

Regular and Idiosyncratic Meaning in The Roots of Words

1 Introduction

- We have seen that word meanings are generally broken into a template and a root: the bits that are shared across words and the bits that are unique to each.
- This can be captured using event structures, where templates reflect **event types** and roots fill in real world details, such as particular **states** for adjectives and change-of-state verbs:

- (1) a. The rug is flat. [*y* < FLAT >]
b. The rug flattened. [BECOME [*y* < FLAT >]]
c. Mary flattened the rug. [[*x* ACT] CAUSE [BECOME [*y* < FLAT >]]]

- The template generally defines the verb's argument structure, plus more:
 - States end up as adjectives in some languages (Dixon 1982), while things denoting change end up as verbs (Koontz-Garboden 2006a).
 - Sometimes templatic structure is reflected in recurring morphology, e.g. in many languages causation is reflected overtly as is often the case in Japanese (Jacobsen 1992):

(2)	root meaning	intransitive	causative
	'bend'	<i>soru</i>	<i>sorasu</i>
	'boil'	<i>waku</i>	<i>wakasu</i>
	'rise/raise'	<i>agaru</i>	<i>ageru</i>
	'walk'	<i>aruku</i>	<i>arukaseru</i>

- Conversely, roots don't figure into much save the unique form of each word.
- An underexplored question (though see Dowty 1979, Goldberg 1995, Wechsler 2005, a.o., for related discussion) is whether there is an equivalent clean divide between meanings entailed by roots and by templates, e.g. are cause and become *only* introduced templatically?
- This is Embick's (2009) **Bifurcation Thesis for Roots** (see also Arad 2005, Borer 2005, Dunbar and Wellwood 2016), and it makes a strong prediction: entailing templatic meaning requires templatic grammar (argument structure, part of speech, morphology)!
- But is this true? Answering this is important for shoring up event structural theories. If roots can mean anything then it potentially undermines what kind of predictions we can make about the syntax/semantics correlation (as per the dire warning of Dowty 1979: 125-126).
- Beavers and Koontz-Garboden (2020), Beavers et al. (2021), and Beavers et al. (in prep) argued against bifurcation on the basis of certain specific root classes for change-of-state and caused possession verbs across languages:

Roots of certain verbs of change entail templatic meaning in every template they occur in, and show consistent, distinct grammatical patterns across languages from other roots.

- Nonetheless, we show that this does not mean there are no predictions to be had from event structural theories, just that they are more complicated than previously expected.

2 The Roots of Canonical Change-of-State Verbs

- The most common understanding of (1) according to bifurcation is that the root is purely stative; the entailment of change always comes from BECOME.
- Furthermore, all stative roots should appear in this template and furthermore should be semantically and grammatically identical in their behavior, modulo lexical idiosyncrasy or subregularity that is orthogonal to bifurcation (e.g. phonological or historical effects).
- But there are significant divergences from this (cf. Megerdoomian 2002, Koontz-Garboden 2006b). Beavers and Koontz-Garboden (2020) distinguish Dixon's (1982) **property concept (PC) roots** (e.g. Levin's 1993: 245 deadjectival change-of-state verbs) from **result roots** (e.g. Levin's non-deadjectival change-of-state verbs). The roots for our study are:

(3) **Property Concept** (deadjectival verbs)

- a. *Dimension*: large/big/enlarge, small/shrink/shrunk, short/shorten, long/lengthen, deep/deepen, wide/widen, tall/height/heighten
- b. *Age*: old/aged/age
- c. *Value*: bad/worsen/worse, good/improve/improved
- d. *Color*: white/whiten, black/blacken, red/redden, green/make green, blue/make blue, brown/make brown
- e. *Physical Property*: cool/cool, cold/make cold, warm/warm, hot/heat up, dirty/dirty, dry/dry, wet/wetted, straight/straighten, hard/harden (tough/toughen), soft/soften, tight/tighten, clear/clear, clean/clean, smooth/smooth, sharp/sharpen, sweet/sweeten, weak/weaken, strong/strengthen
- f. *Speed*: fast/speed up, slow/slow down

(4) **Result Roots** (non-deadjectival verbs)

- a. *Entity-specific Change of State*: burned/burn, melted/melt, frozen/freeze, decayed/decay (rotten/rot), swollen/swell, grown/grow, bloomed/bloom (flowered/flower, blossomed/blossom), withered/wither (wilted/wilt), fermented/ferment, sprouted/sprout (germinated/germinate), rusted/rust, tarnished/tarnish
- b. *Cooking Verbs*: cooked/cook (baked/bake, fried/fry, roasted/roast, steamed/steam), boiled/boil
- c. *Breaking Verbs*: broken/break, cracked/crack, crushed/crush, shattered/shatter, split/split, torn/tear (ripped/rip), snapped/snap
- d. *Bending Verbs*: bent/bend, folded/fold, wrinkled/wrinkle, creased/crease
- e. *Verbs of Killing*: dead/killed/kill, murdered/murder, drowned/drown
- f. *Destroying Verbs*: destroyed/destroy (ruined/ruin)
- g. *Verbs of Calibratable Change of State*: differ/different, go up (raised/rise, ascended/ascend, increased/increase, gained/gain), go down (fallen/fall, dropped/drop, descended/descend, decreased/decrease, declined/decline)
- h. *Verbs of Inherently Directed Motion*: come/come, gone/go, go in (entered/enter), go out (exited/exit), returned/return

- I'll first show that English result roots show morphological and semantic properties that violate bifurcation, and offer a principled account of it that involves rejecting bifurcation. Then I'll turn to cross-linguistic and typological data.

3 Morphological and Semantic observations

#1 All stative roots should show all of the same forms (barring idiosyncrasy/phonology).

- English PC roots have *two* stative forms: a simple adjective and a deverbal *-en* one.

- (5) a. Look at the bright picture on your left. (=camera took a bright picture)
 b. Look at the brightened picture on your left. (e.g. a digitally brightened picture)

- Crucially, with result roots there is just one morphological form, the *-en* form.

- (6) broken, chipped, cracked, crashed, crushed, shattered, splintered, split, baked, ...

- Why? Embick (2004) analyzes the difference between simple vs. deverbal adjectives as one root in two different adjective templates: either make the root an adjective straightaway as in (1) or else make it a verb first and then make it an adjective (however that's done).

- For result roots but not PC roots the forms are homophonous, a morphological accident:

(7)	PC roots	Result roots
Simple adjective (derived from root)	-∅	-en
Result adjective (derived from verb)	-en	-en

- That's totally reasonable! Sometimes things just happen to fall into two classes. However...

#2 This analysis makes predictions about meanings of the various stative forms:

- (8) a. Simple adjectives from PC roots (e.g. *red*) will not entail prior change.
 b. Derived adjectives from PC roots (e.g. *reddened*) will entail prior change.
 c. Result root adjectives will not entail prior change (due to the homophony in (7)).

- (8a,b) are true; (8c) is not (Koontz-Garboden 2005, 2010, Deo et al. 2011, Denlinger 2023).

- (9) a. The bright/#brightened photo has never (been) brightened.
 b. The red/#reddened dirt has never (been) reddened.

- (10) a. #The shattered vase has never (been) shattered.
 b. #The cooked chicken has never (been) cooked.

- Perhaps we haven't clarified what the relevant simple state would be. However, even taking the simple state to be the "prototypical" one (the outcome of an event had it occurred), we don't get the right reading, e.g. (10a) doesn't improve if one makes pieces that form a vase.

- NB: there are the "derived statives" of Nedjalkov and Jaxontov (1988), but there is still a change, albeit atemporal: it is measured along a spatial scale (Gawron 2009, Koontz-Garboden 2010) (see Deo et al. 2011, 2013 on non-spatial atemporal change).

- (11) Broken or pecked lines, and dotted lines are constantly used for boundaries, paths, shorelines, &c. (from the *Oxford English Dictionary* (OED) entry on *broken*)

- Also, there is cross-speaker variation: for some speakers *broken* has a "non-functioning" reading not requiring prior change (cp. *closed*, which does not require prior change either).

