

**Title:** States and events for S-level gradable adjectives

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**Short abstract:** Since Davidson’s (1967) seminal paper introduced event quantification into the logical form of action sentences, that analysis has gotten richer: while the traditional translation of a sentence like *Ann kicked Bill* might simply involve a particular relation holding between Ann and Bill, this analysis is often supplanted by a translation that appeals to existential quantification over events—meaning, for example, ‘there is an event in which the Agent, Ann, kicks the Patient, Bill’ (e.g. Parsons 1990). However, the analysis of gradable property ascriptions hasn’t changed in the same way: *Ann was happy* is still likely to be translated in terms of a simple property applied to an entity ( $\text{HAPPY}(a)$ ), or, in a degree semantics framework, in terms of an entity’s instantiating a degree of the property that meets or exceeds a contextually-relevant standard (e.g.  $\text{HAPPY}(a) \geq \text{standard}(\text{HAPPY})$ ). Yet, evidence is mounting that even apparently simple adjectival predications too involve eventualities (e.g. Fults 2006, Husband 2010, Francez & Koontz-Garboden to appear, Wellwood 2015). I use evidence from comparatives to suggest that sentences like *Ann was happy* can express quantification over both states  $s$  and events  $e$ .

## States and events for S-level gradable adjectives

**Big picture.** Since D67’s seminal paper introduced event quantification into the logical form of action sentences, that analysis has gotten richer: ignoring tense, a traditional translation of (1a) like (1b) is often supplanted by (1c) (e.g. P90). However, the analysis of gradable property ascriptions hasn’t changed in the same way: (2a) is still likely to be translated as (2b), or, in a degree semantics framework, as (2c). Yet, evidence is mounting that even apparently simple adjectival predications too involve eventualities (e.g. F06, H10, FK, W15). I use evidence from comparatives to suggest that (2a) can translate as (2d), expressing quantification over states  $s$  and events  $e$ .

- (1) a. Ann kicked Bill.  
 b. **kick**( $a, b$ )  
 c.  $\exists e[\text{Agent}(e)(a) \ \& \ \text{kick}(e) \ \& \ \text{Patient}(e)(b)]$
- (2) a. Ann was happy.  
 b. **happy**( $a$ )  
 c. **happy**( $a$ )  $\succ$  **standard**(**happy**)  
 d.  $\exists e \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \text{happy}(s)]$        $\triangleright_{\tau}$ : ‘is temporally constituted by’

**Main empirical evidence.** My major empirical motivation for a double-eventuality analysis for (at least some) gradable adjectives is based on consideration of how expressions that are both **gradable** and **stage-level** interact interpretively with modifiers expressing temporal measurement. What distinguishes this class of adjectives is that they flexibly allow for both ‘low’ and ‘high’ attachment of degree morphemes like *-er/more*, with correspondingly distinct interpretations.

Consider that while the comparatives in (3) compare levels of happiness/availableness and tallness/aliveness (e.g. C76, vS84), (4a) expresses a comparison between numbers of occasions of being happy/available. Such a pattern is characteristic of gradable and S-level adjectives like *happy* and *available*. In contrast, I-level adjectives like *tall* and *alive* are odd with the ‘high’ attachment, (4b), apparently because their lexical preference for expressing ‘once-only’ or ‘long-lasting’ properties clashes with the implied numbers of occasions on which the property holds.

- (3) a. Ann was **happier/more available** than Bill was.  
 b. Ann was **taller/more alive** than Bill was.
- (4) a. Ann was **happy/available more** than Bill was.  
 b. ? Ann was **tall/alive more** than Bill was.

When the degree morpheme is ‘high’, the position of a temporal *for*-phrase affects the truth conditions of the sentence. To see this, consider two contexts. In  $c_1$ , Ann and Bill are counselors whose schedules are divided into one hour slots. On Monday and Tuesday, 12/14 of Bill’s were filled with meetings, but only 5/14 of Ann’s were; (5a) captures  $c_1$ . In  $c_2$ , Ann and Bill are contractors whose 6-day workweeks are divided into two day chunks. Last week, 3/3 of Bill’s were booked, but only 1/3 of Ann’s were; (5b) captures  $c_2$ . Yet, (5b) cannot felicitously capture  $c_1$ , nor (5a)  $c_2$ .

