On the typology of state/change of state alternations

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Abstract

This paper examines the morphological and lexical semantic typology of the relationship between words denoting states and their associated changes of state. Two empirical findings emerge. First, while words denoting property concept states (Dixon 1982) are morphologically basic, this is not always the case for words denoting result states (states entailing an event giving rise to the state). Second, a single word can be polysemous between a property concept state and change of state denotation only in languages where property concepts are lexicalized as verbs. The first generalization is explained by observing that property concepts and result states have differing lexical semantics—while result states presuppose a prior change, property concepts do not. This asymmetry in morphological encoding is expected given the Principle of Monotonic Composition (Olsen 1996; Rappaport Hovav and Levin 1998), according to which meaning can be added in word formation but never removed or changed. The second generalization follows from the idea that only verbs can denote changes of state. This idea is fleshed out via lexical decomposition and by appealing to a recent idea due to Lieber (2004) whereby the highest operator in a lexical decomposition determines lexical categoryhood. Implications of the empirical findings and analysis are discussed alongside areas for future research.

Keywords: states, change of state, property concepts, adjectives, verbs, lexical categories, morphological typology, lexical semantics

1 Introduction

Words denoting non-causative and causative change of state (COS) predicates often are morphologically related to words denoting the related state predicates, though the relationship sometimes differs for different types of states. For the state of 'brokenness', for example, in English the word denoting the state in (1c) is derived from the word denoting the change of state. In contrast, the word denoting the state of 'looseness' in (2c) is morphologically basic, with the words denoting the changes of state being derived from it.[1]

(1) a. The glass broke. (non-causative change of state)
b. Sandy broke the glass. (causative change of state)
c. The glass is broken. (state predicate is deverbal)

(2) a. The knot loosened. (non-causative change of state)
b. Sandy loosened the knot. (causative change of state)
c. The knot is loose. (state predicate is morphologically basic adjective)

[1]Here and throughout the paper I intend the phrase "morphologically basic" to mean that a word stripped of its inflectional morphology (i.e., a lexeme) and of any semantically irrelevant derivational morphology (e.g. syntactically conditioned derivational morphology) has undergone no morphological rules (ablaut, reduplication, affixation, etc.). In contrast, I use the phrase "morphologically derived" when a lexeme has undergone such a rule. For my purposes, the determining factor for whether a lexeme is considered morphologically derived or basic has to do with whether the lexeme has undergone any morphological rules effecting changes in the lexical semantic representation (i.e., lexical conceptual structure) of the lexeme. For further discussion see Stump's (1998:13ff.) characterization of the notion *lexeme* and of morphological rules deriving new lexemes from lexemes, effecting a change in the lexical semantics of the original lexeme.

The morphological typology of words denoting non-causative (e.g. (1a),(2a)) and causative (e.g. (1b),(2b)) COS predicates has been relatively well studied (Nedjalkov and Silnitsky 1973; Haspelmath 1993), with one important finding being that for certain types of COS events, languages tend to have morphologically basic words denoting the causative predicates, morphologically deriving the corresponding word denoting the non-causative COS predicate. For other types of events, the opposite direction of derivation is favored. This pattern of behavior is observed in Tongan (Polynesian), as shown in (3) and (4).

(3) Tongan
  a. pelu 'cause become bent' (causative change of state)
  b. ma-pelu 'become bent' (non-causative change of state)

(4) Tongan
  a. lahi 'become big' (non-causative change of state)
  b. faka-lahi 'cause become big' (causative change of state)

Certain types of events are lexicalized with the causative as the morphologically basic form, deriving the word denoting the non-causative change of state, as seen in (3) for the word for 'bend.' Other events, in contrast, have the non-causative change of state lexicalized as the morphologically basic form, deriving the word denoting the causative change of state as in (4) for the word for 'big'. Haspelmath (1993) argues that the direction of morphological derivation correlates with the likelihood that the event can occur spontaneously—events more likely to occur spontaneously are lexicalized in their morphologically basic form as words denoting non-causative COS predicates (e.g. *melt*), while those less likely to occur spontaneously are lexicalized in their morphologically basic form as words denoting causatives (e.g. *break*). The leading idea behind his research program is that the morphological direction of derivation, within and across languages, is suggestive of how non-causative and causative COS predicates are conceptually related to one another.