- But all that matters for us is that *some* result root adjectives require change.

#3 Maybe English result roots require a BECOME template (1b,c) (cf. Pross 2016). That would be to say, in effect, that they have some requirement that they *must* start their life as verbs.

- But BECOME templates leave the root exposed to modification by *again*. As we saw last time PC roots allow both restitutive and repetitive readings with *again*:

(12) John flattened the rug again (and it had been flat/flattened before):

- a. [[x ACT] CAUSE [y [BECOME < **again**(FLAT) >]] (restitutive)
- b. [**again**([x ACT] CAUSE [y [BECOME < FLAT >]]) (repetitive)

- Conversely, result roots lack restitutive readings (Rappaport Hovav 2010: 7, Beavers and Koontz-Garboden 2012: 358), even in contexts that favor a one (as best as one can tell):

(13) [A store makes their shirts in the back. John buys one and leaves with it, but then decides he does not want it. He takes the shirt back to exchange it.]

#John returned the shirt again. (necessarily two returnings)

(14) [John lives in a hot region and finds a fruit with brown, fatty edges. He takes it home, trims off the edges, and puts it in the fridge. He later takes it out and fries it.]

#John fried the fruit again. (necessarily two fryings)

- We could stipulate that these verbs don't allow restitutive *again*, but why? And why for the class that has no simple adjective as morphological quirk? That's kind of a big coincidence.

#4 English PC root verbs tend to be marked (barring morphophonological conditions; Jespersen 1933, Halle 1973, Asudeh et al. under review) while result root are unmarked:

- (15) a. **widen**, **whiten**, **straighten**, **stiffen**, **shorten**, **enlarge**, **harden**, etc.
- b. **burn**, **melt**, **freeze**, **cook**, **break**, **crack**, **crush**, **shatter**, **murder**, **wrinkle**, etc.

- We could assume that PC roots *must* start out in adjective template (1a) and then turn into verbs, i.e. they must start their lives as adjectives, the opposite of result roots.

- Now we have more coincidental syntactic assumptions. Is there a deeper explanation? An emergent generalization is that *the states described by result roots are never dissociable from change*. Maybe change is *part of the root state itself*, contra bifurcation:

- (16) a. [[FLAT]] = $\lambda x \lambda s [x \text{ is flat in state } s]$
- b. [[CRACK]] = $\lambda x \lambda s [x \text{ is cracked in state } s]$, where “cracked in state *s*” entails that there is a BECOME event leading to *s*

- The semantics follows: every use of a result root (adjective or verb) will entail change, and if *again* modifies the root it'll require change twice.

- The morphology seems simple: verbs conventionally indicate change and adjectives conventionally indicate simple states; when they do this, they are unmarked:

- (17) a. If the root entails change, it will form an unmarked verb
- b. If the root does not entail change, it will form unmarked adjective

- Assuming cross-cultural similarity, we'd expect the semantic patterns to recur crosslinguistically, a prediction we do *not* get if it's a syntactic fact of English. We explore this next.

4 Cross-Linguistic Semantic Study of Change-of-State Verbs

- To test the semantic predictions we did speaker studies of (mostly) translations of the English terms as a proof-of-concept, using Greek (Spathas 2017), Kinyarwanda (Northeastern Bantu) (Jerro 2017), Kakataibo (Panoan) (Valle et al. 2017), Marathi (Indic, Indo-European), and Hebrew (Semitic, Afro-Asiatic). I give Kakataibo as an example.
- Kakataibo simple states and inchoatives are usually the same form, though the former are adjectives and the latter verbs, while causatives are generally formed by causative *-o* (plus a few other relations), and result states by factive *-kë*:¹

(18)	Language	Root	simple state	inchoative	causative	result state
	Kakataibo	large	<i>ani</i>	<i>ani</i>	<i>ani-o</i>	<i>ani-kë/ani-o-kë</i>
	Kakataibo	wrinkle	—	<i>churi</i>	<i>churi-o</i>	<i>churi-kë/churi-o-kë</i>

- We examined the following culturally appropriate terms (which accommodated lexical gaps and difficulties of some terms in cultural contexts):

(19) **PC:** *xo paxada* ‘yellow’, *ani* ‘big’, *upi(t)* ‘pretty, beautiful’, *tuna(n)* ‘black’, *uxu(a)* ‘white’, *inru* ‘hard’, *xana* ‘hot’, *bata* ‘sweet’, *bachu* ‘soft’, *aidama* ‘bad’, *bënsi(t)* ‘thin’, *xëni* ‘old’, *chadkë(t)* ‘thin’, *chabat* ‘wet’, *puntë(t)* ‘straight’, *diba(t)* ‘smooth’, *kacha* ‘sour’, *anaha* ‘wide’, *chukúma* ‘small’, *cha* ‘big’, *mamúa* ‘round’, *ëd-ki-kë* ‘dry-INTR-NMLZ’

(20) **Result:** *tëa-kë* ‘cut-NMLZ’, *nën* ‘burn’, *a-ru-kë* ‘do-UP-NMLZ’, *tun-ka-kë* ‘shoot-TR-NMLZ’, *rëtë* ‘kill/murder’, *këñu* ‘exterminate’, *chachi* ‘stab’, *xui* ‘barbecue’, *sasa-ka* ‘fry-TR’, *musa* ‘mix/stir/mash’

- In general PC vs. result roots seem to show a distinction regarding change entailments. Simple PC statives do not entail change but derived PC statives do:

(21) a. *báinka* *ani* ‘ikë ‘*aibika* *uini* *abi* *ni*
 báin=ka=a ani ‘ikë ‘ai=bi=ka=a uini a=bi ni
 hill=VAL=3A/S big be.3.IMPF then=EMPH=VAL=3A/S INDF.PRO 3=EMPH nor

Diosabi *ni* *uni* *yubë* *unibi* *anioima*.

Diosabi ni uni yubët uni=bi ani-o-i-i=ma.

God=EMPH nor man sorcerer man=EMPH big-FACT-IMP=PROX=NEG

‘The hill is big, but nobody nor God nor a sorcerer made it big.’

b. #*taíka* *puntëokë* ‘*ikë* ‘*aibika*
 tain=ka=a puntët-o-kë ‘ikë ai=bi=ka=a
 arrow.stick=VAL=3A/S straight-FACT-NFUT.NMLZ be.IMP=3 then=EMPH=VAL=3A/S
uini *abi* *puntëoima* ‘*íaxa*.
 uini a=bi puntët-o-i=ma ‘i-a-x-a
 INDF.PRO 3=EMPH straight-FACT-A/S>S:SE=NEG be-PRFV-3-N.PROX

‘The tree (used to make arrows) stem is straightened but nobody made it straight.’

¹1-10(S)=noun classes, 3=third person, A=subject of transitive verb, EMPH=emphatic, FACT=factitive, FV=final vowel, IMPF=imperfective, INDF=indefinite, INTR=intransitive, ITR=iterative, NEG=negation, NFUT.NMLZ=non=future nominalizer, PASS=passive, PAST=past, PFV=perfective, POSS=possessive, PRO=pronoun, PRES=present, PROX=proximate, S=subject of intransitive verb, UP=up, VAL=validational.

- Stative forms of result roots pattern like derived stative forms of PC roots exclusively:

(22) #*nū* *nami tēakē* 'ikē 'aibika *uini* *abi*
nū *nami tēa-kē* 'ikē 'aibika *uini* *abi*
 thing flesh cut=NFUT.NMLZ be.3.IMPF then=EMPH=VAL=3A/S INDF.PRO 3=EMPH
tēakēma 'ikē.
tēa-kē=ma 'ikē.
 cut=NFUT.NMLZ=NEG be.3.IMPF
 'The meat is cut but nobody cut it.'

