The roots of change of state verbs

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1 Introduction

- In much work in lexical semantics (Lakoff 1965; Dowty 1979; Pinker 1989; Jackendoff 1990; Levin and Rappaport Hovav 1995; Wunderlich 1997), the meanings of verbs are characterized through use of decompositional event structure representations.

  (1) $[\![break]\!] = \lambda y \lambda x [x\ CAUSE\ BECOME\ \neg whole'(y)]$

  (2) $[\![redden]\!] = \lambda y \lambda x [x\ CAUSE\ BECOME\ red'(y)]$

- Classes of verbs are identified on the basis of common decompositional structure (the template; Grimshaw 1993; Levin and Rappaport Hovav 2003) with individual verbs within classes differentiated from one another on the basis of the "root" lying at the heart of that template.

- While in lexicalist work operators and roots have only a semantic reality, in non-lexicalist work (Lakoff 1965; Pesetsky 1995; Marantz 1997; Hale and Keyser 2002; Doron 2003; Embick 2004; Arad 2005; Harley 2005; Jackson 2005; Levinson 2007; Ramchand 2008) they are claimed to additionally have a morphosyntactic reality.

- Much non-lexicalist work, in fact, adheres to what Embick (2009) calls "The Bifurcation Thesis for Roots" (BTR) (cf. the "Root Hypothesis" of e.g., Arad 2005: Ch. 1): If a component of meaning is introduced by a semantic rule that applies to elements in combination, then that component of meaning cannot be part of the meaning of a [morphological] root (Embick 2009: 1).

- I.e., decompositional operators such as CAUSE and BECOME are introduced syntactically and are not part of the meanings of morphological roots, the simple lexemes (bound, precategorial in DM) from which words are formed.

- Given standard representations for COS verbs (where the root is always some stative meaning), this entails that such verbs are *morphosyntactically derived from a state denoting morphological root*, as in e.g., Embick (2004).

  (3)   Causative *flatten* in Embick (2004: 366)
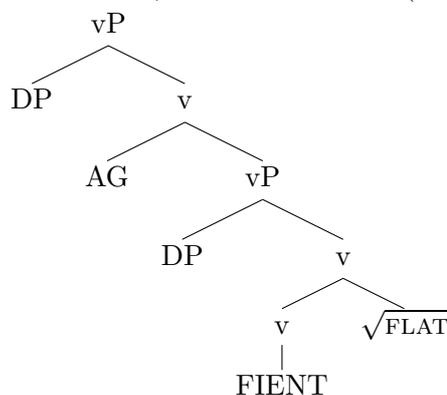
- **My observation**: While this may be correct for some COS verbs (deadjectival ones), it is not for others (cf. Megerdoomian 2002; Koontz-Garboden 2006; Embick 2009).

(4) Deadjectival COS verbs (Levin 1993: 245)
     awaken, brighten, broaden, cheapen, coarsen, dampen, darken, deepen, fatten, flatten, freshen, gladden, harden, hasten, heighten, lengthen, lessen, lighten, loosen, moisten, neaten, quicken, ripen, roughen, sharpen, shorten, sicken, slacken, smarten, soften, stiffen, straighten, strengthen, sweeten, tauten, thicken, tighten, toughen, weaken, widen, . . .

(5) *break*-type COS verbs
     a. Levin's (1993:241) *break* verbs: break, chip, crack, crash, crush, fracture, rip, shatter, smash, snap, splinter, split, tear
     b. Levin's cooking verbs (Levin 1993: 243): bake, barbecue, blanch, boil, braise, broil, charbroil, charcoal-broil, coddle, cook, crisp, deepfry, fry, grill, hardboil, poach, . . .
     c. Verbs of killing (Levin 1993: 230ff.; Koontz-Garboden and Beavers 2010): crucify, electrocute, drown, hang, guillotine, . . .

- There are both morphological and semantic arguments that while deadjectival verbs are built on state-denoting morphological roots, *break*-type verbs are not, contrary to the prediction of the BTR and to general claims in the literature (e.g., Hale and Keyser 2002; Embick 2004).

- **Consequence**: The denotation of some morphological roots contains meaning beyond the simple lexical semantic root that is elsewhere introduced decompositionally.

- Outline:

  – Deadjectival verbs and *break*-type verbs contrast morphologically

  – Deadjectival and *break*-type roots contrast semantically

  – Consequences and concluding remarks

2   Morphological observations

- The claim is that all COS verbs are built on a state-denoting morphological root.