- (5) a. Ann was [**available more than Bill was**] **for 2 days**.  
 b. Ann was [**available for 2 days**] more than Bill was.

**The challenge for existing literature.** Such data challenge both ‘mainstream’ and ‘non-mainstream’ approaches to degree-based analyses of adjectival comparatives. Assuming L03’s interpretation of *for*-phrases as involving a mapping between an eventuality  $e$  and its temporal

duration,  $\tau(e)$ , **some eventualities must be involved** in (5). We will take H10 to be emblematic of mainstream approaches that fit this bill, and W15 to be emblematic of non-mainstream approaches. Both of these accounts, I suggest, suffer from positing **too few eventualities**.

Mainstream approaches interpret gradable adjectives as lexically denoting measure functions (type  $\langle e, d \rangle$ ; e.g. K99) or degree relations ( $\langle d, \langle e, t \rangle \rangle$ ; e.g. H00); H10 extends this picture by positing that some gradable adjectives derivationally map to properties of states. Non-mainstream approaches already interpret gradable adjectives as introducing entities that may be temporally quantified—whether properties of states ( $\langle v, t \rangle$ , where  $v$  ranges over eventualities; F06, W12, W15), abstract substances (FK), or tropes (M09).

The challenge for H10 is that the *for*-phrases in (5) would apply to the same states. Filling in some of the details, (3a) would compare degrees introduced by *happy*'s measure function, while (4a) would compare counts of states of happiness introduced by a verbal POS morpheme. If these are the only eventualities that could be quantified by *more* (e.g., via covert *many/much*), then H10 predicts that the sentences in (5) should be semantically equivalent. And, while W15's account involves states already in (3a), so it isn't yet clear how that account would capture (3b).

**Arguments for states.** There are independent reasons to think that the eventuality analysis extends down to the lexical interpretation of the adjective. Briefly: adjectival nominalizations like *the happiness she felt with herself* must refer to something (M09); and indeed, these can be anaphorically referred to, e.g. *Ann was happy; luckily, it lasted awhile*; the reference cannot be to something else, e.g. a fact, cp. *?The fact that Ann was happy lasted awhile* (Hi00); sentences with *the state of* seem equivalent to sentences without it, e.g. *(The state of) Ann's happiness was threatened* (Hi00); sentences containing the nominalized forms can mutually entail sentences with the non-nominalized forms, e.g.  $[[Ann\ was\ happy\ for\ 10\ years]] \Leftrightarrow [[Ann's\ happiness\ lasted\ 10\ years]]$  (Hi00); and, a D67-style permutation argument can be given for predications like *Ann is a happy young woman*, so long as the comparison class (e.g. *for a war veteran*) is kept constant (L00).

**Arguments for events.** At the same time, S-level adjective predications can behave like uncontroversially eventive predicates in a number of contexts. R95's analysis of sentences like *Every time I went to the bakery, I met a friend* involves a matching relation between events in the matrix and subordinate clauses; if events are involved in adjectival predications, I can similarly explain how *Every time Ann is happy, she pinches herself* is interpreted. A related analysis captures *When Mary is happy, she plays the piano* (M78, M93). The temporal anaphor *then* in sentence-initial position following an event description 'updates' narrative time (G93), cp. *Ann climbed Mt Everest. Then she climbed Mt Kilimanjaro* and *?Ann knew French. Then Bill liked her*. With S-level predications, *then* can perform this function: *Ann was unhappy. Then Bill liked her*.

**My analysis.** I resolve these data by positing a stative core to adjectives like *happy*, and the possibility of mapping those states to events. In (5), the difference comes down to the fact that the relevant events are constituted by states with different temporal commitments. The *for*-phrase in (5b) specifies how long a state holds, while that in (5a) specifies over what period the occasions (defined in terms of states of unspecified duration) occurred. The lack of equivalence exists because **the *for*-phrase applies to different eventualities**; but, *more* quantifies over events regardless.