I take Nedjalkov and Silnitsky's and Haspelmath's ideas further by examining how the non-causative and causative COS predicates they are interested in are related to their associated states. Specifically, for a given state such as 'broken' or 'wide', there has been no systematic investigation of the morphological relationship between words denoting the state, a non-causative change into the state, and a causative change into the state. In this paper I take the first steps in such an investigation, considering not only whether the meaning of all states is comparable, but also the well-known fact that languages lexicalize states as members of different lexical categories. While some languages have a large open class of adjectives, others do not, instead lexicalizing notions that turn up as adjectives in other languages, as nouns or verbs (Dixon 1982). This point of crosslinguistic variation turns out to have a significant impact on other areas of grammar (cf. Lehmann 1990), as is seen below.

The study yields two principal empirical findings. First, as noted previously by Dixon (1982), not all states are the same. States entailing some prior event giving rise to the state, result states, are derived in many languages from the verb denoting that event as in *break/broken*. States that do not presuppose such a change, for example *red*, are never derived from the corresponding change of state verb. Instead, the COS verb is derived from the word denoting the state (e.g., *redden*), the opposite direction of derivation as that for predicates like *break/broken* (cf. (1)-(2)). These facts follow, I argue, from a principle of monotonic composition, whereby meaning is added in the construction of word meaning, but never deleted. The second major empirical finding of the study is that the derivational relationship between words denoting states and words denoting the associated change of state is affected by the lexical category of the associated state. In particular, I find that it is only in languages where states are lexicalized as verbs that the same word is polysemous between a state and a non-causative change of state meaning. I argue that this follows from a constraint on the type of lexical category that can denote changes of state—only verbs may do this. For there to be a polysemy between state and change of state, the state must be lexicalized as a verb, otherwise this principle would be violated.

I begin by laying out what I believe to be some of the more important empirical questions in this domain. I follow this with discussion of some suggestive data culled from reference grammars and native speakers of relevant languages, and then move on to the explanation of the observed typological facts. I then discuss some potential challenges for the analysis and conclude by discussing the implications of the findings for theories of event structure representation.

2 Two questions about change of state encoding

The question of how words denoting states are related to their non-causative and causative COS counterparts is prefigured in the work of Hale and Keyser (2002) and Baker (2003). Theories such as theirs predict a very specific type of relationship between states and their causative and non-causative COS counterparts, namely, causative and non-causative COS predicates are predicted to be derived from their state counterparts.

Hale and Keyser especially, give suggestive data supporting the idea that words denoting non-causative and causative COS predicates are morphologically derived from words denoting the corresponding state.

(5) O'odham (Hale and Keyser 1998:92, (31))
  a. (s-)moik ‘be soft’
  b. moik-a ‘become soft’
  c. moik-a-(ji)d ‘cause to become soft’

(6) Warlpiri (Hale and Keyser 1998:92, (31))
  a. wiri ‘be big’
  b. wiri-jarri- ‘become big’
  c. wiri-ma- ‘cause to become big’

In the O'odham data in (5) the word denoting the causative is derived from the word denoting the non-causative, which is in turn derived from the word denoting the state. In the Warlpiri data in (6), on the other hand, the words denoting the causative and the non-causative COS predicates are derived from the word denoting the state. In both cases the state is morphologically basic, an observation Hale and Keyser use to argue for the derivation of the changes of state from the state itself. Though it is clear that this sort of relationship holds in many instances, the results of Nedjalkov and Silnitsky (1973) and of Haspelmath (1993) suggest that it should not be taken for granted that the relationship will be identical for all types of states and all types of languages. There are two main issues to be considered. First, Dixon (1982) highlights a distinction between two kinds of states; it could be that the relationship between words denoting states and words denoting changes of state is different for these two different types of states. Secondly, Dixon (1982) also shows that languages differ in the lexical category assigned to states. Both of these issues, I argue in the following sections, have an impact on how words denoting states and words denoting changes of state are morphologically related to one another. Before discussing the data illustrating these points, however, I consider Dixon's observations.

2.1 Two kinds of states

In contrast to what is suggested by the theories of Hale and Keyser (2002) and Baker (2003), Dixon shows that "... certain states, naturally described by adjectives, contrast with states that are the result of some action" (1982:50). Dixon refers to the class of states naturally described by adjectives—in languages that have that lexical category—as *property concepts* (e.g. predicates denoting states related to speed, age, dimension, color, value, etc. and that presuppose no prior event). Contrasting with the class of property concepts is the class of states "that are the result of some action," *result states*. These two classes of states differ from one another in fundamental ways. The defining distinction between them is in their entailments—while result states entail that there was an event giving rise to the resulting state, this is not the case for property concept states. This contrast is illustrated by the data in (7) and (8).

