Measurement in VP

1 Varieties of measurement in VP

There are a number of different ways that we can express measurement in the verbal system. Let's start by cataloguing a few of them.

1.1 Temporal measurement

Perhaps most obviously, we can talk about how long a particular event took using a temporal measure phrase. There are well-known restrictions on the way we express such measurements, though.

Activity verbs/VPs (or *atelic* predicates) prefer measurement by *for*-PPs:

(1)   a.   Kim ran for/??in 45 minutes.
         b.   Lee studied maps for/??in 2 hours.
         c.   Pat worked on the paper for/??in 4 days.

Accomplishment verbs/VPs (*telic* predicates) prefer measurement by *in*-PPs:

(2)   a.   Kim ran to the park ??for/in 45 minutes.
         b.   Lee drew the maps ??for/in 2 hours.
         c.   Pat wrote the paper ??for/in 4 days.

Achievement verbs/VPs also appear to prefer measurement by *in*-PPs, though here the PP is not actually measuring the event described by the verb/VP, but rather the 'run-up' to the event:

(3)   a.   Kim arrived at the park ??for/in 45 minutes.
         b.   Lee noticed the maps ??for/??in 2 hours.
         c.   Pat finished the paper ??for/in 4 days.

What is responsible for these distinctions? To answer this, we need both an analysis of the aspectual distinctions between these different predicates (and a corresponding analysis of verb meaning) and analyses of the two types of temporal measure phrases.

Whatever we say should also account for the fact that stative verbs also seem to accept modification by *for*-PPs, more or less (*in*-PPs are totally out).

(4)   a. ?Max loved playing chess for 10 years.
        b. ??Max knew French for 10 years.
        c. ??Max knew Kim for 10 years.

1.2 Degree measurement

The English degree adverbial *a lot* can be used to modify a range of different verb/VP types, but the sort of interpretation we get varies depending on the type of verb/VP:

(5)   a.   Max loves swimming a lot.   *intensity*
        b.   Max swam a lot.   *duration/iteration*
        c.   Max swam 50 laps a lot. *iteration*
        d.   Max jumped in the pool a lot. *iteration*

Does this indicate an ambiguity in the modifier, or is it telling us something about the meanings of the verbs/VPs, and if so, what?

Of particular relevance is the fact that we see a similar range of interpretations for *a lot* when we look at its interaction with other categories, specifically adjectives/APs and nouns/NPs:

(6)   a.   Max swam a lot faster than Kim.   *intensity*
        b.   Max displaces a lot of water.   *amount of stuff*
        c.   Max swam a lot of laps.   *amount of objects*

Are these accidental parallels, or do they indicate some deeper connection between adjective/noun/verb meanings? Do the different types of interpretations indicate (grammatically) disinct types of measurement or ways of encoding/expressing measurement?

1.3 'Measuring out'

The direct objects in (7), unlike those in (8), 'measure out' the event described by the verb: the event is complete when all of the described object has been affected.

(7)   a.   Jo mowed half of the lawn.
        b.   Pat ate two bowls of rice.
        c.   Max read four abstracts.

(8)   a.   Jo could see half of the lawn.
        b.   Pat would like two bowls of rice.
        c.   Max received four abstracts.

Is 'measuring out' really an instance of measurement in the technical sense (are there measure phrases and measure functions floating around somewhere in the truth conditions?), or is this just an inference that can be drawn based on some other aspect of the meanings of the verbs in (7)?

1.4 The plan

Today I'll focus mainly on degree measurement, addressing temporal measurement and measuring out more next week.

First we'll probe the distinctions in (7) (and (8)) in a bit more detail, and then we'll talk about semantic relations between (certain) nouns, verbs and adjectives, and see what this tells us about what's being measured here, and how it's encoded.

2 Degree quantifiers in VP

2.1 Intensification vs. duration/iteration

Doetjes (1997) argues that there is an important distinction between the use of *a lot* in (7a) and its use in the other examples. Looking at English, we see that in contexts in which

a lot has an intensifying interpretation, it can be replaced by a 'high degree adverb' like *enormously, terribly*, etc.

(9)   a.   She worries a lot about her children.
      b.   She worries enormously about her children.

