

## Derived statives<sup>1</sup>

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### 1 Introduction: Derived statives and the problems they pose

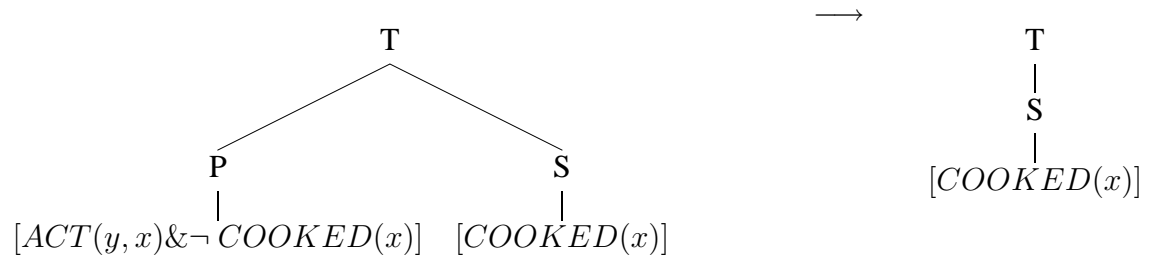
- The broader context: What do word formation operations do to the meanings of lexemes they operate on? What are possible and impossible semantic operations in word formation?
- Morphological and semantic literature: To the extent that a word formation operation is productive, it will also be semantically compositional (Zimmer 1964:32; Aronoff 1976:38ff.; Dowty 1979:302; Hoeksema 1985:Chapters 1,2; Kornai 1988; Badecker 2001; Bauer 2001:147).
- But outside of the formal semantic tradition, in the lexical semantic and argument structure literature, there are phenomena that are not obviously consistent with this idea.
- E.g., anticausativization (Koontz-Garboden 2009).
  - (1) Anticausativization in Spanish
    - a. *romper*  
'cause to become broken'
    - b. *romper-se*  
'become broken'
- This paper: Deverbal adjectives.
  - (2) Result states—entail an event of the kind named by the verb giving rise to the state (Kratzer 2000)
    - a. Given a choice between the two versions of the photo, Jane prefers the **darkened** one.
    - b. Smith earned his billions off of the booty in a **sunken** ship he discovered at the bottom of the ocean.
    - c. There's a **broken** vase on the floor.
  - (3) Derived statives—fail to entail an event of the kind named by the verb giving rise to the state
    - a. He has no scars but there is a slightly **darkened** portion of skin on his right leg, near the femoral artery, which he has had since birth and is in the crude ...  
<http://www.adventdestiny.com/forum/archive/index.php?t-2820.html>
    - b. Lower Knoll, is a **sunken** area of land that is located on the eastern side of the Avenues, area in Exmouth and lies above the Maer Valley.  
[http://www.eastdevon.gov.uk/reportdc\\_120108\\_07.3421.out.jb.pdf](http://www.eastdevon.gov.uk/reportdc_120108_07.3421.out.jb.pdf)
    - c. Elementary school writing paper is manufactured with **broken** lines on it. (Itamar Francez, p.c.)

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- Such uses are relatively well-known in the typological literature (Nedjalkov 1988).
- In the lexical semantics/argument structure literature, derived statives have been analyzed as having a semantic analysis involving a (non-compositional) deletion operation (Dubinsky and Simango 1996).

(4) Stativization of Chichewa *phika* ‘cook’, via suffixation of *-ika* in Dubinsky and Simango (1996:771-772)



- My claims:
  - The lexical semantics of derived statives are more complicated than has been appreciated. They do not name semantically simple states (on a par with Dixon’s 1982 *property concept states*) that fail to entail an event giving rise to them.
  - Like anticausativization, the derivational operation giving rise to derived statives is fully compositional, once their lexical semantics is better understood.
  - Derived statives are derived from *extent* uses of change of state verb (Langacker 1986:464; Matsumoto 1996; Talmy 2000:Chapter 2; Gawron 2009).

- (5) a. His skin darkens on his right leg near the femoral artery.  
 b. The valley sinks even further five miles ahead.  
 c. The line breaks right at the point where you’re supposed to begin the sentence.

- Once we have an understanding of the nature of extent uses of change of state verbs, the semantics of derived statives make more sense.

- Broader claim: Morphologically productive word formation is semantically compositional.

- Roadmap:

- Crosslinguistic data
- An analysis based on data from English
- Predictions
- Comparison with alternative analyses
- Concluding remarks

## 2 A general problem

- Derived statives are crosslinguistically common, having received explicit attention in the studies in Nedjalkov (1988), where Nedjalkov and Jaxontov (1988) in their crosslinguistic survey observe a distinction between two types of deverbal state denoting words, one which they dub *resultative* (=result state) and the other which they dub *stative*.

“...the term resultative is applied to those verb forms that express a state implying a previous event. The difference between the stative and the resultative is as follows: the stative expresses a state of a thing without any implication of its origin, while the resultative expresses both a state and the preceding action it has resulted from... sometimes the past passive participle [otherwise a resultative] may be a stative”(Nedjalkov and Jaxontov 1988:6)

- As suggested by Nedjalkov and Jaxontov, derived statives don't appear at all to be peculiar to English (though the examples in the literature genuinely showing absence of temporal change are relatively few).

### Chichewa

- The stative involves suffixation of one of three allomorphs (*-k-*, *-ik-*, *-ek-*) to a transitive verb (Mchombo 2004:95).

(6) *Maíta a-na-pink-ik-a.*  
6.bows 6SM-PST-bend-STAT-FV  
'The bows got bent.' (Mchombo 2004:95)

- Semantically, it is claimed that the stative does not entail either a causing agent (Mchombo 2004:96) or a causing event (Dubinsky and Simango 1996:772, fn. 19), as exemplified by (7).