- PC roots allow restitutive readings under iterative *-tēkēn* marking, while result roots usually resist them (though it was hard to come up with what the simple state would be):

(23) a. [The desert starts off dry. Then, it is made non-dry. Then it turns dry again.]

madin *papanka* *ēdkitēkēnia.*
madi=n *papa=n=ka=a* *ēd-ki-tēkēn-i-a.*
 sand=POSS father=A/S=VAL=3A/S dry-INTR-AGAIN-IMPF=N.PROX
 'The desert is getting dry again.'

b. [The man picks up a banana. A wizard makes it inedible. The man fries it.]

#*uninka* *nodi* *sasakatēkēnia.*
uni=n=ka=a *nodi* *sasa-ka-tēkēn-a-x-a'* *a-ru-tēkēn-a-x-a*
 man=A/S=VAL=3A/S banana fry-TR-AGAIN-PFV-3-N.PROX
 'The man fried the banana again.'

- There was some variation from English, e.g. Kakataibo *kill* allowed restitutive modification.

(24) [The stone was always dead. Then, it was brought to life. Then, I kill it.]

maxákana *rē(tē)tēkēa.*
maxat=ka=na *rētē-tēkēn-a*
 stone=VAL=1A/S kill-AGAIN-PFV

'I killed the stone again.' (≈ I made the stone be not alive again)

- This is expected: we do not expect all translation equivalents to be perfectly equivalent.
- However, *fierro* is a man-made metal, and this may be the source of the contradiction.

Upshot: While PC roots behave as predicted by bifurcation having a purely stative meaning, result roots can have an entailment of change, a fact that holds up in several languages.

5 Typological Study on the Morphology of Change-of-State Verb Roots

5.1 Basic Methodology

- To test the morphological predictions we examined a balanced language sample for various PC and result root meaning forms, looking at their stative and eventive uses.

#1 We targeted the *World Atlas of Linguistic Structures* (WALS) 100 Language list (Dryer and Haspelmath 2013), an areally and genetically balanced sample.

- If we lacked good written resources for a language we substituted one from the WALS 200 list, plus we added others based on available resources or native speakers/fieldworkers. We ended up with 88 languages, mostly covering the areas and families of WALS 100 (see §A).
- We used the 72 English adjectives/verbs in (3) and (4) (or source language equivalents).
- For 11 languages we had native speakers who helped us with the paradigms. For the rest, we did bidirectional dictionary searches. We did not assume all translations were perfect, just similar enough to justify being in the same broad/medium-grained semantic class.
- Primarily, we collected paradigms with both adjectives and both verbs, i.e. simple state-inchoative-causative-result state paradigms (as in *red-redden-redden-reddened*).
- But for some languages all of those forms are based on some underlying morphological root that never surfaces on its own, so we added such forms into our paradigms. Tzeltal represents a language without underlying roots, Oromo represents one with them:

(25)

Language	Root	underlying root	simple state	inchoative	causative	result state
Tzeltal	small	—	<i>tut</i>	<i>tut-ub</i>	<i>tut-ub-tes</i>	<i>tut-ub-en</i>
Oromo	long	<i>dheer-</i>	<i>dheer-aa</i>	<i>dheer-addh</i>	<i>dheer-essuu</i>	—

- If a form was unattested but our resources gave processes for deriving it, this was suggestive that it existed, but we don't know if it does or what it is. But it could affect our results.
- This was especially problematic for morphology-rich (“agglutinative”) language like Kiowa, where some dictionaries give stems and rules rather than lists of forms (Watkins and McKenzie 1984: 153). To check for this we constructed hypothetical forms (marked by @):

(26)

Language	Root	underlying root	simple state	inchoative	causative	result state
Kiowa	big	—	<i>ét</i>	@ <i>ét-óm-gyá</i>	@ <i>ét-óm</i>	@ <i>ét-dó</i>

- We do not use hypotheticals below — we instead just left the cell blank if no form was attested — but we reran our tests with hypotheticals included and nothing changed.
- Finally, we ignored a root meaning in a language if we had no data for its paradigm, i.e. we treated it as a resource gap. For example, we found no data for a ‘hurt’ root in Anejoñ.
- Conversely, if we had synonyms we collected them all, but for our statistical analyses we selected one at random (a Monte Carlo simulation showed that synonym choice didn't matter).

#2 In addition to recording the forms for each member of the paradigm, we also coded how each member of the paradigm was morphologically related to the other members in its paradigm.

- The details of the coding scheme aren't relevant, but there are several primary relationships that can arise when you look at how two forms are related (drawing on Haspelmath 1993):

- (27)
- X is **derived** from Y by some process (e.g. $red_Y \rightarrow redder_X$)
 - X and Y are **labile**, i.e. the same form (e.g. verb $cool_X$ and adjective $cool_Y$)
 - X and Y are **equipollent**, i.e. both derived from some other, shared form Z ($receive_Y$ and $deceive_X$, from $-ceive_Z$)
 - X and Y are formally **unrelated** (e.g. die_Y and $kill_X$)

∴ We ended up with 3,368 PC and 3,500 result roots with data, totaling 6,868 paradigms and 34,340 possible forms. 15,127 were found. Once one synonym is chosen per set there are 2,712 PC and 2,417 result roots with data; the exact number of cells filled depends on which synonyms were chosen. See <https://verbal-roots.la.utexas.edu/>.

- For an example full paradigm see §B, with our Kinyarwanda data.

5.2 The Existence of Simple Stative Forms

- PC roots overwhelmingly tend to have simple stative forms (that usually serve as input to the rest) and result roots overwhelmingly tend not to, as per §3.
- We calculated for each root the percentage of languages for which we had a simple state form among those that had data for that root at all and compared the distributions (medians) for PC vs. result roots. The results in Fig. 1 were statistically significant (on a Mann Whitney U-test; PC = 95.67%, result = 1.59%, $U = 1266.5$, $n_1 = n_2 = 36$, $p < 0.001$ one-tailed).

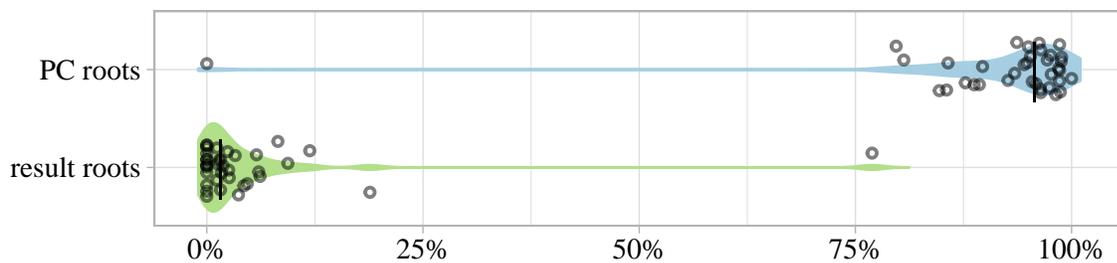


Figure 1: *Percentage of languages with underived states by root class, coded by translation*

- Comparing the various subclasses produced some interesting results as in Fig. 2, with only two odd cases. Age is a PC root that patterns like a result root. This was a coding decision; one cannot be old without having started young, so we classed *old* and its translations result states. For calibratable change *differ* was a verb but *different* was coded as a simple state.