(10)   a.   We appreciated your help a lot.
       b.   We terribly appreciated your help.

This is not the case when *a lot* has a durative or iterative interpretation; in these contexts, a high degree adverb can only have a manner interpretation.

(11)   a.   She swam (laps) a lot.
       b.   She swam (laps) terribly/??enormously.

Interestingly, high degree adverbs can directly modify gradable adjectives, but *a lot* cannot; the situation is the reverse when we look at noun modification:

(12)   a.   Max is terribly/enormously tall/smart/fat/boring
       b.   *Max is a lot tall/smart/fat/boring

(13)   a.   *Max swam terribly/enormously laps.
       b.   Max swam terrible/enormous laps.
       c.   Max swam a lot of laps.

(14)   a.   Max swam terribly/enormously many laps.
       b.   Max swam a terrible/enourmous amount of laps.

In Dutch, we have to use different modifiers in the two verbal contexts: *veel* 'a lot' for duration/iteration, and *erg* 'badly' for intensity.

(15)   a.   Jan wandelt veel/*erg   de laatste tijd
             Jan walks   a lot/badly the last   time
             'Jan walks a lot.'
       b.   Jan waardeert   Marie erg/*veel
             Jan appreciates Marie badly/a lot
             'Jan appreciates Marie a lot.'

Again, we see a parallism in the nominal/adjectival domain: *erg* is used to express high degree with adjectives, and *veel* to express high amount with nouns.

(16)   a.   Jan heeft veel/*erg boeken.
             'Jan has a lot of books.'
       b.   Jan is erg/*veel slim.
             'Jan is very clever.'

Some verbs accept both *erg* and *veel*, but the resulting interpretations are not the same:

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(17) a. Jan hoest   veel.
        Jan coughs a lot
        'Jan coughs a lot.'
     b. Jan hoest   erg.
        Jan coughs badly
        'Jan has a bad cough.'

(18) a. Jan heeft Marie veel beledigd.
        Jan has   Marie a lot offended
        'Jan offended Marie a lot.' (= *frequently*)
     b. Jan heeft Marie erg   beledigd.
        Jan has   Marie badly offended
        'Jan offended Marie deeply.'

(19) a. We hebben samen   veel gelachen.
        We have   together a lot laughed
        'We laughed a lot together.'
     b. We hebben samen   erg   gelachen.
        We have   together badly laughed
        'We had great fun together.'

The differences are even more striking in adjectival passives:

(20) a. Jan is veel afwezig (de laaste tijd).
        Jan is a lot absent (the last   time)
        'Jan is absent a lot (lately).
     b. Jan is erg   afwezig.
        Jan is badly absent
        'Jan is very absent minded.'

(21) a. Jan is veel thuis   (de laaste tijd).
        Jan is a lot at-home (the last   time)
        'Jan is at home a lot lately.'
     b. Jan is erg   thuis   in de   taalkunde.
        Jan is badly at-home in linguistics
        'Jan is very (much) at home in linguistics.'

2.2   Degrees vs. quantities

As Doejtes puts it, *veel* modifies 'quantity', while *erg* modifies 'quality'. She implements this intuition in terms of a particular theory of argument selection that we do not need to go through; instead, I will try to convey the more general aspects of what is going on.

First, the crucial semantic difference between (gradable) adjectives and nouns/NPs is the following:

(22) a. Gradable adjectives denote relations between objects and degrees.
     b. Noun (phrases) denote properties (sets) of objects, pluralities or quantities of stuff.

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This leads to the following hypothesis about the different modifiers we see here:

(23) a. *erg* high degree adverbs are used to restrict the degree argument of an adjective.
      b. *veel* and *a lot* are used to measure/quantify the denotation of a(n appropriate) noun/NP.

We can build at least a partial explanation of the verb modification facts by adopting the following (pretty reasonable) hypothesis:

(24) a. Verbs that accept *erg* (psych-predicates and adjectival passives) have an adjectival component to their meaning — they have a degree argument.
      b. Verbs that accept *veel* do not have a degree argument.

Comparatives provide evidence for this distinction, though at first glance, they seem not to:

(25) a. Max loves swimming more than running.
      b. Max swam more than Kim did.