Compositionally, I extend W15. There, I interpret an adjective like *available* as a property of states, and comparatives like (3a) as in (6), ignoring tense. The 'Holder' relation is introduced by a stative Voice head, and composed using Event Identification (cf. K00, H10). *-er/more* (uniformly analyzed as MUCH+ER, B73) is neutral between the types  $e$  and  $s$ , and introduces a contextually-given measure function,  $A(\mu)$  (cp. WHP, S15). Existential closure applies at the sentence level, and the *than*-clause contributes a degree, here abbreviated  $\delta$ ; names translate as individual constants.

$$(6) \quad \llbracket (3a) \rrbracket = \exists s[\text{Holder}(s)(a) \ \& \ \mathbf{available}(s) \ \& \ A(\mu)(s) \succ \delta]$$

Novel to the present proposal is a covert ‘eventizer’ (cf. K04) that maps properties of states to properties of events that are ‘temporally constituted by’ (generalizing L83) those states, (7a). If that property is pluralized, the implication will be that there was more than one occasion of a state’s holding. For transparency and simplicity, I assume interpretations for the covert plural and the relevant *for*-phrase (cf. L03, C10) as in (7b) and (7c) (the specifics of these aren’t necessary).

$$(7) \quad \begin{array}{ll} \text{a.} & \llbracket \text{EV} \rrbracket = \lambda P.\lambda e.\exists s[e \triangleright_{\tau} s \ \& \ P(s)] \\ \text{b.} & \llbracket \text{PL} \rrbracket = \lambda P.\lambda E.\forall e \in E[P(e)] \\ \text{c.} & \llbracket \text{for two days} \rrbracket = \lambda \alpha.\tau(\alpha) = \mathbf{2-days} \quad [\alpha \text{ neutral between events and states}] \end{array}$$

In (5a), the *for*-phrase combines after EV and PL combines with the adjectival complex, (8a), and indicates the runtime of the events, (8c). (5a) is thus interpreted as in (9). This interpretation is true if there is a plurality of events occurring over two days, each of which is temporally constituted by an availableness state, and whose number is greater than  $\delta$  (i.e. the number of such events of Bill being available). (For the restriction to number in plural contexts, see BB and W15.)

$$(8) \quad \begin{array}{ll} \text{a.} & \llbracket \llbracket \llbracket \text{Ann was available} \rrbracket \text{ EV} \rrbracket \text{ PL} \rrbracket^A = \lambda E.\forall e \in E : \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \mathbf{available}(s)] \\ \text{b.} & \llbracket \dots \text{ more}_{\mu} \rrbracket^A = \lambda E.\forall e \in E : \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \mathbf{available}(s)] \ \& \ A(\mu)(E) \succ \delta \\ \text{c.} & \llbracket \dots \text{ for 2 days} \rrbracket^A = \\ & \lambda E.\forall e \in E : \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \mathbf{available}(s)] \ \& \ A(\mu)(E) \succ \delta \ \& \ \tau(E) = \mathbf{2-days} \end{array}$$

$$(9) \quad \llbracket (5a) \rrbracket = \exists E[\forall e \in E : \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \mathbf{available}(s)] \ \& \ A(\mu)(E) > \delta \ \& \ \tau(E) = \mathbf{2-days}]$$

In (5b), the *for*-phrase combines directly with the adjective, as in (10a), where it contributes the runtime of the state. This phrase then combines with EV, PL, then *more*. (5b) is thus interpreted as in (11). This interpretation is true if there is a plurality of events, each of which is temporally constituted by an availableness state holding for 2 days, and whose number is greater than  $\delta$  (i.e. the number of such events of Bill being available).

$$(10) \quad \begin{array}{ll} \text{a.} & \llbracket \llbracket \llbracket \text{available [ for 2 days ]} \rrbracket \rrbracket^A = \lambda s.\mathbf{available}(s) \ \& \ \tau(s) = \mathbf{2-days} \\ \text{b.} & \llbracket \llbracket \llbracket \text{Ann was ...} \rrbracket \text{ EV} \rrbracket \text{ PL} \rrbracket \text{ more}_{\mu} \rrbracket^A = \\ & \lambda E.\forall e \in E : \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \mathbf{available}(s) \ \& \ \tau(s) = \mathbf{2-days}] \ \& \ A(\mu)(E) \succ \delta \end{array}$$

$$(11) \quad \llbracket (5b) \rrbracket = \exists E[\forall e \in E : \exists s[e \triangleright_{\tau} s \ \& \ \text{Holder}(s)(a) \ \& \ \mathbf{available}(s) \ \& \ \tau(s) = \mathbf{2-days}] \ \& \ A(\mu)(E) > \delta]$$