(6) Morphological predictions of the BTR
     a. Adjectives based on these two types of roots are identical in morphological complexity.
     b. Intransitive COS verbs based on these roots are identical in morphological complexity.
     c. Transitive COS verbs based on these roots are identical in morphological complexity.
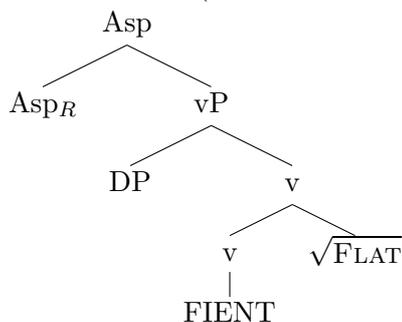
- Here, I deal just with (6a) (see Koontz-Garboden 2005, 2009a for observations about (6b,c)).

- Two adjectival structures—basic states and result states (the latter deverbal).

(7) Basic states (aka adjectives, statives, etc.) in DM (Embick 2004: 363; Embick's ?)

AspP
?   Asp
    Asp $\sqrt{Root}$
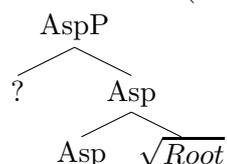
(8)   Result states (aka resultatives) in DM (Embick 2004: 367)

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                    Asp
                   /    \
              Asp_R      vP
                        /    \
                     DP       v
                            /    \
                          v      √FLAT
                          |
                        FIENT
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- The contrast is transparently seen in English with adjective/deverbal adjectives derived from deadjectival verbs, which show the verbalizing morphology *–en* (Koontz-Garboden 2005).

    (9)   a.   Look at the bright picture on your left. (=camera took a bright picture)
            b.   Look at the brightened picture on your left. (=camera took a bad picture, brightened with e.g. software)

    (10)   a.   Kim ate a red apple.
            b.   Kim ate a reddened apple.

    (11)   a.   Sandy's shirt has long sleeves.
            b.   Sandy's shirt has lengthened sleeves.

- By contrast, with *break*-type verbs, there is a single morphological form, which is claimed to be the realization of both structures (Embick 2004: 358).

    (12)   broken, chipped, cracked, crashed, crushed, fractured, ripped, shattered, smashed, snapped, splintered, split, torn, baked, barbecued, blanched, boiled, braised, broiled, charbroiled, charcoal-broiled, coddled, cooked, crisped, deepfried, fried, grilled, hardboiled, poached, crucified, electrocuted, drowned, hanged, guillotined, . . .

- Embick's claims:

    – In English, the adjectivizing morphology (*–ed* and allomorphs) realizes the Asp head in both (7) and (8) with *break*-type roots.

    – By contrast, with *red*-type roots, Asp is realized differently in the two structures—null in (7), overt in (8).

- The contrast between the two types of root is considered an accident of English morphology.

- However, the same contrast is found not only in English, but in other languages—crosslinguistically, the morphological roots that *break*-type verbs are built on do not form state-denoting words like the roots deadjectival verbs are built on do.

    (13)   a.   Eastern Armenian deadjectival verbs (Megerdoomian 2002: 98)

	adjective	non-causative COS	causative COS
	layn (wide)	layn.anal (widen)	layn.ats.nel (widen)
	čor (dry)	čor.anal (dry)	čor.ats.nel (dry)
	metz (big)	metz.anal (grow)	metz.ats.nel (grow, bring up)
	arag (fast, quick)	arag.anal (quicken)	arag.ats.nel (accelerate)
	čaq (fat)	čaq.anal (become fat)	čaq.ats.nel (fatten)
	sev (black)	sev.anal (blacken)	sev.ats.nel (blacken, darken)

    b.   Eastern Armenian *break*-type verbs (Megerdoomian 2002: 98)

adjective	causative COS	non-causative COS
–	k'ot'Rel (break)	k'ot'R.v.el (break)
–	epel (cook)	ep.v.el (cook)
–	poxel (change)	pox.v.el (change)
–	šarǰel (move)	šarǰ.v.el (move)
–	xort'ak'el (sink, drown)	xort'ak'.v.el (sink, drown)