(7) *Nthambi ndi yo-pind-ika ngakhale si-i-na-pind-idwe.*  
branch is AGR-bend-STAT even.though NEG-AGR-PAST-bend-PASS  
'The branch is [in a state of being] bent, event though it was not bent.' (Chichewa; Dubinsky and Simango 1996:772, fn. 19)

### Indo-Aryan

- According to Condoravdi and Deo (2008) (and many others before them), Indo-Aryan languages have a suffix *-ta* that derives state denoting words from change of state verbs (on the relevant use of *-ta*; their “lexical *-ta*” or “reading one”; Condoravdi and Deo 2008:3).

Despite the restriction to change of state verbal roots with an associated result state, the *-ta* form does not entail the existence of a prior event of the type denoted by the corresponding verb ... (Condoravdi and Deo 2008:3)

- “In [(8) ], the *-ta* form predicates of the tree the state of being fixed/established in a certain location, and it certainly does not imply any event that resulted in coming about of this state” (Condoravdi and Deo 2008:4).

(8) *káḥ svid vrkṣó niṣṭh-ito mádhy-e árṇas-o yá-m*  
which indeed tree.NOM.SG fix-PERF.M.SG middle-LOC.SG sea-GEN.SG which-ACC  
*taugryó nādhī-táḥ paryáṣasvaj-at*  
taugrya.NOM.SG supplicate-PERF.M.SG cling-IMPF.3.SG  
'Which tree (was it) that *was fixed* in the middle of the sea, to which Taugrya (the son of Tugra), supplicated, was clinging to?' (RV.1.182.7; Condoravdi and Deo 2008:4)

- “[9] ] is part of a characterizing description of Maruts (minor storm deities), which enumerates stable attributes of these deities rather than describing a result state obtaining from a prior event. The visors are understood as being in a spread-out position without there being a prior event by which they come to be in such a position” (Condoravdi and Deo 2008:4).

(9) *agníbhṛājas-o vidyút-o gábhastiy-oḥ śíprā-ḥ śīrṣá-su*  
 fire.glowing-NOM.PL lightning-NOM.PL hand-LOC.DU visor-NOM.PL head-LOC.PL  
**víta-tā hiraṇyáyī-ḥ**  
 spread-PERF.M.PL golden-NOM.PL  
 ‘Lightenings glowing with fire are on your hands; visors wrought of gold *are spread* on your heads.’ (RV.5.54.11; Condoravdi and Deo 2008:4)

- These same forms, as implied above, can also have clear result state meanings: “The plain stative reading of *-ta* forms contrasts with their result stative reading, asserting the existence of a prior event and the result state it brings about” (Condoravdi and Deo 2008:5).

(10) *ayám hí te śunáhotre-ṣu sóma índra tvā-yá*  
 this FOC you.GEN.SG S-LOC.PL soma.NOM.SG indra.VOC you-DAT.SG  
**párisík-to mād-āya**  
 sprinkle-PERF.M.SG delight-DAT.SG  
 ‘This Soma juice *has been sprinkled* among the Sunahotras, in love, for your delight, Indra.’ (RV 2.18.6c; Condoravdi and Deo 2008:5)

## Tongan

- Polinsky (1988) claims for Tongan that *ma-* derived deverbal state denoting words needn’t entail an event giving rise to the state.

The stative interpretation of the prefixed forms is confirmed by the existence of certain contexts where the forms in question denote a state which does not imply any preceding action (1988:293).

- She gives (11) as support for the claim.

(11) *Na ‘a ma-puni (‘a) e māketiū he uike kuo osí*  
 ‘The market was closed (past obj.stat., *puni* ‘to close’) (all) the last week.’ (Tongan; Shumway 1971:523 in Polinsky 1988:289)

## Georgian

- “These statives do not express a prior action, though in the context there can be an indication thereof” (Mačavariani 1988:268).

(12) *es biblia-š-i-c cer-i-a*  
 ‘This is-*written* (pres. obj. stat.) even-in-the-Bible’ (it implies the fact of an idea to be found in the bible rather than the result of a prior action of writing it; Mačavariani 1988:268)

- Additionally, the following is reported for the data in (13).

If one asks “Aren’t you cold? Shall I cover you with a blanket?” and if the person asked is already covered with a blanket he will use the stative in his answer . . . The resultative will imply that someone has already covered him with a blanket or that he himself has done it and that the person who is offering help is told not to trouble himself. (Mačavariani 1988:271)

- (13) a. *[me] saban-i ukve m-a-par-i-a*  
lit. ‘To-me (dat. ind. obj.) the-blanket (nom. subj.) already me-covering-is (pres. obj. stat., *m-* is here 1st p. sg. ind. obj. marker; *a-* is loc. prefix . . . )
- b. *[me] saban-i ukve da-par-eb-ul-i m-akv-s*  
‘I (lit. to-me; dat. ind. obj.) have (lit. to-me-have-it) a-blanket (nom. subj.) covering (lit. covered; pass. perf.; pres. obj. res.) (me)’ (Mačavariani 1988:271)

## Pima

- Pima has a suffix *-s* that has been described as a:

. . . suffix added to active verbs and gerunds to form stative verbs [which mean] ‘be in a (specified) state as a result of action.’ (Saxton et al. 1983:51)

- (14) *Haahag ’0 veesko ’iig-s.*  
leaf 3.SUB.IMP everywhere fall-STAT  
‘The leaves are fallen (and scattered) everywhere.’ (Jackson 2005b:120)

- As Jackson (2005a,2005b) notes, however, in some instances, an event preceding the state is not entailed.