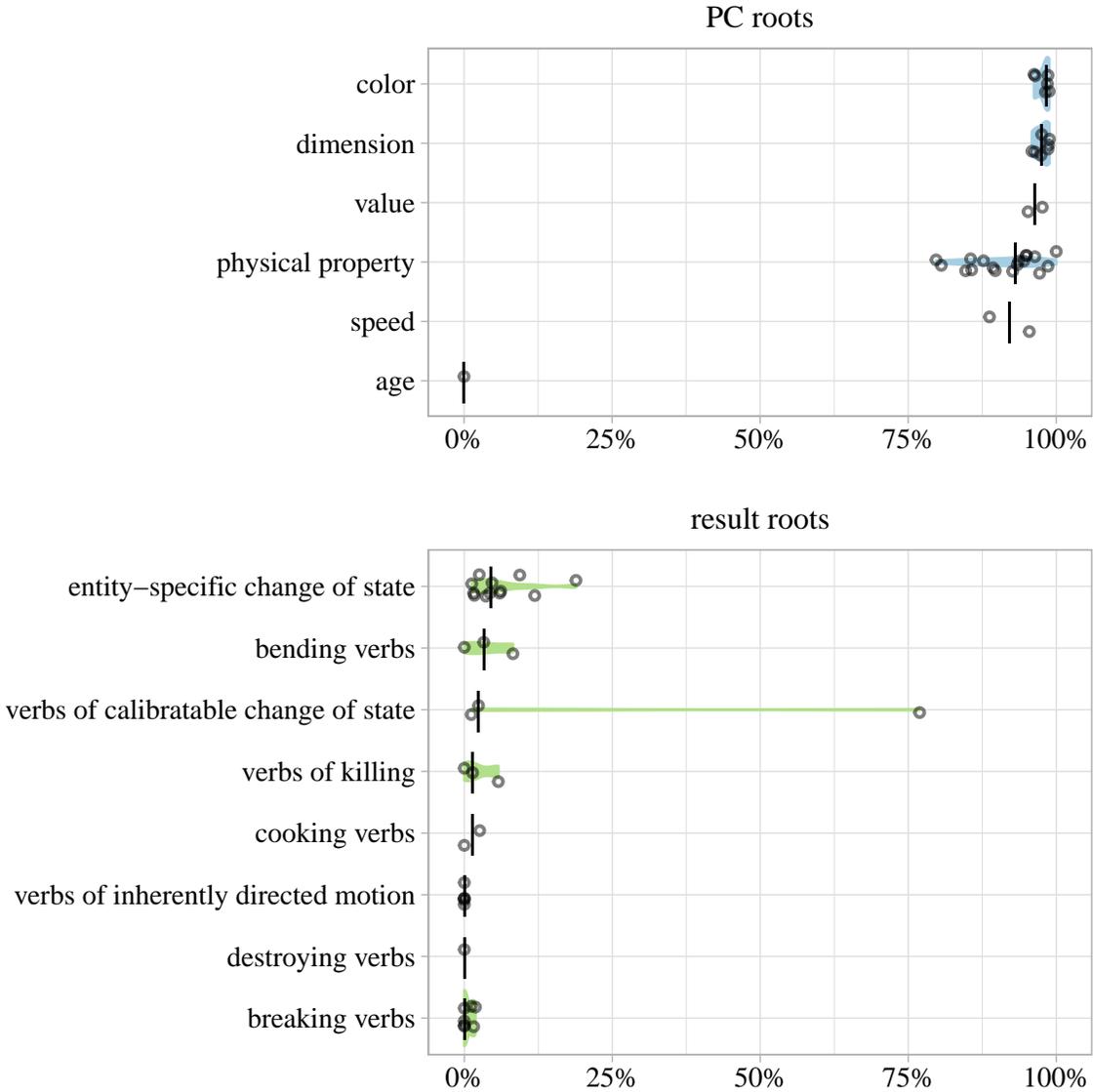


Figure 2: Percentage of languages with underived states by root subclass, coded by translation

- An objection is that some terms might have simple stative meanings but there is no corresponding English simple state form, so a deverbal result was used instead. However, we could code all statives as simple unless derived from a verb. The results (Fig. 3) do not change (PC median = 95.61%, result median = 27.66%, $U = 1293$, $n_1 = n_2 = 36$, $p < 0.001$ one-tailed).

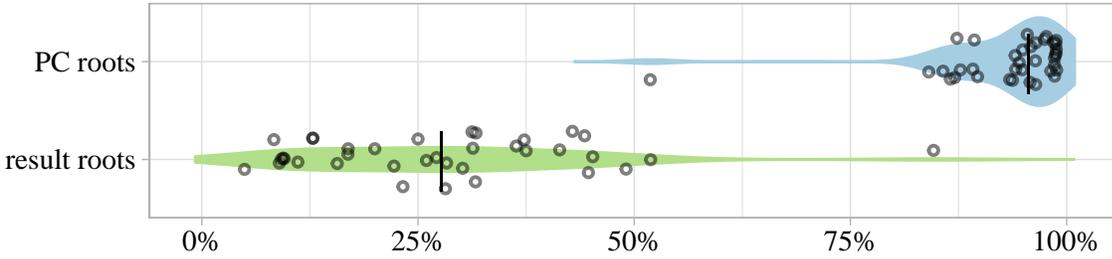


Figure 3: Percentage of languages with underived states by root class, correcting for morphology

5.3 Preferences for Marked vs. Unmarked Verbal Forms

- We coded every causative and inchoative as “marked” iff it was overtly derived from or equipollent to something. A verbal paradigm is marked iff both verbal forms are marked.
- For each root we calculated the percent of languages with a marked verb paradigm and compared the distributions for PC vs. result roots. The results (Fig. 4) were significant (PC median = 56.01%, result median = 15.20%, $U = 1291$, $n_1 = n_2 = 36$, $p < 0.001$ one-tailed).

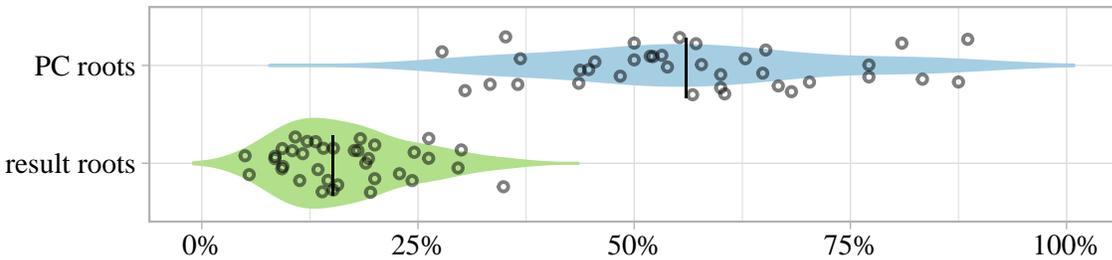


Figure 4: Percentage of languages with marked verbal paradigms by root class, for complete paradigms

- But we don’t have the same floor/ceiling effect we saw with having a simple state. PC root verbal paradigms aren’t always marked, and result root paradigms aren’t always unmarked.
 - Typological trends explain this, plus issues regarding the data collected with a few languages.
- #1 The expected pattern was many marked PC root verbal paradigms and few marked result root paradigms, since PC roots start off as statives and get derived into verbs but result roots start off as verbs. This is a **markedness asymmetry**, where the language is using the simple vs. marked contrast to reflect something about derivation (ultimately semantics).
- Yet several languages showed marked verbal paradigms among PC and result roots at **rough parity**. However, these languages fell into two rough typological types:
 - **Equipollent languages** - These languages tend to mark everything no matter what. If you’re in a cell in a paradigm you’re marked (often based on underlying roots).
 - **Labile languages** - These languages tend to use the same forms for everything and not mark much with morphology. If you’re in a cell in a paradigm you’re unmarked.

- What unifies these two together languages together is that as a property of their morphological systems they don't employ overt markedness asymmetries: such asymmetries, were they to exist underlyingly, are neutralized at the surface by marking everything or nothing.

#2 Four languages (Paumarí, Navajo, Kinyarwanda, Kakataibo) showed **more marked result root paradigms** than marked PC root verbal paradigms. This definitely shouldn't happen.

- In a nutshell, Paumarí and Navajo are equipollent languages, while Kinyarwanda and Kakataibo are labile languages. So these should have been at parity. But these four had a few irregulars here and there that skewed the stats.

∴ Beyond that, the majority of languages showed the expected paradigms.

Languages that rely on marking differences show the predicted English-type pattern. Language which characteristically just mark everything (equipollent) or nothing (labile) don't, simply because they neutralized the markedness asymmetry. Thus wholesale language type interacts with the rules in (17), albeit in predictable ways.