In (25b), however, note that the comparative crucially 'takes over' the internal argument of the verb. When we control for this, we see very clearly that the comparative loses any sort of 'degree interpretation'; (26a) can only be understood as equivalent to (26b).

(26) a. Max swam 100 laps more than Kim did.
      b. Max swam 100 laps more (frequently/often) than Kim did.

(27) a. Max loves Kim more than Lee does.
      b. *Max ate that pizza more than Lee did.
      c. Max ate more (of the) pizza than Lee did.

Interestingly, (27c) does have a sort of high degree interpretation; we'll look into this in more detail next week.

To round things out, we need to add the following assumption for English: *a lot* can either express a degree or quantify over a noun/verb denotation.

This raises the following question, though: why don't we get *a lot* with adjectives? According to Doetjes, this is because it's blocked by *very*, which has a more specific meaning/distribution (the Elsewhere Effect).

What about comparatives???

(28) a. Max is very/*a lot tall.
      b. Max is *very/a lot taller than Bill.

Is this just a matter of syntax, or is this telling us something interesting about the semantics of comparatives?

What about *much*?

2.3 Interim summary

The interpretation of *a lot* and the distinction between Dutch *veel* and *erg* suggest a picture in which we have two kinds of grammatical expression of measurement: via a degree argument and via 'measure-based' (partitive?) quantification over some domain.

- Degree arguments: gradable adjectives (incl. adjectival passives), psych verbs, ...?

- Quantification: (mass and plural) noun (phrases), eventive verbs, ...?

We have an understanding of why gradable adjectives have degree arguments: they incorporate measure functions. The modification facts and the acceptability of comparatives indicates that verbs like *love* include GAs as part of their meanings. (They're also vague in the same sense as GAs.)

We also have an understanding of how measurement/quantification with mass/plural NPs work: the measure term quantizes an unbounded (dissective?) noun denotation by imposing some measurement on it.

To see how things work with eventive predicates, and why we sometimes get durative interpretations and sometimes iterative ones, we need to look at the semantic parallels betwen nouns and verbs.

3 The algebra of events

3.1 More parallels between nouns and verbs

Verbs seem to show count/mass distinctions, just like nouns.

(29)   a.   Much mud was in evidence.
        b. ??Much dog was in evidence.

(30)   a.   Lee slept a lot last night.
        b. ??Lee found his missing watch a lot last night.

(31)   a.   Many dogs were in the yard.
        b. ??Many muds were on the floor.

(32)   a.   Lee woke up three times during the night.
        b. ??Lee slept three times during the night.

Bach's (1986) analogy: events:processes::things:stuff

We've already seen that the *a lot* facts are a bit more complicated, though: *a lot* <u>can</u> modify a 'count' verb, as long as we get an iterative interpretation:

(33)   a.   Max swam a lot.   *duration/iteration*
        b.   Max swam 50 laps a lot. *iteration*
        c.   Max jumped in the pool a lot. *iteration*

3.2 Aspectual classification and verbal reference

Bach's system, with the Vendler/Dowty classes in CAPS (Vendler 1957; Dowty 1979):

(34)