**Consequences & extensions.** This analysis accounts for the flexible interpretation of S-level adjectives between ‘low’ and ‘high’ attachments of degree operators in terms of *what is quantified*: degrees of ADJ-ness are compared when states are measured, and numbers of occasions when events are measured. States are mapped to events by grammatical mechanisms that appear to be independently needed; working out the details for the non-comparative cases awaits future research. An alternative possibility to the ‘wrapping’ of states by events presented here is thinking about the events introduced derivationally as *teloi* (AT). Finally, I have minimized the potentially real ontological distinction for adjectives, between states, abstract substances (FK), and tropes (M09). Are there real distinctions to be drawn here, or should the differences be considered terminological?

**Conclusion.** The fact that while (3b) involves a straightforward comparison of numbers of occasions, yet (4b) is odd, is captured on the present account: ‘high’ attachment requires a plurality of (atomic) events, each temporally constituted by some state; for a given individual to be the

Holder of more than one such state, it must be of the sort that we can understand an individual to sometimes be in, and sometimes out of. This idea can thus support the generalization advanced by N07 and WHP that, cross-categorially, degree constructions disdain atomic predications.

**AT** Atkins 2015, Stative puzzles: a case against hidden modality. WMU m.s., [http://www.ashley-atkins.com/uploads/2/3/1/1/23110980/a\\_case\\_against\\_hidden\\_modality.pdf](http://www.ashley-atkins.com/uploads/2/3/1/1/23110980/a_case_against_hidden_modality.pdf).

**BB** Bale & Barner 2009, The interpretation of functional heads: Using comparatives to explore the mass/count distinction.

**B73** Bresnan 1973, Syntax of the comparative clause construction in English.

**C10** Champollion 2010, *Parts of a whole: Distributivity as a bridge between aspect and measurement*.

**C76** Cresswell 1976, *The semantics of degree*.

**D67** Davidson 1967, The logical form of action sentences.

**FK** Francez & Koontz-Garboden (in press), Semantic variation and the grammar of property concepts.

**F05** Ferreira 2005, *Event quantification and plurality*.

**F06** Fulst 2006, *The structure of comparison*.

**G93** Glasbey 1993, Distinguishing between events and times: Some evidence from the semantics of “then”.

**H00** Heim 2000, Degree operators and scope.

**Hi00** Higginbotham 2000, On events in linguistic semantics.

**H10** Husband 2010, *On the compositional nature of stativity*.

**K99** Kennedy 1999, *Projecting the adjective*.

**K00** Kratzer 2000, Building statives.

**K04** Kratzer 2004, Building resultatives.

**L00** Landman 2000, *Events and Plurality*.

**L03** Larson 2003, Time and event measure.

**L83** Link 1983, The logical analysis of plurals and mass terms: A lattice-theoretical approach.

**M09** Moltmann 2009, Degree structure as trope structure: A trope-based analysis of positive and comparative adjectives.

**M78** Mourelatos 1978, Events, processes, and states.

**M93** McNally 1993, Adjunct predicates and the individual/stage distinction.

**N07** Nakanishi 2007, Measurement in the nominal and verbal domains.

**P90** Parsons 1990. *Events in the semantics of English: A study in subatomic semantics*. **R95**

Rothstein 1995, Adverbial quantification over events.

**S15** Solt 2015, Q-adjectives and the semantics of quantity.

**vS84** von Stechow 1984, Comparing semantic theories of comparison.

**W12** Wellwood 2012, Back to basics: *more* is always *much-er*.

**W15** Wellwood 2015, On the semantics of comparison across categories.

**WHP** Wellwood, Hacquard, Pancheva 2012, Measuring and comparing individuals and events.