- (15) a. *’Oola ’o ’am do’ag c’ed: ’eesto-s.*  
gold 3.SUB.IMP DXF mountain in hide.PFV-STATE  
‘The gold is hidden in the mountains.’ (Jackson 2005b:128)
- b. *Voog ’o gahi nod:-s.*  
road 3.SUB.IMP sideways turn-STAT  
‘The road turns to the side.’ (Jackson 2005a:3)

- There seems to be a lexical semantic generalization about which roots allow/disallow derived stative readings with their *-s* derivatives:

With intransitive verbs that do not lexicalize a path of motion or a spatial position, suffixation with the *-s* results in a verb which denotes (*sic*) an object that is characterized by the action of the verb . . . (Jackson 2005b:119)

- In essence, what we have in Pima is no different from what’s going on in English—for some verbs, deverbal statives entail an event giving rise to the state, while for other verbs, an event giving rise to the state is not necessarily entailed.
- It seems to be root dependent.

## Chinese

- In Chinese *-zhe* is used to derive result states (Jaxontov 1988).

- It also has derived stative uses as well.

Chinese sentences having a resultative [=result state, AKG] as their predicate mostly denote states which by their very nature could have arisen only as a result of deliberate activity of an agent . . . However there are sentences in which the resultative obviously denotes a state as such, unrelated to any preceding action (Jaxontov 1988:132).

- (16) *Xixide zhītiao shang, guá-she l'üsé de shìz*  
 thin branches from hung green? persimmons  
 ‘Green persimmons hung from thin branches.’ (Jaxontov 1988:132)

- “Obviously, while persimmons did hang from the branches, they hadn’t been hung there” (Jaxontov 1988:132).

## Others

- Languages for which it is claimed that there are derived statives, but for which sufficient data are presently lacking: Ancient Greek (Perel’muter 1988), Chukchee (Nedjalkov et al. 1988:155), Evenki (Nedjalkov and Nedjalkov 1988), Huave (Kim 2008:197),

## 3 A new solution

- Derived statives are the result of deriving a result state from an extent reading of a verb.
- The denotation of the derived stative morphology is the same as what would be expected for a result state.

### 3.1 Extent verbs

- “Functional change is the existence of some correlation between two ordered domains, and change with respect to time is a special case of that” (Gawron 2009:16).
- So, (17), for example, describes a change in width in the spatial domain; the width of the crack at two points in space is different.

- (17) The crack in the (north/south running) M60 motorway widened 5 inches in less than 100 yards.

- The two ordered domains are:
  - Width, a linearly ordered set of degrees on a scale defined by the width dimension as in Kennedy 1999:43 inter alia.
  - Space, a well-ordered set of points on a scale supplied by context (Gawron 2009:16).
- In (17), then, width changes with respect to space.
- The width scale is provided by the predicate *widened*, the spatial scale of points along the north/south scale along the M60 motorway is provided by context.
- A width axis (i.e., scale with spatial extent) runs perpendicular through each point along the spatial axis (Gawron 2009).
- The change is measured by measuring width at points along the contextually supplied spatial scale, i.e., by examining the degree of width holding at each point along the spatial scale (the axis of change).

- Evidence for dynamicity comes in the form of the fact that extent readings allow adverbial modifiers that require change (Gawron 2009:6).
  - (18) a. The crack widened nearly half an inch *in ten meters*.
  - b. The crack *gradually* widened from the north gate to the tower. (Gawron 2009:6-7)
- At the same time, if the change is really in the spatial domain and not in the temporal domain, we expect temporal stativity.
- Evidence: Non-occurrence in the progressive and non-habitual present tense uses (Gawron 2009:4).
  - (19) a. The lines on that magnificent piece of paper broke every 2 millimeters.
  - b. \*The lines on that magnificent piece of paper were breaking every 2 millimeters.
  - (20) a. The river bent northward 100 meters back.
  - b. ?The river is bending to the north right now.
  - (21) a. The crack widened 5 inches in less than 100 yards.
  - b. \*The crack was widening 5 inches in less than 100 yards.
  - (22) The lines on that magnificent piece of paper break every 2 millimeters.
  - (23) The river bends to the north in 100 meters.
  - (24) The crack widens 5 inches in less than 100 yards.
- Given that these verbs can be used in this way, the null hypothesis would be that adjectives derived from them could be based not only on the temporally dynamic sense of the verb, but on the temporally stative (but spatially dynamic) one as well.
- This seems to be the case—for any verb that has an extent use, there seems to be a deverbal adjective with a derived stative reading.
  - (25) a. Lower Knoll, is a sunken area of land that is located on the eastern side of the Avenues, area in Exmouth and lies above the Maer Valley.  
[http://www.eastdevon.gov.uk/reportdc120108\\_07.3421.out.jb.pdf](http://www.eastdevon.gov.uk/reportdc120108_07.3421.out.jb.pdf)
  - b. It is a five minute walk to Dunster Beach and along the way walkers may be able to make out the sunken area of land which marks the site of the Medieval.  
<http://www.west-somerset-railway.co.uk/Dunster.html>
  - c. Pit, definition 15: Bowling. the sunken area of a bowling alley [presumably constructed that way—AKG] behind the pins, for the placement or recovery of pins that have been knocked down.  
<http://dictionary.reference.com/browse/Pits>
  - (26) a. The areola, the darkened portion of skin surrounding the nipple, can be created with a medical tattoo.  
<http://www.milesplasticsurgery.com/procedures/reconstruction.c>
  - b. He has no scars but there is a slightly darkened portion of skin on his right leg, near the femoral artery, which he has had since birth and is in the crude ...  
<http://www.adventdestiny.com/forum/archive/index.php?t-2820.ht>
  - (27) Because it's essentially a widened portion of the river, Lake Lillinonah is technically an impoundment not a lake, but it's long, skinny configuration has ...  
<http://www.countytimes.com/site/index.cfm?newsid=11375715&BRD=2303&PAG=4>

- (28) Q: My penis bends. Please help. . . my penis has always had this bend in it, for as long as I remember, so it doesn't seem to me that it occurred as a result of something.  
 A: If you have no pain . . . I would say with almost complete certainty that you have just, for some reason, been born with a bent penis . . .  
<http://www.the-penis.com/problems4.html>

- **My proposed solution to derived statives:** They are derived from extent uses of COS verbs.
- Extent uses entail no temporal change. As a consequence, state denoting words compositionally derived from them wouldn't be expected to either.