(7) a. #The glass is broken, but it never broke.
b. #Kim prefers his barbecued chicken uncooked.
c. #Sandy is dressed, but neither she nor anyone else dressed her.

(8) a. The dirt is red, but nobody reddened it.
b. Mount Chimborazo is tall and has always been so.
c. The rainy season is and has always been a bad time to plan a picnic.

The data in (7) show that there must be a prior event leading up to the states of *broken, barbecued* and *dressed*. When the entailment that there was a prior event leading up to the result state is contradicted, the sentence is quite odd (contradictory). For example, (7a) shows that if something is *broken*, it must be the case that that something underwent a breaking event. To deny that there was a prior breaking event leads to contradiction. Likewise for *barbecued*—meat cannot be inherently barbecued. As shown by the data in (7b) it must undergo some sort of cooking process (i.e., barbecuing) in order to reach the result state *barbecued*. The same holds for being *dressed*—one cannot be dressed without putting on clothes, as shown by (7c). These facts contrast with the facts for property concept states, as illustrated by the data in (8). In naive physics, at least, there is no sense in which red dirt becomes red (8a), a mountain must become tall (8b), or a time of year has to become bad (8c). Because these states do not entail a prior event, sentences that deny that there was such an event leading up to the state, like those in (8), are not at all contradictory.

The contrast in entailment behavior between property concept states and result states is also illustrated quite clearly in English by adjectives, which denote property concepts, and their corresponding deverbal adjectives.

(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.

The data in (9)-(11) illustrate a minimal contrast between property concept states and result states. While the picture in (9-a) is inherently *bright*, the picture in (9-b) had to undergo some sort of brightening process in order to reach the result state *brightened*. Things are similar for the apple in (10)—whereas in (10a), the apple is just inherently red, the apple in (10b) had to become (more) red via some sort of reddening process. The data in (11) illustrate a similar contrast. While the sleeves of Sandy's shirt are just plain long in (11a), they had to become long via some sort of lengthening process in (11b).

In the following sections, I show that this semantic difference between two types of states is reflected morphologically as well—while result states are often derived from a verb denoting the event leading to the result state (cf. *bright* versus *brightened*), words denoting property concepts in all languages I have examined, with one possible exception I discuss in §5, are morphologically basic, whether lexicalized as nouns, verbs, or as adjectives.

2.2 Lexical category encoding of states varies crosslinguistically

An additional relevant question in this domain of study is what effect a language's lexical category inventory has on the relationship between words denoting states and words denoting their associated changes of state. It is well-known that not all languages have adjectives. Property concepts show up as nouns in some of these languages, and as verbs in others (Dixon 1982). Given that derivational morphology is often sensitive to lexical categoryhood, it seems quite possible that crosslinguistic variation in lexical category inventory might contribute to different types of relationships between words denoting states and their related changes of state. This is a point that has not thus far been seriously considered in the literature (though see Hale and Keyser (1998) for suggestions that variation in lexical category encoding may be a source of crosslinguistic variation). Below, I show that indeed, variation in the lexical category of states across languages correlates with different types of relationships between words denoting states and words denoting changes of state.

3 Some suggestive data

Having laid out these questions regarding the relationship between states and changes of state, I turn to some preliminary data suggesting answers and further areas for research. I begin by addressing the question in §2.1 and then move on to the question in §2.2. I follow the empirical discussion here with theoretical analysis in §4.

3.1 Are all states conceptually and morphologically basic?

The lexical semantic considerations discussed above already show, at least on the basis of semantic intuitions from English, that not all states are conceptually basic—while some are (the so-called "property concepts") others are not (so-called "result states"). Data from a variety of languages, such as English, Quechua, Eastern Armenian, and Tongan suggest that this conceptual difference correlates with a morphological difference.

3.1.1 English

As already suggested by the data discussed above, in English words denoting property concepts are morphologically basic in their stative denotation, with words denoting the related changes of state being derived. Words denoting result states, in contrast, are often derived from the word denoting the related change of state. The data in (12) and (13) illustrate this point.

Words whose denotation includes a property concept are morphologically basic in their stative denotation, as shown in (12) for *loose*, while the words denoting the changes of state are derived from the word denoting the property concept state with the *–en* suffix.

(12) a. The knot is loose.

b. The knot loos*en*ed.
c. Kim loos*en*ed the knot.