(14)   Ulwa (Koontz-Garboden 2006; fieldnotes)

    a.   "deadjectival" verbs

state	non-causative COS	causative COS
auh– 'fat'	auh-ta– 'fatten'	auh-ta– 'fatten'
pau– 'red'	pau-ta– 'redden'	pau-ta–'redden'
yam– 'good'	yam-pa– 'become better'	?
dut– 'bad'	dut-ta– 'get worse'	?

    b.   *break*-type verbs (unmarked meaning of root in *–ta/pa–*; Koontz-Garboden 2009b)

state	non-causative COS	causative COS
∗	bah-wa– 'break (intrans)'	bah-ta– 'break (trans)'
∗	lah-wa– 'boil (intrans)'	lah-ta– 'boil (trans)'
∗	birh-da– 'tear (intrans)'	birh-pa– 'tear (trans)'
∗	bis-da– 'rip (intrans)'	bis-pa– 'rip (trans)'

(15)   Pima morphological classes (Smith 2006: 3; morph simple in bold, following Smith)

		stative	inchoative	causative	non-pred
I	big	/ge'e-di/	/ge'e-di-μ/	/ge'e-di-μ-jid/	/**ge'e**/
II	soft	/**moika**/	/moika-μ/	/moika-μ-jid/	/**moika**/
III	get fat	/gi'i-g/	/**gi'i**/	/gi'i-cud/	/gi'i-g/
IV	break	/hain-s/	/'e-hain/	/**hain**/	/hain-s/

- See also Tongan (Koontz-Garboden 2005), O'odham (Hale and Keyser 1998: 92).

- The crosslinguistic morphological generalization that the DM analysis misses is that words naming Dixon's (1982) property concept states are consistently of one morphological shape, while words naming results states like *cooked, broken, split, etc.* are another (often deverbal).

- Framed in the context of DM, the question is: Why is it consistently the case that Asp is realized in one way with *red*-type roots and in another way with *break*-type roots?

- The DM analysis misses a morphological generalization. It predicts that any difference in the morphological shape of state-denoting words from *red*-type roots and *break*-type roots is accidental.

- But the crosslinguistic generality of the difference suggests a systematicity in need of explanation.

- (Cf. similar concerns with morphological contrasts in causative/inchoative derivatives from such roots; Alexiadou and Anagnostopoulou 2004 on Greek and Koontz-Garboden 2005 generally.)

3 The lexical semantics of the two kinds of roots

(16) Semantic predictions of the BTR

    a. Simple adjectives (e.g., *red*) will not entail a prior event.

    b. Adjectives derived from deadjectival verbs (e.g., *reddened*) will entail a prior event.

    c. *boiled, split, cracked*, etc., since they realize both (7) and (8), will not entail a prior event (since in any particular context, the adjective could be realizing (7)).

- (16a,b) are correct.

    (17)   a. The red dirt has never been reddened.

              b. The long river has never been lengthened.

              c. The bright photo has never been brightened.

    (18)   a. #The reddened dirt has never been reddened.

              b. #The lengthened river has never been lengthened.

              c. #The brightened photo has never been brightened.

- The prediction in (16c) is not—such adjectives entail a prior event (Koontz-Garboden 2005, 2010).

    (19)   a. #The shattered vase has never been shattered.

              b. #The dead man never died.

              c. #The cooked chicken has never been cooked.

- What about data like (20), involving what Nedjalkov and Jaxontov (1988) call "derived statives"?

    (20)   ... this paper provides a guide for writing letters that extend below the baseline. Internal broken lines serve as a reference for writing half-space letters.
`http://www.abledata.com/abledata.cfm?pageid=19327&top=11104&ksectionid=0&productid=79080&trail=22,10825,11088&discontinued=0`

- Two observations: (i) such uses are very much the exception amongst Levin's *break* verbs; very few allow these uses, (ii) for each such use, there is a corresponding extent use (Gawron 2009) of the COS verb, i.e., even these uses are *semantically* deverbal (Koontz-Garboden 2010).

    (21)   ONE suggestion on ur story, it's hard to read when the line suddenly breaks off and u hav to go down a line in the middle of a sentence, to make it flow easier ...
`http://www.fanfiction.net/r/6766517/`

- Morphologically deverbal adjectives entail a prior change of the kind named by the verb they are derived from; what has not been appreciated is that the change need not be temporal (or even spatial—Deo et al. In prep).[1]

- **The semantic upshot**: While the lexical semantic root of deadjectival verbs like *redden* is accessible in the form of their morphological roots like *red*, this is not the case for verbs like *break*.