### 3.2 Outline of an analysis of extent verbs

- My analysis of extent verbs is inspired by Gawron (2009), but cast in a formalism building on Kennedy and Levin (2008).
- The ingredients of the semantics:
  - ordinary individuals (type  $e$ , variables  $x, y, z$ ).
  - events (a subdomain of the domain of individuals; type  $v$ , variables  $e, e', e''$ ).
  - scales are sets of totally ordered points; scales are defined by some dimension.
  - $T$  the set of real numbers, each of which represents one of the totally ordered points defining a scale (whether temporal or spatial). The points  $t_1, t_2, t_3$  are among these.  $i$  is an interval if  $i \subset T$  and for all points if  $t_1, t_3 \in i$  then  $t_2 \in i$  (cf. Dowty 1979:139).
  - “times” ( $t$ ) are intervals on a temporal scale; “degrees” ( $d$ ) are intervals on a scale (Kennedy 2007) whose dimension is defined by the lexical content of adjectives and verbs. These are sorts of the more general type *interval on a scale* ( $p$ ).
- Consider first extent-like uses of adjectives, adjectival predications in which a state holds at a certain interval on a spatial scale (Gawron 2009:30).

- (29) a. The road is 10 meters wide at the summit.  
 b. The road is 10 meters wide from the first phone pole past my house to the second.

- I follow Kennedy (1999) in analyzing the denotations of gradable adjectives as measure functions, functions from times to functions from individuals to a degree on a scale defined by the lexical content of the adjective.
- In order to account for sentences like (29), however, I allow that the measure function can take not only temporal intervals as arguments, but spatial ones as well.
- The measure function is thus looking for an interval  $p$  on some scale, perhaps temporal, perhaps spatial (and the property lexicalized by the adjective holds of its argument at all points in that interval, whether the scale is spatial or temporal).

- (30)  $\llbracket wide \rrbracket = \lambda p \lambda x [\iota d [wide'(p)(x) = d]]$   
 (cf. Piñón's 2008:192 recasting of KL with the iota operator)

- Predicates like (30) compose with degree morphology to become predicates of individuals.

- In the absence of overt degree morphology (in the form of comparatives, intensifiers, etc.; Kennedy 2007:5), I follow Kennedy in assuming a null *positive* degree (or alternatively, a type-shifting operation with the same effect) that introduces a standard of comparison and generates a predicates of individuals (Kennedy 1999, 2007; Kennedy and Levin 2008).

$$(31) \quad \llbracket pos \rrbracket = \lambda P \in D_{\langle p, \langle e, d \rangle \rangle} \lambda p \lambda x [g(p)(x) \succeq stnd(P)]$$

- The semantics of change of state verbs has the adjectival core (e.g., (30)) as its starting point, combining it with the semantics of change.
- To capture extent verb phenomena, rather than defining change exclusively in terms of a temporal scale (as in KL), I define it in scalar terms more generally, allowing the change to be measured out along any scale, whether temporal or spatial (cf. Gawron 2009).
- Kennedy and Levin’s (2008) notions of *difference functions* (from the analysis of comparatives) and *measure of change functions* provide a semantics for scalar change.
- A difference function is like a measure function, but rather than returning a particular degree, it returns “... the difference between the object’s projection on the scale and an arbitrary degree  $d$  (the comparative standard): a positive value when there is a positive difference, and zero otherwise” (Kennedy and Levin 2008:172).

(32) Difference functions: For any measure function  $\mathbf{m}$  from objects and points on a temporal or spatial scale to degrees on a scale  $S$ , and for any  $d \in S$ ,  $\mathbf{m}_d \uparrow$  is a function just like  $\mathbf{m}$  except that:

- its range is  $\{d' \in S \mid d \preceq d'\}$ , and
- for any  $x, p$  in the domain of  $\mathbf{m}$ , if  $\mathbf{m}(x)(p) \preceq d$  then  $\mathbf{m}_d \uparrow(x)(p) = d$  (cf. Kennedy and Levin 2008:172)

(33) Schematically (where  $d$  is an arbitrary degree on the scale associated with  $m$ , and  $d'$  is a difference value):  $\lambda p \lambda x [\iota d' [\mathbf{m}_d \uparrow(p)(x) = d']]$

- The denotation of a COS verb is a *measure of change* function, a difference function, where the arbitrary degree  $d$  is generated by a measure function, with the measure function’s scalar argument the starting time/spatial interval of the change event.
- The scalar argument of the difference function is generated by computing the endpoint of the event, a temporal or spatial interval.
- *init* and *fin* are functions that for an event  $e$  return the interval on a scale at which it begins/ends. This can be either a temporal interval or a spatial interval.