6 Extensions That Move Us Towards A Typology of Roots

- The PC/result root split recurs significantly across languages. Were it the result of some syntactic features of English there's no reason we'd see it so robustly preserved. But if it instead has to do with the semantic content of roots we should expect exactly this.
- The deeper question is *why* this split should exist, and why consistently across broad meaning category types. Beavers and Koontz-Garboden (2020) propose two conceptual explanations.

#1 Some states are conceived of as arising naturally while others are conceived of as coming about, just part of what those states are to people. Naming the state implies the change:

- (28) a. $[[\text{FLAT}]] = \lambda x \lambda s [x \text{ is flat in state } s]$
 b. $[[\text{CRACK}]] = \lambda x \lambda s [x \text{ is cracked in state } s]$, where “cracked in state *s*” entails that there is a BECOME event leading to *s*

#2 There are also states that may not require prior change as part of their nature, but are so conventionally associated with it it is functionally useful for to have roots lexicalizing it:

- (29) a. Mary liquified the mixture again. (restitutive or repetitive)
 $[[\text{LIQUID}]] = \lambda x \lambda s [x \text{ is a liquid in state } s]$
 b. Mary melted the mixture again. (repetitive only; Rappaport Hovav 2010: 7)
 $[[\text{MELT}]] = \lambda x \lambda s [x \text{ is a liquid in state } s \text{ due to a BECOME-type event}]$

- Either way, change will end up being part of root meanings, either by the nature of the concept or strong conventional associations. But what *else* can be in a root meaning?
- For some of these roots the actual process leading to change is open, predicting that under *again* modification it shouldn't matter what gave rise to the state in prior changes:

- (30) [A vase's center of gravity caused it to fall over and shatter. Mary then painstakingly glued it back together but hated the look, so she hit it with a hammer.]
 Mary shattered the vase again.

- But if there are states that must/conventionally arise from a process, are there also states that result from *particular* processes, or particular processes that must give rise to a state?
- Beavers and Koontz-Garboden (2012, 2020) cite manner of cooking verbs as one case, and this is what we saw above with *fry*. Given that, a meaning for the root FRY might be:

(31) $[[\text{FRY}]] = \lambda x \lambda s [x \text{ is fried in state } s]$, where “ x is fried in state s ” entails that s came about because of a BECOME-type event caused by an event where x was cooked in high heat in a hot fatty substance.

- We seem to have a typology of roots based on what templatic information they entail in ways that basically mimics our typology of templates:

(32)	templatic semantics	template	root
	state	stative template (1a)	FLAT, LONG, WIDE, etc.
	change of state	inchoative template (1b)	CRACK, SHATTER, BEND, etc.
	caused change of state	causative template (1c)	FRY, BRAISE, etc.

- So it’s not quite that there’s a free for all here. Rather, roots still fall into systematic types. These types also predict certain types of verbs in terms of grammatical behaviors:

(33)		unmarked stative	unmarked verb	<i>again reading</i>
	FLAT	Y	N	restitutive
	CRACK	N	Y	repetitive over change
	FRY	N	Y	repetitive over cause+change

- The expectation, though, is that we shouldn’t have mixed properties — roots with “non-sensical” templatic meanings, or showing (say) simple states but high repetitive readings.
- And, of course, we saw above expected morphological patterns that we won’t see a violation of — PC roots as marked adjectives and unmarked verbs and vice versa for result roots.
- Thus even if roots can mean a lot more things than bifurcation would have it, we at least still have a predictive theory of possible and impossible verbs.

Roots fall into classes based on a how much additional templatic meaning they entail that form a predictive typology. These data strongly argue against bifurcation.

7 Root-Governed Argument Realization in Caused Possession Verbs

7.1 Ditransitive Verbs in English

- The effects above were all about morphology and modification. But we also see root-conditioned argument realization when we look at verbs of caused possession.
- Caused possession verbs in English show one of two argument structures, known as the dative alternation (Green 1974, Oehrle 1976, Goldberg 1995, Beavers 2011, *inter alia*):

(34) a. Sandy sent Mary a book. (indirect object (IO) construction)
 b. Sandy sent a book to Mary. (to construction)

- A very standard understanding of the difference is that, roughly, the two variants reflect the same root in two distinct event structures indicating caused possession and caused motion, where the root indicates the manner by which the result obtained (Harley 2003):

- (35) a. [[x ACT_{<SEND>}] CAUSE [BECOME [z HAVE y]]] (IO)
 b. [[x ACT_{<SEND>}] CAUSE [BECOME [y AT z]]] (to)

- These structures explain restrictions on possible non-themes (the “London Office” effect):

- (36) a. #Sandy sent London
 b. Sandy sent a letter to London.

- Caused possession/motion is otherwise just another change of state (Beavers 2011). The difference from (say) *break* has to do with the nature of the state and the role of the root:
 - *Break* describes a result state involving some inherent property of the patient, while *send* describes a result that relates two entities together, the patient and recipient/goal.
 - The result in caused possession/motion is assumed to come from the template, not the root. The root instead indicates the manner by which the change came about.

- However, there are some known issues with this approach.

#1 Not all roots of the same semantic type show the same alternations, e.g. *carry* verbs rarely allow IOs (Bresnan and Nikitina 2009), meaning roots partly determine argument realization:

- (37) a. Jim threw/carried a ball to his friend.
 b. Jim threw/??carried his friend a ball.

#2 The meaning of an alternation can vary depending on the root (Rappaport Hovav and Levin 2008 call this “verb-sensitivity”; I use “root-sensitivity”). For example, while caused possession IO constructions have possession as a component, with *to* it depends on the root:

- (38) a. #Kim mail/sent/threw/gave/bequeathed/loaned London a book.
 b. Kim mail/sent/threw/#gave/#bequeathed/#loaned a book to London.

∴ The two alternants are synonymous with *give* but not with *throw*, meaning that the root determines what thematic role some arguments get in the same template.

#3 Furthermore, whether receiving/arriving occurs depends on the root:

- (39) a. Kim sent/mailed/#gave/#loaned John a book, but he never received it.
 b. Kim threw/hurled/#carried/#took a ball to left field, but it never got there.

∴ Rather, the possession that gives rise to the “London Office” effect when it arises in most cases is just “prospective” (Gropen et al. 1989, Beavers 2011) (ditto for prospective arrival). But this means it’s the root that determines when actual change occurs.

- Beavers and Koontz-Garboden (2020) (building on Beavers 2011) suggest weaker meanings for the templates, incorporating prospectivity (the \diamond on CAUSE means “possibly causes”) and where the result of the *to* variant is vague between possession and being at (labeled R’).

- (40) a. [[x ACT_{<SEND>}] \diamond CAUSE [BECOME [z HAVE y]]]
 b. [[x ACT_{<SEND>}] \diamond CAUSE [BECOME [y R’ z]]]

- Possession, being located at, and actual/prospective change come the root, even though those are supposed to be templatic notions, in violation of bifurcation:

(41)	root	root class	templatic meaning
	GIVE, HAND	actual possession	HAVE, R’
	LEAVE, WILL, BEQUEATH	possessible possession	HAVE, R’
	CARRY, BRING	actual arrival	R’
	THROW, TOSS, SEND	possible arrival	R’

- However, the limited availability of English IO templates means that root-sensitivity effects could alternatively just reflect idiosyncratic lexicalization, and not a general theory.
- So we looked at Kinyarwanda, which derives the dative alternation through a productive applicative, but at the same time shows patterns of root-sensitivity, albeit much more diverse than in English. I’ll ignore prospectivity, but it plays out similarly in Kinyarwanda.

7.2 Ditransitive Verbs in Kinyarwanda

- Ditransitives in Kinyarwanda are typically formed through a process of applicativization: a morpheme on an otherwise transitive verb licenses a new, second object called an “applied object” (AO) that corresponds to an IO (see e.g. Kimenyi 1980, Jerro 2016):²

- (42) a. *Mukamana y-a-juguny-e* (*Nkusi) *umu-pira*.
 Mukamana 1S-PST-throw-PRFV Nkusi 3-ball
 ‘Mukamana threw the ball.’
 b. *Mukamana y-a-juguny-iy-e* Nkusi *umu-pira*.
 Mukamana 1S-PST-throw-APPL-PRFV Nkusi 3-ball
 ‘Mukamana threw the ball to Nkusi.’