The same sort of relationship between states and changes of state holds for other adjectives in English, such as *bright, broad, cheap, coarse, damp, dark, deep, fat, flat, fresh* and others (Levin 1993). In other instances, the word denoting the change of state and the associated state are morphologically identical (e.g. *clear*), but I assume that the COS predicates are again derived, as represented by the category change. I attribute the absence of the affix to a failure to meet the phonological conditions governing its appearance, an observation dating at least to Jespersen (1939).[2]

This contrasts with the situation for words whose denotation includes a result state—for these types of words in English, the word denoting the state tends to be the one that forms English past participles, derived with the *–en* suffix (and its allomorphs) from the word denoting the change of state, as shown in (13).

(13) a. The glass is brok*en*.
b. The glass broke.
c. Alex broke the glass.

The same sort of relationship holds for other verbs denoting an action giving rise to a result state, such as *bend, break, crease, crinkle, crumple, fold, rumple, wrinkle, break, chip, crash, crush, fracture, rip, shatter, smash, snap, splinter, split, tear,* and others (Levin 1993).

Additionally, as Dixon (1982:50ff.) observes, a contrast can be observed in English between states with "action oppositions." The observation is that there is a subclass of property concept states for which the antonym is a result state. For example, in order for something to no longer be *raw*, it must be *cooked*, i.e., undergo some cooking event. Some other examples of property concept/result state antonyms are given in (14).

(14) Some basic state/result state opposites

raw	cooked
whole	broken, split, torn, crushed, snapped, smashed etc.
same/similar	changed
clear	clogged (e.g. pipes)
brilliant	faded
live	detonated (e.g. bomb)
nude, naked	dressed
steady	increasing (e.g. prices)
solid	melted

The data in (14) show that in each case when there is a property concept/result state antonym pair, while the word denoting the property concept is morphologically basic, the word denoting the result state (negation of the property concept state) is derived. Similarly, as was already seen in (9)-(11), there is a morphological contrast correlating with a lexical semantic contrast between property concepts and deverbal adjectival forms. For example, it was seen that while *bright* in (9-a) does not entail a prior event leading to the state, *brightened* in (9-b) does. The differences in entailments are reflected in the morphological shapes of the words—the word denoting the property concept *bright* is morphologically basic while the word denoting the result state *brightened* is deverbal (i.e.,

[2]See also Dixon (1982:22) for discussion of the conditions. According to him, *–en* can be attached to adjectives ending in *p, t, k, f, s, ʃ, θ,* and *d*.

derived from a deadjectival verb).

3.1.2 Cuzco Quechua

This asymmetry between property concepts and result states is observed in other languages as well. In Quechua for instance, words whose denotation includes a property concept have a morphologically underived form that denotes a state. This is illustrated by the data in (15) from the Cuzco dialect.

(15) a. wasi-qa *hatun*-mi (ka-sha-n)
house-TOP big-EVIDENTIAL be-PROG-3P
'The house is big' (Martina Faller, p.c.)

b. *hatun-ya*-y
big-TRANSFORMATIVE-INF
'become big' (agrandarse) (Cusihuaman 1976:195)

c. wasi-ta *hatun-ya-chi*-rqa-n
house-ACC big-TRANSFORMATIVE-CAUS-PAST-3P
'(s)he made the house big.' (Martina Faller, p.c.)

The data in (15) show that the word for 'big' in Quechua is morphologically basic in its stative denotation. The word denoting the associated non-causative change of state is then derived from the word denoting the state, as shown in (15b). The word denoting the causative change of state for its part, is derived from the word denoting the non-causative change of state via additional affixation, as is illustrated by the data in (15c). Other words denoting property concepts seem to pattern similarly. According to Weber, describing the related Huallaga dialect, *–yā* is an inchoative marker and "... seems to be completely productive ..." occurring with property concept words with meanings such as 'big', 'crazy', 'white', 'rich', 'red', 'sickness/sick person', 'curly', 'hard', 'deaf', etc. (Weber 1989:30-31). Words denoting causative changes of state can then be derived from the *–yā* marked non-causative changes of state with the *–chi* causative suffix (Weber (1989:166), Cusihuaman (1976:194), Martina Faller, p.c.; compare (15b) to (15c)).

This direction of derivation from state to non-causative change of state to causative change of state contrasts with the direction of derivation for states that entail an event giving rise to a result state. This is illustrated by the data in (16).

(16) a. Tela *qhasu-sqa* ka-sha-n.
cloth tear-PAST.PART be-PROG-3P
'The cloth is torn.' (Martina Faller, p.c.)

b. tela *qhasu-ku*-n.
cloth tear-REFL.-3P
'The shirt tore/got torn.' (Martina Faller, p.c.)

c. tela-ta *qhasu*-sha-n.
cloth-ACC tear-PROG-3P
'She/he tore the shirt./She tears/is tearing the cloth.' (Martina Faller, p.c.)