(34) Measure of change (cf. Kennedy and Levin 2008:173):

$$\text{For any measure function } \mathbf{m}, \mathbf{m}_\Delta = \lambda x \lambda e [\iota d [\mathbf{m}_{\mathbf{m}(init(e))}(x) \uparrow (fin(e))(x) = d]]$$

- “A measure of change function  $\mathbf{m}_\Delta$  takes an object  $x$  and an event  $e$  and returns the degree that represents the amount that  $x$  changes in the property measured by  $\mathbf{m}$  [whether along a temporal or spatial scale—AKG] as a result of participating in  $e$ ” (Kennedy and Levin 2008:173).
- On this view, then, the denotation of a (intransitive) COS verb like *darken* is as in (35), a function from individuals to events to the degree representing the difference of an individual  $x$  in degree of darkness at the beginning of an event  $e$  as compared to its end.

$$(35) \quad \llbracket \text{darken} \rrbracket = \lambda x \lambda e [\iota d [\mathbf{dark}'_{\mathbf{dark}'(init(e))(x)} \uparrow (fin(e))(x) = d]]$$

- The measure of change function is composed with verbal degree morphology to yield a predicate of events (Piñón 2008; Kennedy and Levin 2008).
- As with adjectival degree morphology, there is a “positive degree” which introduces a contextual standard, when no overt standard is present.

$$(36) \quad \llbracket pos_v \rrbracket = \lambda g \in D_{m\Delta} \lambda x \lambda e [g(x)(e) \succeq stnd(g)]$$

$$(37) \quad \llbracket pos_v \rrbracket (\llbracket \text{darken} \rrbracket) = \lambda x \lambda e [\iota d [\mathbf{dark}'_{\mathbf{dark}'(init(e))(x)} \uparrow (fin(e))(x) = d]] \succeq stnd(\llbracket \text{darken} \rrbracket)]$$

(38) The room darkened.

- E.g., (38) will be true on this theory iff the degree to which the room darkened is at least as big as the contextually standard degree of darkening.

### 3.3 Not all COS verbs have extent readings

- Some, e.g., those seen above do, while others do not.
- E.g., verbs of cooking do not.

- (39) a. The side of beef is cooking between the rib and the joint. ( $\rightarrow$  there is temporal change; that portion undergoes temporal change)  
 b. #The side of beef cooks between the rib and the joint.

- *Cook* is only acceptable in eventive frames, e.g., (39a).
- (39b) is anomalous because the present tense requires temporal stativity, and *cook* has no temporally stative use akin to the extent uses of the COS verbs discussed above. (Of course, the English present is fine with eventive verbs with a habitual reading, irrelevant for consideration of the matter at hand.)
- As discussed, on this analysis, extent readings arise as a consequence of the ability of a verb to take either a temporal or spatial interval.
- I assume that it is a lexical property of any given verb (or verb class) that it can/can't take certain kinds of interval arguments.
- More specifically, the semantic root Levin and Rappaport Hovav (2003) of a verb (e.g., *dark'* in *darken* above) says that the *p* argument can be temporal, spatial, only temporal, etc.
- As will be seen below, this predicts that the ability to take a particular kind of interval argument should be maintained across all derivationally related lexemes having the same root.

- (40) a. Kim's skin is dark at the kneecap.  
 b. Kim's skin darkens at the kneecap.  
 c. The darkened portion of skin on Kim's kneecap has been there seen birth.

- (41) a. #The side of beef cooks between the rib and the joint.  
 b. #The cooked portion of meet between the rib and the joint is raw.

### 3.4 Adjectives derived from extent verbs

- I treat deverbal adjectives, following Kennedy and McNally (2005) type-theoretically as any other adjective, as functions from intervals to individuals to a degree on a scale.
- The difference between result states (42a) and derived stative (42b) readings is a consequence of the nature of the scale the interval is an interval on.

- (42) a. In the last days of the campaign, ads had run in many of these districts that used darkened photos of Jindal and ominous intonations.  
[http://americantaino.blogspot.com/2007\\_03\\_25\\_archive.html](http://americantaino.blogspot.com/2007_03_25_archive.html)
- b. He has no scars but there is a slightly darkened portion of skin on his right leg, near the femoral artery, which he has had since birth ...  
<http://www.adventdestiny.com/forum/archive/index.php?t-2820.htm>

- If spatial intervals, then a derived stative reading (e.g., (42b)) is generated, while if temporal intervals, a result state reading (e.g., (42a)) is generated.
- Adjectives like *darkened*, then, say something about the degree  $d$  of darkness holding of an entity  $x$  at a particular interval  $p$ .
- What's special about deverbal adjectives is that they're deverbal. As such, the interval at which the degree holds is preceded by a change of state event giving rise to that degree.
- The intuitions:

- With result states, the interval  $p$  is temporal, so that the adjective is saying something about the degree of darkness holding at a particular interval of time. Further, it is preceded on the temporal scale by an interval at which the degree of darkness holds to a lesser degree.
- With derived statives, the interval  $p$  is spatial, so that the adjective says something about the degree of darkness holding at a particular interval in space (e.g., at the peak of the mountain, a place on the body, etc.). Further, this interval is preceded on the scale by an interval at which the degree of darkness holds to a lesser degree.