- The only morphological form in which they can be state denoting is a deverbal one. This morphologically deverbal form is also semantically deverbal.

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[1] Although more work is needed, it certainly seems possible that this generalization extends to similar phenomena that have been observed in other languages, e.g., Greek (Alexiadou and Anagnostopoulou 2008) and Hebrew (Doron 2009).

- I.e., with *break*-type roots, we only ever find meanings consistent with (8)—the meanings consistent with (7) are not attested.

- Similar semantic contrasts exist between the two classes of COS verbs based on these roots. E.g., Rappaport Hovav (2010) observes that they contrast in their readings under *again* modification, there being no restitutive reading for *break* verbs.

  (22)   a.   John opened the door again. (only one event of opening necessarily presupposed)
         b.   John thawed the meat again (necessarily two 'defrostings')
         c.   John melted the soup again (necessarily two 'defrostings')

  (Rappaport Hovav 2010: 7)

- The root of deadjectival COS verbs is accessible, as predicted by the BTR. By contrast, it is not accessible for *break*-type COS verbs, contrary to the prediction of BTR.

4   Consequences

- The lexical semantic roots that *break*-type verbs are built on do not surface in the expected contexts. They appear neither in the expected morphological forms, nor with the expected meanings.

- **My assertion**: This is because the stative lexical semantic roots upon which *break*-type meanings are constructed are not, in fact, the denotations of the morphological roots of *break*-type verbs (contrary to the prediction of the BTR).

- The morphological roots of these types of verbs do not have as their meaning the lexical semantic roots of these verbs. They have a different kind of meaning.

- What kind? A good starting point is to consider what it *can't* be—a predicate of conceptually simple (property concept-type) states, like e.g., *red* roots.

  (23) $[\![red]\!] = \lambda s[red'(s)]$

- If *break*-type roots had a denotation like (23), then we'd expect them to show up in the same contexts (morphological, semantic) as *red*-type roots. But they don't, as evidenced by the above.

- So, what's the right kind of denotation? It's an open question. Some possibilities:

  - The lexicalist solution: *break* (and its kin) is lexicalized with a COS meaning.
  - *break*-type roots are manner-denoting, with non-lexicalized states (Embick 2009).
  - *break*-type roots are state denoting, but denote states which must be brought about by events.

4.1   A lexicalist solution

- *break*-type roots and *red*-type roots are lexicalized with fundamentally different kinds of meanings (Koontz-Garboden and Levin 2005; Koontz-Garboden 2005, 2006).

- *break*-type lexemes are lexicalized as causative COS verbs, something like (24).

  (24) $[\![break_V]\!] = \lambda x\lambda y\lambda e\exists s[CAUSE(y,e) \wedge BECOME(e,s) \wedge \neg whole'(s,x)]$

- Giving *break* such a lexicalization has the following positive consequences:

- State denoting words based on *break*-type roots are morphologically deverbal.
- Any state-denoting lexeme based on *break*-type roots entails a prior event (assuming that decompositional structure cannot be deleted by word-formation operations, Koontz-Garboden In press).

- Added bonuses:
  - Inchoative verbs based on *break* are morphologically derived from the causative (Haspelmath 1993; Levin and Rappaport Hovav 1995; Chierchia 2004; Koontz-Garboden 2009a).
  - Derived inchoatives of such verbs have causative meaning (Chierchia 2004; Koontz-Garboden 2009a).

- By contrast *red*-type lexemes are lexicalized as simple state-denoting words, e.g., something like (25).

  (25) $[\![red_A]\!] = \lambda x \lambda s[red'(s,x)]$

- Consequences:
  - *red*-type lexemes are morphologically simple in their state-denoting form.
  - *red*-type lexemes in their state denoting form do not entail a prior event.

- Added bonuses:
  - Lexemes denoting COS events based on these states are morphologically complex, i.e., deadjectival.
  - Given a general process of deverbal adjective formation, the existence of minimal pairs (e.g., *red* versus *reddened*) is predicted (by contrast with with *break*-type roots).

## 4.2 *break*-type roots are manner denoting

- Taking as a point of departure observations in Koontz-Garboden and Levin (2005) and Koontz-Garboden (2005), Embick (2009) reaches a similar conclusion—that *red* and *break*-type morphological roots must have different kinds of denotations.

- His proposal: rather than taking a DP as an argument, as in (26), as is assumed for roots denoting predicates of states (e.g., $\sqrt{red}$), $\sqrt{break}$ has little-v as a sister.