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                              EVENTUALITIES
                        /                        \
               STATES                            NON-STATES
               STATES                        /              \
            /         \                                        \
      DYNAMIC        STATIC                                    EVENTS
        sit         be drunk    ACTIVITIES              /              \
       stand        be in NYC   PROCESSES                                \
      lie+LOC         own x        walk                                   \
                                push a cart   ACCOMPLISHMENTS      ACHIEVEMENTS
                                               PROTRACTED          MOMENTANEOUS
                                                 build x          /            \
                                              walk to school  HAPPENINGS   CULMINATIONS
                                                              recognize        die
                                                               notice      reach the top
                                                              flash once
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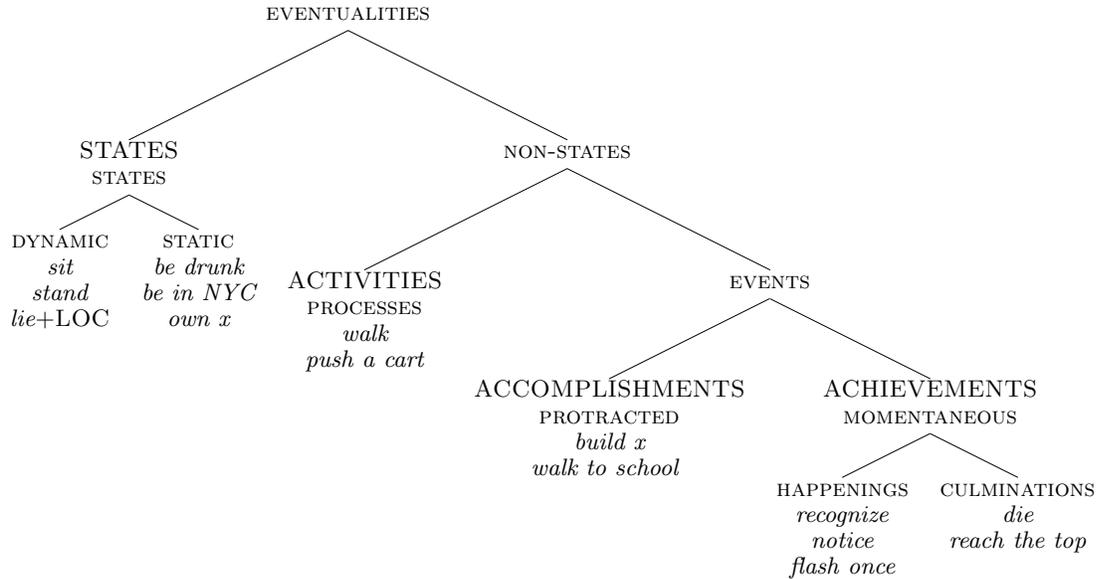
Bach argues that at least at the level of reference, predicates in the different aspectual classes should be treated in the same way that Link (1983) treats mass/count predicates. The system includes the following components (see Bach 1986, pp. 8-9 for the details):

(35) i.   A set of events with join operations $\cup_e$ and partial ordering $\preceq_e$ (a complete Boolean algebra)
      ii.   A set of atomic events
      iii. A set of bits of process with join $\cup_p$ and partial ordering $\preceq_p$ (a complete join semilattice)
      iv.   Two temporal orderings on events: a 'strictly precedes' relation and an 'overlaps' relation
      a.   A homomorphism from events to the processes that make them up

We further add the assumption that tenseless clauses in English denote sets (or properties) of events, and the result is that 'event descriptions' have essentially the same denotational properties as individual/substance descriptions. In particular, we have:

(36) a.   ⟦Max swim⟧ = $\lambda e.e$ is an occurrence of Max swimming = PROCESS
      b.   ⟦Max swim 50 laps⟧ = $\lambda e.e$ is an occurrence of Max swimming 50 laps = ATOMIC EVENT
      c.   ⟦Max jump in the pool⟧ $\lambda e.e$ is an occurrence of Max swimming 50 laps ATOMIC EVENT

(36a) differs from (36b-c) in denoting a process vs. an atomic event; (36b-c) differ from each other in that the former has subprocesses and the latter does not.

- Note that nothing we've said so far explains *why* these particular predicates have these referential properties; this is an issue of compositional semantics of VP meaning. We will worry about this next week.

3.3   Duration vs. iteration

We're now in position to explain the pattern of durative vs. iterative degree measurement in VP that we've observed, and why we see the parallels with the nominal system that we see. *a lot* needs an 'unmeasured' input: a mass or plural noun; a process or plural event.

(37)   a.   a lot of dough
        b.   a lot of bagels
        c. ??a lot of bagel

(38)   a.   Max swam a lot.
        b.   Max swam 50 laps a lot.
        c.   Max jumped in the pool a lot.
        d. ??Max swam 50 laps yesterday a lot.
        e. ??Max jumped in the pool a few seconds ago a lot.

So 'durativity' and 'iterativity' aren't semantic primitives in any sense (there's no ambiguity here), they're just what we get from measuring a process vs. measuring a plurality of events.

Some questions:

1. Are there other modifiers (in English) that are sensitive to this distinction?

2. What about 'verbal classifiers'?

3. How does the quantized/non-quantized distinction fit into this picture?

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