- Formally, exemplified with *darkened*, in (43) (where  $\supset\subset$  is the abut relation, so that for two intervals  $p$  and  $p'$ ,  $p \supset\subset p'$  iff the final point of  $p$  immediately precedes the initial point of  $p'$ ).

$$(43) \quad \llbracket \textit{darkened} \rrbracket = \lambda p \lambda x [\iota d [\exists e [\iota d' [\mathbf{dark}'_{\mathbf{dark}'(\textit{init}(e))(x)} \uparrow (\textit{fin}(e))(x) = d']] = d \wedge \textit{fin}(e) \supset\subset p \wedge \neg \exists e' [\exists d'' [\iota d''' [\mathbf{dark}'_{\mathbf{dark}'(\textit{init}(e'))(x)} \uparrow (\textit{fin}(e'))(x) = d''']] = d'' \wedge \textit{init}(e') = \textit{fin}(e) \wedge \textit{fin}(e') = p]]]]]$$

- In (somewhat simplified) prose, (43) is a function from intervals  $p$  on a scale (whether temporal or spatial) to individuals  $x$  to the degree  $d$  representing the difference in darkness in  $x$  from the beginning of an event  $e$  to the end of  $e$ , where the end of  $e$  abuts interval  $p$ , and there exists no event of change in degree of darkness of  $x$  between the end of  $e$  and  $p$  (i.e., the degree of darkness of  $x$  reached by the end of  $e$  must be identical to its value at  $p$ ).
- The denotation of stativizing  $-ed$ , then, is (44).

$$(44) \quad \llbracket -ed \rrbracket = \lambda g \in D_{m\Delta} \lambda p \lambda x [\iota d [\exists e [g(x)(e) = d \wedge \textit{fin}(e) \supset\subset p \wedge \neg \exists e' [\exists d' [g(x)(e') = d' \wedge \textit{init}(e') = \textit{fin}(e) \wedge \textit{fin}(e') = p]]]]]]]$$

$$(45) \quad \llbracket \text{darkened} \rrbracket = \llbracket -ed \rrbracket (\llbracket \text{darken} \rrbracket) = \\ \lambda g \in D_{m\Delta} \lambda p \lambda x [\iota d [\exists e [g(x)(e) = d \wedge \text{fin}(e) \supset \subset p \wedge \neg \exists e' [\exists d' [g(x)(e') = d' \wedge \text{init}(e') = \\ \text{fin}(e) \wedge \text{fin}(e') = p]]]]] (\lambda x \lambda e [\iota d [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e))(x)} \uparrow (\text{fin}(e))(x) = d]] = \\ \lambda p \lambda x [\iota d [\exists e [\iota d' [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e))(x)} \uparrow (\text{fin}(e))(x) = d']] = d \wedge \text{fin}(e) \supset \subset p \wedge \\ \neg \exists e' [\exists d'' [\iota d''' [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e'))(x)} \uparrow (\text{fin}(e'))(x) = d''']] = d'' \wedge \text{init}(e') = \text{fin}(e) \wedge \\ \text{fin}(e') = p]]]]]]$$

- The deverbal adjective is made a predicate of individuals with the same degree morphology found with other adjectives.

$$(46) \quad \llbracket \text{pos} \rrbracket = \lambda g \in D_{\langle p, \langle e, d \rangle \rangle} \lambda p \lambda x [g(p)(x) \succeq \text{stnd}(g)]$$

$$(47) \quad \llbracket \text{pos} \rrbracket (\llbracket \text{darkened} \rrbracket) = \\ \lambda g \in D_{\langle p, \langle e, d \rangle \rangle} \lambda p \lambda x [g(p)(x) \succeq \text{stnd}(g)] (\lambda p \lambda x [\iota d [\exists e [\iota d' [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e))(x)} \uparrow (\text{fin}(e))(x) = \\ d']] = d \wedge \text{fin}(e) \supset \subset p \wedge \neg \exists e' [\exists d'' [\iota d''' [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e'))(x)} \uparrow (\text{fin}(e'))(x) = d''']] = \\ d'' \wedge \text{init}(e') = \text{fin}(e) \wedge \text{fin}(e') = p]]]]]] = \\ \lambda p \lambda x [\iota d [\exists e [\iota d' [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e))(x)} \uparrow (\text{fin}(e))(x) = d']] = d \wedge \text{fin}(e) \supset \subset p \wedge \\ \neg \exists e' [\exists d'' [\iota d''' [\mathbf{dark}'_{\mathbf{dark}'(\text{init}(e'))(x)} \uparrow (\text{fin}(e'))(x) = d''']] = d'' \wedge \text{init}(e') = \text{fin}(e) \wedge \\ \text{fin}(e') = p]]]]] \succeq \text{stnd}(\llbracket \text{darkened} \rrbracket)]$$

- Predicated of an interval  $p$  on a temporal scale and of an individual  $x$ , a sentence headed by (47) is true iff the degree of change in darkness of  $x$  from the temporal beginning of an event  $e$  to its end prior to  $p$  (at which the same degree of darkness still holds) is greater than the contextually determined standard.
- Crucially, the interval  $p$  at which a particular degree of darkness holds must be preceded by an event of change ending immediately prior to  $p$  and that brings about the degree of darkness that holds at  $p$ .
- Whether a result state or a derived stative reading is generated is entirely a consequence of the nature of the interval that's composed with.
- For the result state reading, there must be a temporal change prior to  $p$ . I.e.,  $\text{init}(e)$  and  $\text{fin}(e)$  must pick out temporal intervals.
- This is forced if  $p$  is temporal by the condition that  $\text{fin}(e) \supset \subset p$ , the abut relation holding between two intervals only if they are intervals on the same scale (i.e., abut cannot hold between an interval on a temporal scale and an interval on a spatial scale).
- That  $\text{init}(e)$  picks out a temporal interval is guaranteed by the difference function—it allows the calculation of a degree of difference only if  $\text{init}(e)$  and  $\text{fin}(e)$  are intervals on the same scale.
- Therefore, if  $p$  is temporal, and  $\text{fin}(e) \supset \subset p$  then  $\text{init}(e)$  must also be temporal.
- By contrast, if  $p$  is spatial, then  $\text{fin}(e) \supset \subset p$  guarantees that  $\text{fin}(e)$  is also spatial, and as a consequence  $\text{init}(e)$  too must be spatial.
- And in this kind of case the spatial interval  $p$  at which a particular degree of e.g., darkness holds will necessarily be preceded by an interval over which a spatial change takes place (but not a temporal change).
- In this way, the meanings of derived statives are crucially different from the meanings of morphologically simple adjectives.