- Unlike English IOs, *-ir* AOs in Kinyarwanda occur with any transitive change verb. However, with canonical change-of-state verbs the AO is a beneficiary and not a recipient:

- (43) a. *Mukamana y-a-menny-e* (*Karemera) *igi-kombe*.
 Mukamana 1S-PST-break-PRFV Karemera 7-cup
 ‘Mukamana broke the cup.’
 b. *Mukamana y-a-men-ey-e* Karemera *igi-kombe*.
 Mukamana 1S-PST-break-APPL-PRFV Karemera 7-cup
 ‘Mukamana broke the cup on behalf of Karemera/#to Karemera’.

²Vowel harmony determines the quality of the applicative’s vowel (*e* vs. *i*), and the perfective suffix causes consonant mutations at the end of the verbal stem, which often turns *-ir/* to *-ij/* (represented orthographically as “iy”).

- A recipient AO is only licensed with certain roots, viz. translation equivalents of English caused possession ditransitives among (though a beneficiary AO is also possible):

- (44) a. *Mukamana y-a-juguny-e* (*Nkusi) *umu-pira*.
Mukamana 1S-PST-throw-PRFV Nkusi 3-ball
'Mukamana threw the ball.'
- b. *Mukamana y-a-juguny-iy-e* Nkusi *umu-pira*.
Mukamana 1S-PST-throw-APPL-PRFV Nkusi 3-ball
'Mukamana threw the ball to Nkusi.'
- (45) a. *Habimana y-a-gabuy-e* *ibi-jumba* (*aba-na).
Habimana 1S-PST-serve-PRFV 8-sweet.potatoes 2-children
'Habimana served sweet potatoes.'
- b. *Gatete y-a-gabur-iy-e* *ibi-jumba* *aba-na*.
Gatete 1S-PST-serve-APPL-PRFV 8-sweet.potatoes 2-children
'Gatete served the children sweet potatoes.'

- Which do beneficiaries and which recipients? Transitives that license a recipient AO always entail an implicit third participant *absent* the AO, e.g. the theme ends up elsewhere in (46):

- (46) a. #*Nkusi y-a-juguny-e* *umu-pira ariko Nkusi*
Nkusi 1S-PST-throw-PRFV 3-ball but Nkusi
a-ra-cya-wu-fit-e.
1S-NON.PST-PERS-3O-have-PRFV
'Nkusi threw the ball, but Nkusi still has it.' (implicit goal)
- b. #*Nkusi y-∅-oherej-e* *im-pano ariko a-ra-cya-yi-fit-e*.
Nkusi 1S-PST-send-PRFV 9-gift but 1S-NON.PST-PERS-9O-have-PRFV
'Nkusi sent the gift, but he still has it.' (implicit goal)

- Crucially, sometimes it is an implicit recipient, sometimes a goal, contingent on the root:

- (47) a. [Karemera is making a fancy cake for a competition. Nobody will eat the cake, it's just going to be displayed.]
#*Karemera y-a-gabuy-e* *cake*.
Karemera 1S-PST-serve-PRFV cake
'Karemera served the cake.' (implicit recipient)
- b. [Habimana is a spy and sends a microphone in a letter to record people without them knowing. There is no specific person he is sending it to]
Habimana y-∅-oherej-e *i-barwa*.
Habimana 1S-PST-send-PRFV 9-letter
'Habimana sent the letter.' (implicit goal)

- Conversely, canonical change-of-state verbs do not entail a beneficiary absent the AO:

- (48) *Nkusi y-a-menny-e igi-kombe.*
 Nkusi 1S-PST-break-PRFV 7-cup
 ‘Nkusi broke the cup (#to the benefit of someone else).’

Some roots entail an implicit third participant, and determine its role as recipient or goal. Such roots also thus dictate that their applied objects under *-ir* are recipients. Thus roots are determining templatic meaning that figures productively into argument realization.

- A tiny number of roots allow additional objects without *-ir* (IOs), with root-contingent roles:

- (49) a. *N-a-ha-ye Mukankusi igi-tabo.*
 1SGS-PST-give-PRFV Mukankusi 7-book
 ‘I gave Mukankusi the book.’ (recipient IO)
- b. *Nkusi y-a-siz-e igi-tabo i Kigali.*
 Nkusi 1S-PST-leave-PRFV 7-book 19 Kigali
 ‘Nkusi left a book in Kigali.’ (goal IO)

- The effect of adding *-ir* to a lexical ditransitive is root contingent.
- With *gu-ha* ‘give’ the AO is a new beneficiary and the IO remains a recipient (a *tritransitive*):

- (50) *N-a-h-er-ey-e Nkusi igi-tabo Habimana.*
 1SGS-PST-give-APPL-PRFV Nkusi 7-book Habimana
 ‘I gave Habimana the book for Nkusi.’ (not ‘I gave Habimana the book to Nkusi’)

- But with *gu-siga* ‘to leave’ and *gu-tera* ‘throw at’ the goal IO becomes a recipient AO and the result is ditransitive:

- (51) *Nkusi y-a-sig-iy-e Gatete igi-tabo.*
 Nkusi 1S-PST-leave-APPL-PRFV Gatete 7-book
 ‘Nkusi left Gatete a book.’

Lexical ditransitive roots select two objects, one a recipient or goal. Such roots dictate whether applied objects supplant or augment their indirect objects. Again, roots are determining templatic meaning that figures productively into argument realization.

- We have observed at least five types of roots in terms of their non-applicativized variants (with the caveat that in all cases the AO can also just be a wholly separate beneficiary):

(52)	example	root type	third participant of root	Applicative effect
	<i>gu-ha</i> ‘give’	ditransitive	recipient IO	add beneficiary AO(≠IO)
	<i>gu-siza</i> ‘leave’	ditransitive	goal IO	IO becomes recipient AO
	<i>ku-gabura</i> ‘serve’	transitive	unexpressed recipient	AO realizes recipient
	<i>ku-jugunya</i> ‘throw’	transitive	unexpressed goal	goal becomes recipient AO
	<i>kumena</i> ‘break’	transitive	none	add beneficiary AO

- The templates themselves have very general meanings; the root must define the actual change:

- (53) a. Transitive template: caused change (cp. English transitive)
 b. AO template: caused receiving or benefiting (cp. English IO)
 c. IO template: caused receiving or arriving (cp. English *to*)

- I won't go over our analysis (see Beavers et al. in prep, building on Beavers and Koontz-Garboden 2020 for English), but the way all these effects work is essentially:
 - Roots name manners that also have results built into them. Some of those result in turn involve a third participant, either a recipient or a goal. This is all from the root.
 - The AO template also involves a third participant, either a recipient or a beneficiary.
 - When those roots occur with those templates, semantic and pragmatic interactions between those two participants, combined with the possibility of conflating them or not (à la Beavers and Zubair 2013, Beavers and Udayana 2023), derive all the readings above.
 - The tiny number of lexically ditransitive roots are similar, save that there's an independently requirement on the AO template (Jerro's 2016: 57 Applicativization Output Condition) requiring it to have a strictly stronger reading than IO template.
 - For *guha* 'give' this can only be satisfied by treating the AO as a distinct beneficiary (since treating it as recipient would make the AO and IO uses synonymous).
- The key point is that once again roots are doing a lot of heavy-lifting for the grammar, in this case for argument realization, contra expectations of bifurcation.

