event semantics. *Semantics and contextual expression* 75.115.

Landman, F. 2006. Indefinite time-phrases, in situ-scope, and dual-perspective intensionality. *Non-definiteness and Plurality* 95.237.

Landman, F. 2008. *Indefinites and the type of sets*, volume 7. John Wiley & Sons.

Link, G. 1983. *The logical analysis of plurals and mass terms: a lattice-theoretical approach*. Wiley Online Library.

Parsons, T. 1990. *Events in the Semantics of English*, volume 5. Cambridge, Ma: MIT Press.

Vries, H. d. 2015. *Shifting sets, hidden atoms: the semantics of distributivity, plurality and animacy*. Utrecht University dissertation.

Yang, R. 2001. *Common nouns, classifiers, and quantification in Chinese*. Rutgers University New Brunswick dissertation.