## 4 Consequences of the analysis

- **Prediction 1:** Verbs that disallow change in a non-temporal domain lack adjectival derivatives with derived stative readings.

- E.g., Dubinsky and Simango's *cook*—they predict that this should have a derived stative (generalizing their analysis to English). It doesn't (and it's hard to imagine it really does in Chichewa, either).

(48) #The portion of meat between the rib and the joint is cooked, but has never been cooked.

- (49) a. The side of beef is cooking between the rib and the joint. (→ there is temporal change; that portion undergoes temporal change)  
b. #The side of beef cooks between the rib and the joint.

- *Cook* is only acceptable in eventive frames, e.g., (49a).
- (49b) is anomalous because the present tense requires temporal stativity, and *cook* has no temporally stative use akin to the extent uses of the COS verbs discussed above. (Of course, the English present is fine with eventive verbs with a habitual reading, irrelevant for consideration of the matter at hand.)
- As predicted, then, (48) is also contradictory. Because *cook* takes a temporal interval argument, it entails temporal change, and thus has no derived stative readings.
- And it's not just *cook*, but all kinds of cooking verbs.

(50) #Kim prefers to eat only fried/sauteed/baked/boiled/fricasseed/steamed meat that has not been fried/sauteed/baked/boiled/fricasseed/steamed.

(51) #The side of beef fries/sautees/bakes/boils/fricassees/steams between the rib and the joint.

- The verb *kill* and manner of death verbs more generally (Krohn 2008; Koontz-Garboden and Beavers 2009), best I can tell, also systematically disallow derived stative readings.

- (52) a. #Kim has congenitally drowned lungs.  
b. #Kim drowns midway through his lungs.

(53) #A congenitally killed/electrocuted/drowned/asphyxiated/beheaded/poisoned/suffocated/crucified knee/head/etc.

- **Bottom line:** The analysis developed above predicts that only verbs that allow non-temporal change have derived adjectives with derived stative readings. This seems to be the case.
- **Prediction 2:** It should be common for the same morphology to appear on derived statives and result states.
- The analysis given above has it that, at least in English, the same morpheme is used to derive derived statives and result states.
- In principle, it could also be that there is specialized morphology for the derivation of result states (the morphology's denotation selecting for a temporal point on a scale) versus derived states (selection for a non-temporal point on a scale).

- The analysis certainly gives a natural explanation, however, for the highly common syncretism of the two.
- It remains to be seen whether there are actually languages in which the two are marked differently.
- **Prediction 3:** Deverbal versus morphologically simple state-denoting words contrast in meaning.
- On this analysis, there is a correlation between presence of participial morphology and entailment of an event giving rise to the state (Koontz-Garboden 2005).
- By contrast morphologically simple state denoting words are underspecified, so that the state they name may or may not be a consequence of a prior event.

- (54)
- a. The road is wide. (simple state)
  - b. After the work of the road crew, Lafayette had a widened I65. (result state)
  - c. I65 is widened at Lafayette city center. (derived stative)

- (54a) and (54c) contrast with one another in that (54c) entails that there are portions of the road with a lesser degree of width, hence the contradiction in (55).

(55) #I65 is widened at Lafayette city center. In fact, it's of the same width for its entire extent.

- The morphologically simple adjective *wide* will certainly allow that the point on the scale that it is predicated of is preceded by others having a lesser degree of width (56), but unlike (54c), does not entail it, viz, (57).

(56) I65 is wide at Lafayette city center, but not in Gary.

(57) I65 is wide at Lafayette city center. In fact, it's the same width for its entire extent.

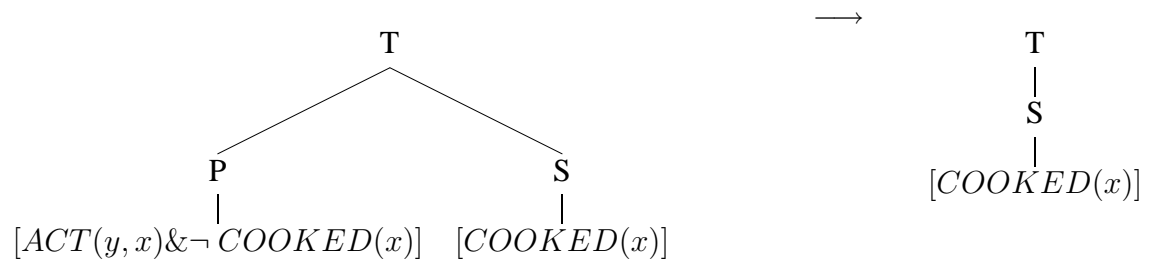
- Simple states and result states contrast in the same way, but in the temporal domain.
- **Fact:** Morphologically deverbal adjectives entail an event of the kind named by the verb they're derived from. They do not name the same kinds of states that morphologically simple adjectives tend to.
- The analysis above predicts exactly this state of affairs.

## 5 Comparison with previous approaches

### 5.1 Deletion analyses

- Assuming a Pustejovskyan lexical conceptual semantics (Pustejovsky 1992), Dubinsky and Simango (1996) analyze derived statives as the result of a process that “alters the LCS ... by removing the process ... to yield a stative predicate” (Dubinsky and Simango 1996:771-772).
- A similar kind of analysis is also suggested by Mačavariani (1988:268): “The stative derivation results in a formal as well as a semantic deletion of the agent ...”.