8 Roots vs. Templates: The Big Picture

- Let me pop back up to a higher level, the very nature of the root vs. template distinction. We saw that roots can have meanings that include pretty much anything a template can.
 - Given this, why would we even posit the distinction? Could we just say words have unique meanings that happen to include shared templatic meanings, and leave it at that? Well, no.
- #1 I discussed this last time, but the behavior of things like *again* operate on templates: as far as *again* is concerned a root is a single unanalyzable chunk, even if it has templatic meaning in it. So we need something to *give structure to lexical meaning*.
- #2 We also need templates to do what in the first lecture I referred to as “event composition”.
- While the root CRACK has change in its meaning, FLAT doesn't, but words based on it sometimes do. That's coming from somewhere, and the somewhere is (by definition) a template. After all, it shows templatic syntax: restitutive and repetitive readings, *flatt-en*, etc.
 - We saw that entailing template meaning doesn't mean you'll have that template's syntax (i.e. the main prediction of bifurcation is wrong). But having that syntax *will* predict its semantics.

We still need the root/template distinction to describe word meanings!

- But isn't the overlap of root and template meanings telling us something? Doesn't it suggest they are less distinct than event structural approaches let on?
- I think it does, but in a way that harkens back to Dowty (1989, 1991) (and here I draw heavily on Beavers 2006, 2010 and Beavers and Koontz-Garboden 2020: Ch.6).
- I represented meanings as translations into some (loose) logical forms, but they ultimately reduce to sets of lexical entailments. This is true for roots and templates: this is basically Dowty's individual thematic role vs. thematic role types.

- When I discussed argument alternations last week I noted that lexical entailments can be related to one another in terms of relative specificity (among many other things). I think this matters for why we find roots entailing templatic meaning but not vice versa.

#1 By their nature the lexical entailments templates introduce will be very general and schematic:

- (54) a. $[[\text{BECOME}]] := \{ \dots, \text{change}, \dots \}$
 b. $[[\text{CAUSE}]] := \{ \dots, \text{cause}, \dots \}$

- They can't be too specific: they have to combine with lots of roots and other templates.

#2 By definition, roots introduce more idiosyncratic meanings. But nothing rules out that they *also* introduce more meanings, both because they happen to for conventional reasons but also because *sometimes idiosyncratic things have more general things as part of their essence*.

- Consider again ballistic motion caused possession verbs. This involves change:

$$(55) \quad [[\text{TOSS}]] := \left\{ \begin{array}{l} \dots, \text{low-energy} \\ \text{ballistics,} \end{array} \begin{array}{l} \nearrow \text{physical releasing,} \rightarrow \text{leaving} \rightarrow \text{change} \\ \searrow \text{possible arriving,} \rightarrow \text{possible change} \end{array} \right\}$$

- What this conception is telling us is that:
 - Root and template meanings are not *ontologically* distinct — they are both sets of lexical entailments about events and participants.
 - They differ only in degree of specificity/generality:
 - * Templates have general meanings, functionally motivated by the need to combine with lots of roots.
 - * Roots have more specific meanings, but can have general meanings by convention or because specific things entail general things.
 - But we need both ways of introducing meanings to explain why meaning representations can vary even when the content is the same.
- The question is why we have structured representations at all — I still think it would be nice if roots were the end all, be all of word meaning. But hey, nobody ever listens to me anyway.

9 Conclusion

- At the highest level, what I hope to have motivated in this lecture series is not just that theoretical lexical semantics is a worthwhile field, but also where I see some of the big challenges and lacunae. Let me tie just a few of these together.

#1 I had outlined the following as major components in the field writ large:

- Word meanings are structured — they are not an organized jumble of little details.
- Structure can be representational in nature or truth conditional in nature.
- Word meanings are broken into regular (templatic) and idiosyncratic (root) meanings.
- Grammar (syntax and morphology) is sensitive to semantic structure, as found in both templates and roots, via a variety of regular correspondences (“linking rules”).

- There is principled variation in all of these things across languages, but also considerable cross-linguistic similarity — the same things recur across languages.
 - But the “same” facts sometimes also boil down to lexical pragmatics and how words are used in discourse — not everything is truly lexical semantics!
- At a simple level, there are just a lot of open questions in how those things should be fleshed out, so just lot of basic bread and butter empirically-oriented theorizing to do.
- #2 The things above I believe are uncontroversial in lexical semantics, and said the way I said them above they probably also seem obvious to some degree.
- But my sense is that some of these things are not obvious to everyone — I haven’t harped on it too much but as I noted on Day 1, questions of lexical semantic representation (much imported from syntax) have obscured how much everyone agreement there is.
 - Instead it’s a field sometimes fractured by frameworks that might seem like wildly different proposals but they’re really the same ideas written down in a different way.
 - I say if you’re working in the field already or think you might be interested, don’t let representations fool you! Read widely and look for the themes above in whatever you’re reading. They’re usually there, and you can draw insight from it, looking past representations.
- #3 I harped on this a lot, but I do think one area of the field that is less sufficiently developed is the grounding out in truth conditions (and pragmatics). Semantic representations are just representations, and it’s hard to argue *for* them. But it’s not as hard to argue for what something means (even if you have to figure out if it’s semantic or pragmatic).
- As I hope to have shown, paying attention to actual content can reveal hidden structure in lexical meaning qua places where contrasts in the content of word meaning really matters for the grammar in ways orthogonal to representation.
 - I didn’t discussed this as much, but it’s also important to work out the *compositional details* clearly. Inattention to that has, I fear, made people think certain analyses are not possible, or have caused people to miss generalizations. A lot of what I discussed today required knowing what those details are (even if I didn’t show you the composition for lack of time).
- #4 Lexical semantics has become a more cross-linguistic and typological field of late, and I think that’s a great trend and we need more of it. We need more detailed analyses of particular languages, especially those that do not organize lexical information like the more studied Western languages do, but also comparison across those detailed studies.
- #5 I definitely think a big area for growth is to tie the theoretical work more to things that go beyond linguistic evidence. As I’ve said, there’s still representational structure that matters for grammar that I don’t yet see a way of doing without, but I seriously doubt it’s just there arbitrarily — it must reflect reification of deeper cognitive factors.
- I don’t think you need to figure out what those are to do good lexical semantics. But the degree to which knowing that those explanations are there the more grounded the linguistic theories are, and so it’s a growth area for more collaboration.

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A Languages Used in the Typological Study

All macroareas and genetic affiliations are taken from WALS. Each language is listed with its genus and family, except where those are the same. Italicized languages are from WALS 200 and languages, languages not on WALS 200 or 100 are underlined, and data from boldfaced languages were collected or checked against a native speaker informants (for Spanish, German, and French data were collected from resources but checked by a native speaker). Otherwise all languages are from WALS 100 and data were collected through dictionary and grammatical resources.

Eurasia Basque (Basque)

Burmese (Burmese-Lolo, Sino-Tibetan)

Mandarin (Chinese, Sino-Tibetan)

Meithei (Kuki-Chin, Sino-Tibetan)

Burushaski (Burushaski)

Chukchi (Northern Chukotko-Kamchatkan, Chukotko-Kamchatkan)

English (Germanic, Indo-European)

German (Germanic, Indo-European)

Modern Greek (Greek, Indo-European)

Persian (Iranian, Indo-European)

Russian (Slavic, Indo-European)

Spanish (Romance, Indo-European)

French (Romance, Indo-European)

Hindi (Indic, Indo-European)

Finnish (Finnic, Uralic)

Georgian (Kartvelian)

Modern Hebrew (Semitic, Afro-Asiatic)

Japanese (Japanese)

Kannada (Southern Dravidian, Dravidian)

Khalkha (Mongolic, Altaic)

Korean (Korean)

Lezgian (Lezgian, Nakh-Daghestanian)

Thai (Kam-Tai, Tai-Kadai)

Turkish (Turkic, Altaic)

Vietnamese (Viet-Muong, Austro-Asiatic)

Africa Acholi (Nilotic, Eastern Sudanic)

Egyptian Arabic (Semitic, Afro-Asiatic)

Middle Atlas Berber (Berber, Afro-Asiatic)

Hausa (West Chadic, Afro-Asiatic)

Harar Oromo (Lowland East Cushitic, Afro-Asiatic)

Gújjolaay Eegimaa (Bak, Niger-Congo)

Swahili (Bantoid, Niger-Congo)

Kinyarwanda (Bantoid, Niger-Congo)

Zulu (Bantoid, Niger-Congo)