  (26)   Syntactic configuration for a stative root in Embick (2009: 6)
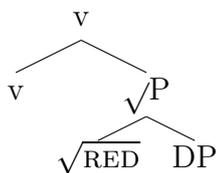
  (27)   Embick's (2009: 17) proposed syntactic configuration for $\sqrt{break}$ (and other manner roots)
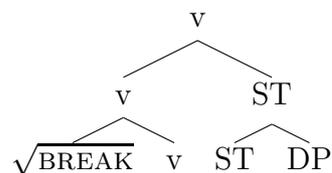
- The idea embodied in (27) is that $\sqrt{\text{BREAK}}$ denotes a predicate of events (composing with little-v by predicate modification) and takes an unspecified state as an argument. In this way, it has a denotation on a par with manner verbs like *pound*.

- Is the claim that *break* verbs have manner-oriented meaning plausible?

7

- Embick's proposal is made absent a theory of what exactly manner is semantically.

- Koontz-Garboden and Beavers (2010) develop a battery of diagnostics for manner based on Rappaport Hovav (2008) and Rappaport Hovav and Levin's (In press) idea that manner is non-scalar change.

- Crucially, many *break*-type verbs are shown in that body of literature to be prototypical result verbs, failing diagnostics for manner encoding.

- As such, it does not seem semantically justifiable to claim that *break* (or many of the *break*-type roots) is manner encoding.

4.3   Break-type roots are state-denoting, but special

- An alternative would be to give $\sqrt{\text{BREAK}}$ a denotation that is still stative, but which requires that the state be brought about by a change. Something like (28).

  (28) $[\![\sqrt{\text{BREAK}}]\!] = \lambda s \exists e[BECOME(e,s) \land \neg whole'(s)]$

- The root could still compose (compositionally) with all the normal functional projections.What the existential statement in the root does is simply guarantee that there will be a prior change. I.e., semantically, (7) and (8) with a root like (28) would be indistinguishable.

- This analysis correctly predicts that there will be no 'basic state' reading with *break*-type roots.

- (It does still fail to capture the morphological asymmetry, however. To get the morphology right, it has to be that *break*-type roots don't merge with the same functional head that *red*-type roots do when they have a stative meaning.)

- When spelled out formally, I believe this is in some form what Rappaport Hovav and Levin (1998) have in mind in saying that *break* type verbs are built on 'result states'. (See similar conclusion for certain COS verbs based on modifier data in Piñón 1999 and Kratzer 2000.)

- Consequence of this is that the morphological root, at least for *break*-type roots, does not denote *only* the lexical semantic root. Instead, it includes a meaning component that elsewhere can be added with a functional projection (in Embick's analysis, the FIENT head).

- This is inconsistent with the BTR, since it builds lexical semantic/functional structure elsewhere available compositionally into the meaning of the morphological root.

5   Concluding remarks

- The BTR has it that the morphological root has as its denotation the lexical semantic root, as commonly understood in decompositional approaches to lexical semantics; decompositional operators are external to the root and added exclusively in the syntax.

- In the domain of change of state verbs, this gives rise to the prediction that all COS verbs have certain common morphological and semantic properties.

- This was shown not to be true:

  - *Break* and *red*-type roots commonly contrast with one another in the morphological forms they take in stative environments.

- – State-denoting words built morphologically on *red*-type roots behave as predicted, failing to entail a prior event in the context in (7) and entailing it in (8).

- – State-denoting words built morphologically on *break*-type roots, however, do not behave as predicted, as they always entail a prior event. I.e., the meaning predicted to exist by the structure in (7) is unattested for *break*-type roots.

- **The claim**: *break*-type roots and *red*-type roots have fundamentally different types of denotations.

- If this were not the case, it would be impossible to come to grips with the semantic contrast in the kinds of states their state denoting forms denote.

- The morphologically contrasting behavior of these two types of roots would similarly be mysterious absent a contrast in meaning between them.

- Broadly speaking, this conclusion is not entirely different from Embick (2009), but the facts and consequences for the BTR are.

- It does not follow from this that word formation is not from pre-categorial roots, as assumed in DM. It does, however, call into question the BTR, the idea that there is no decompositional meaning in the root.

- Beavers (2010), examining the same issue in an entirely different empirical domain, reaches a very similar conclusion.

- **The bottom line**: While some of the facts from derivationally related stative/COS words are consistent with the BTR, others are not.

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