- (58) Stativization of Chichewa *phika* ‘cook’, via suffixation of *-ika* in Dubinsky and Simango (1996:771-772)



- (Although they use the word for *cooked* in the sketch of their analysis in (58), they provide no data suggesting that *phikika* ‘cooked’ can actually have anything other than a result state meaning.)
- Some incorrect predictions (at least based on English data):
  - There are derived statives associated with all change of state verbs.
  - Derived statives have meanings such that no prior change is entailed, i.e., their meanings are the same as those of morphologically simple adjectives. More bluntly, it assigns the wrong semantics to derived statives.
- Additionally, such an operation is semantically non-compositional.
- Maybe it’s true that word-formation operations like this exist, but the null hypothesis, it seems to me, is that they don’t, and there’s empirical evidence in the form of the analysis’ incorrect predictions and broader observations (Koontz-Garboden 2007, 2009) that they don’t.

## 5.2 Root-based analyses

- Jackson (2005b) builds on Embick’s (2004) syntactic analysis of English participles to develop an analysis of derived statives and result states in Pima.
- The analysis has some technical problems, but leaving those aside, the larger vision is relatively clear:
  - Change of state verbs are built up from primitive state denoting roots
  - These roots have the same kind of denotation as morphologically simple adjectives
  - Pima *-s* has two separate denotations: (a) one for deriving derived statives (59a) and (b) one for deriving result states (59a).
  - Derived stative denotation results from composition of derived stative *-s* directly with root.
  - Result state denotation results from composition of result state *-s* with eventivized root, i.e., with a change of state denoting stem.

- (59) Jackson’s two denotations for Pima stativizing *-s*

- a.  $\llbracket -s_{der. state} \rrbracket = \lambda P[\lambda e[P(e)]]$
- b.  $\llbracket -s_{res. state} \rrbracket = \lambda R[\lambda s[\exists e[R(s)(e)]]]$

- Although this analysis is formally quite distinct from deletion analyses, it makes the same incorrect predictions:
  - There should be derived stative readings for all change of state verbs.

- Derived statives and morphologically simple adjectives have the same kinds of denotations (in failing to entail an event of change).
- Morphology deriving derived statives and morphology deriving result states crosslinguistically should be different from one another, since the two operations are semantically quite distinct on this analysis (i.e., the case in Pima where both are lexicalized by a single morpheme is accidental homonymy).
- Aside from these issues, the analysis begs the question why use stativizing morphology at all in derived statives if the meaning that’s being derived is essentially identical to the meaning of the root.
- Stated in terms more consistent with J’s framework, with derived statives, why doesn’t the root just compose with the same word-deriving morphology that adjectives are constructed from, since these roots have the same kind of denotation as adjectives and the derived stative word does too?

### 5.3 Condoravdi and Deo 2008

- Verbs are polysemous: “We take verbs like *yoke* to have purely eventive denotations, such as [that shown in (60a)], as well as denotations that pair the eventive component with the stative component of their meaning, [such as that shown in (60b)]” (Condoravdi and Deo 2008:12–13).

(60) The two denotations of *yoke* in Condoravdi and Deo (2008:13)

- a.  $\lambda y \lambda x \lambda e [\text{put-yoke-on}(e) \wedge \text{Agent}(e, x) \wedge \text{Patient}(e, y)]$
- b.  $\langle \lambda e [\text{put-yoke-on}(e)], \lambda y \lambda s [\text{have-yoke-on}(s)(y)] \rangle$

- “As a lexical operator, [the Indo-Aryan stativizer] *-ta* maps paired properties to [its] stative component. In that case the [predicate] projected to the syntax and entering semantic composition [is as in (61)]” (Condoravdi and Deo 2008:13).

(61)  $\lambda y \lambda s [\text{have-yoke-on}(s)(y)]$

- “The eventive component of the meaning of the original predicate is not made available for semantic composition. Any implications about the existence of an event of the relevant type resulting in the truth of the stative predication are inferential” (Condoravdi and Deo 2008:13).
- “We assume that meaning postulates regulate the identification of arguments across the two [=eventive and stative] predications” (Condoravdi and Deo 2008:17, fn. 10).
- Some incorrect predictions:
  - There are derived statives associated with all change of state verbs.
  - For no change of state verb does the deverbal adjective actually entail a prior temporal change (it’s “inferential” on their analysis).
  - The semantics of derived statives is such that there is no prior change i.e., their meanings are the same as those of morphologically simple adjectives.
- Additionally, although the analysis is fully compositional, it is so at the cost of violation of Lexicon Uniformity.

- (62) Lexicon Uniformity (cf. Reinhart 1996:2; Koontz-Garboden 2007:177)  
For two forms  $\alpha$  and  $\beta$ , if one is formally derivable from the other and the meaning of one makes reference to the meaning of the other, then only one of them is lexically listed.

## 6 Concluding remarks

- I have argued that derived stative are compositionally derived from verbs involving change in a non-temporal domain.
- Such an analysis leads to a number of predictions that are borne out by the facts.
  - Derived stative readings are available only for COS verbs that allow change in a non-temporal domain.
  - Derived stativizing morphology and result stativizing morphology should often be identical (given their semantic similarity).
  - Derived statives and morphologically simple adjectives fundamentally contrast in meaning. The former entail change; the latter do not.
- These predictions distinguish this analysis from others that have been offered in the literature, some compositional (Jackson 2005b; Condoravdi and Deo 2008) some not (Dubinsky and Simango 1996).
- Derived statives do not constitute evidence for non-compositionality in word formation.
- Open questions:
  - Questions surrounding the Kennedy-style analysis of adjectives in general, e.g., evidence for *pos* morphology/type-shifting operations.
  - I have looked in detail only at English; it remains to be seen whether the analysis extends to other languages.

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