Sango (Ubangi, Niger-Congo)

Yoruba (Defoid, Niger-Congo)

Khoekhoe (Khoe-Kwadi)

Koyraboro Senni (Songhay)

Malagasy (Barito, Austronesian)

North America Plains Cree (Algonquian, Algic)

Hopi (Hopi, Uto-Aztecan)

Yaqui (Cahita, Uto-Aztecan)

Jakaltek (Mayan)

Tenango Tzeltal (Mayan)

Karok (Karok)

Kiowa (Kiowa-Tanoan)

Koasati (Muskogean)

Lakhota (Core Siouan, Siouan)

Chalcatongo Mixtec (Mixtecan, Oto-Manguean)

Mezquital Otomí (Otomian, Oto-Manguean)

Navajo (*Athapaskan, Na-Dene*)

Oneida (Northern Iroquoian, Iroquoian)

Rama (Rama, Chibchan)

Tsimshian (*Penutian*)

Yup'ik (*Eskimo, Eskimo-Aleut*)

Zoque (Mixe-Zoque)

South America Barasano (Tucanoan)

Carib (*Cariban*)

Guaraní (Tupi-Guaraní, Tupian)

Minica Huitoto (*Huitoto, Huitotoan*)

Kakataibo (Cashibo-Cacataibo, Panoan)

Mapudungun/Mapuche (Araucanian)

Mocoví (South Guaicurán, Guaicurán)

Paumarí (*Arauan*)

Huallaga Quechua (Quechuan)

Warao (Warao)

Yagua (Peba-Yaguan)

Papunesia Alamblak (Sepik Hill, Sepik)

Kwoma (Middle Sepik, Sepik)

Anejoñ (Oceanic, Austronesian)

Bariai (Oceanic, Austronesian)

Fijian (Oceanic, Austronesian)

Hawaiian (Oceanic, Austronesian)

Chamorro (Chamorro, Austronesian)

Indonesian (Malayo-Sumbawan, Austronesian)

Paiwan (Paiwan, Austronesian)
 Tagalog (Greater Central Philippine, Austronesian)
 Lower Grand Valley Dani (Dani, Trans-New Guinea)
 Kewa (Engan, Trans-New Guinea)
Koiari (Koiarian, Trans-New Guinea)
 Daga (Dagan)
Oksapmin (Oksapmin)

Australia Gooniyandi (Bunuban)
 Kayardild (Tangkic, Tangkic)
 Martuthunira (Western Pama-Nyungan, Pama-Nyungan)
 Pintupi (Western Pama-Nyungan, Pama-Nyungan)
Murrinh-Patha (Murrinh-Patha, Southern Daly)
 Tiwi (Tiwian)

B Full Paradigm for Kinyarwanda Roots

Note that the simple stative form is also used to express the result state. We took this to mean it had a simple state meaning but in context it was clear there this state was a result state. There are no underlying roots in this language; we omit this column for space reasons.

Root	Simple State	Inchoative	Causative	Result State
large/big/enlarge	/nini	kw-iyongera	k-ongera	
small/shrunk/shrink	/toya		ku-gabanya	
short/shorten	/gufi	kw-ihina	ku-gabanya	
long/lengthen	/re-re	kw-iyongera	k-ongera	
deep/deepen	/re-re	gu-tebera	k-ongera	
wide/widen	/gari	kw-iyongera	k-ongera	
tall/height/heighten	/-re-re	ku-bara -re-re	k-ongera	
aged/age	gu-saza	gu-saza		
bad/worse/worsen	/bi	ku-bara mbikurushaho		
good/improved/improve	/iza	kw-iyongera		
white/whiten	kw-era			
white/whiten	umweru	gu-hinduka umweru		
black/blacken	umukara	gu-hinduka umukara		
red/redden	umutuku	gu-hinduka umutuku		
green/make green	icyatsi	gu-hinduka icyatsi		
blue/make blue	ubururu	gu-hinduka ibururu		
brown/make brown	ikaki	gu-hinduka igitaka		
cold/make cold	gu-konja	gu-konja	gu-konjeshya	
hot/heat up	gu-shyuha	gu-shyuha	gu-shyushya	
dirty/dirty	umwanda			
dirty/dirty	kw-andura	kw-andura	kw-anduza	
dry/dry	ku-ma	ku-ma	ku-misha	
wet/wetten	gu-toha	gu-toha	gu-tosa	
straight/straighten	ku-gororoka		ku-gorora	
hard/harden	gu-komera	gu-komera		
soft/soften	k-orooha	k-orooha	k-oroheza	
clean/clean	gu-sukura	gu-sukura	gu-sukura	
sharp/sharpen (a point)	gu-songora		gu-songora	

sharp/sharpen	gu-tyara	gu-tyara/gu-tyaza	gu-tyaza
sweet/sweeten	ku-ryooha	ku-ryooha	ku-ryoheza
strong/strengthen	gu-komera	gu-komera	gu-komeza
fast/speed up	kw-ihuta	k-ongera umuvuduko	kw-ihutisha
slow/slow down	buhoro	ku-gabanya umuvuduko	
angry/anger	ku-rakara	ku-rakara	ku-rakaza
calm/calmed	kw-ikaruma	kw-ikaruma	gu-karumisha
frightened/frighten	gu-tinya	gu-tinya	gu-tinyisha
sick/sicken	ku-rwara	ku-rwara	
sad/sadden	ku-babara	ku-babara	ku-babaza
hurt/hurt	ku-babara	ku-babara	ku-babaza
tired/tire	ku-nanirwa	ku-nanirwa	ku-naniza
entertained/entertain	ku-nezerwa	ku-nezerwa	ku-nezeza
surprised/surprise	gu-tungurwa	gu-tungurwa	gu-tungura
worried/worry	ubwoba		
pleased/please	kw-ishima	kw-ishima	gu-shimisha

English Gloss	Simple State	Inchoative	Causative	Result State
burned/burn		gu-shiririra	gu-shiririza	gu-shiririra
melted/melt		gu-shonga	gu-shongesha	
congeal		gu-fata	gu-fatisha	gu-fata
decayed/decay, rotten/rot		ku-bora	ku-boza	
swollen/swell			ku-byimbisha	ku-byimba
grown/grow		gu-kura	gu-kuza	
bloomed/bloom		ku-bumbura		ku-bumbura
wilted/wilt		ku-raba	ku-rabiza	ku-raba
withered/wither		ku-raba	ku-rabiza	ku-namba
sprouted/sprout		gu-tunguka		gu-tunguka
tarnished/tarnish		gu-koboka		
roast/roasted			k-otsa	
cook/cooked			gu-teka	gu-tek-ek-a
fry/fried		gu-karang-w-a	gu-karanga	gu-karang-ik-a
broken/break		ku-men-ek-a	ku-mena	ku-men-ek-a
cracked/crack		gu-saduka	gu-satura	
crushed/crush		gu-hond-ek-a	gu-honda	gu-hond-ek-a
shattered/shatter		gu-shwanyuka	gu-shwanyura	
torn/tear, ripped/rip		gu-c-ik-a	gu-ca	gu-c-ik-a
snapped/snap		ku-vun-ik-a	ku-vuna	ku-vun-ik-a
bent/bend		ku-gonda	ku-gonda	ku-gond-ek-a
folded/fold			gu-hina	
wrinkled/wrinkle		kw-ihinarika	gu-hinarika	
dead/killed/kill		gu-pfa	kw-ica	gu-pfa
drowned/drown		ku-rohama	kw-ibiza	ku-rohama
destroyed/destroy, ruined/ruin		kw-angir-ik-a	kw-angiza	kw-angir-ik-a
go up		ku-zamuka	ku-zamura	
go down		ku-manuka	ku-manura	
differing/differ		gu-tandukanya	gu-tandukanya	
come/came		ku-za	ku-zana	
gone/go		ku-genda	ku-jyana	

go in (entered/enter)
go out (exited/exit)
returned/return

kw-injira kw-injiza
gu-sohoka gu-sohora
gu-subira gu-subiza

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