In these cases, the word denoting the state is a participle derived from a verb (Weber 1989:282-283; Cusihuaman 1976:225), as illustrated by the data in (16a). The word denoting the non-causative change of state, for its part, is derived from the word denoting the causative change of state with the reflexive marker *–ku*, as seen in (16b)-(16c).

3.1.3 Eastern Armenian

Megerdoomian (2002:96) observes the same sort of contrast in Eastern Armenian that I have documented in other languages. In this language, there is a class of change of state verbs derived from morphologically basic adjectives. This class of change of state verbs contrasts with another class for which there exists no corresponding morphologically basic adjective. The first class is what she calls the Category 1 class, which consists of words with canonical property concept meanings. Words with these meanings are morphologically basic in their stative denotation. Words with the corresponding COS meaning are then derived from the word denoting the property concept state; while the morpheme *–anal* marks the non-causative COS, *–ats–* marks the causative COS. This is illustrated for various property concept words in (17).

(17) Category 1 (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)

Contrasting with the situation for words whose denotation includes a property concept meaning are words whose meaning includes a result state. For words in this class, there is no basic adjectival form.[3] The data in (18) illustrate this point and also show that while the causative COS form is morphologically basic, the non-causative COS form is derived from the latter with the *–v–* morpheme, a marker of the passive according to Megerdoomian (2002:91).

(18) Category 2 (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)

In Eastern Armenian, then, just as has been seen for English and Quechua, there is a contrast in the relationship between words denoting states and words denoting their change of state counterparts. While the morphologically basic form is stative for property concepts, it is the change of state for words whose denotation includes a result state.

3.1.4 Tongan

Tongan is yet another language that distinguishes two classes of states and changes of state. Again, words whose denotation includes a property concept have a morphologically underived form that denotes a state. How the states are related to changes of state is somewhat more complicated in

[3] Megerdoomian does not discuss how result state meanings are expressed in Eastern Armenian. The point of her discussion was simply that there is no morphologically basic form for states associated with an externally caused change of state. Further data collection needs to be undertaken to determine how these meanings are expressed. The implication of her discussion is that if they are expressible at all, it is via some sort of more complex form, as observed for the other languages discussed in this paper.

Tongan, however. Property concepts are lexicalized as verbs in this language, and the same word can have either a state meaning or a non-causative COS meaning, depending upon the aspectual context it appears in.[4] I discuss these and similar data below. The important point for now is simply that the word denoting the property concept is morphologically basic, as shown in (19a). Note too that the word denoting the causative is derived from the word denoting the state/non-causative change of state via prefixation with *faka–*, as in (19c).

(19) Tongan (property concepts)

a. Ko e hala 'oku lahi.
PRSTNL the road PRES wide
'The road is wide.'

b. Hili pe 'uluaki fo'i'akau´, kuo lahi ia.
after only first medicine, INCH big him
After only one pill, he became big.

c. Na'e faka-lahi e he puleanga 'a e hala.
PAST faka-wide ERG the government ABS the road
'The government widened the road.'

As in other languages discussed, the direction of derivation for words whose denotation includes a result state is the reverse, as shown by the data in (20). For such words, the word denoting the causative change of state is morphologically basic as in (20c), while the word denoting the state and the non-causative change of state is derived from the word denoting the causative change of state via the prefix *ma–*, as in (20a,b).

(20) Tongan

a. Ko e hele 'oku *ma*+pelu.
PRSTNL the knife PRES bent.
'The knife is bent.' (S.L., pg. 81)

b. Ko e hele kuo *ma*+pelu.
PRSTNL the knife became/got bent
'The knife became/got bent.' (S.L., 8/20/03)

c. Na'e pelu 'e Mele 'a e hele.
PAST bend ERG Mele ABS the knife
'Mele bent the knife.' (S.L., pg. 81)

There are two important points to take away from the Tongan data. First, as observed for the other languages under discussion, there is an asymmetry in direction of derivation—for words whose denotation includes a property concept, states are basic. For words whose denotation includes a result state, however, the causative change of state is basic and result states are derived. Secondly, in Tongan a single word takes on both a state and a non-causative COS meaning. I argue below that this is possible only because Tongan has states lexicalized as verbs.

3.2 Which states are derived and which are basic?

In English, Quechua, Eastern Armenian, and Tongan, then, while the direction of derivation for words whose denotation includes a property concept meaning is from state to change of state. This is not the case for words whose denotation includes a result state. For these types of states, in many cases the word denoting them is derived from the word denoting the change of state. These data,

[4]See Koontz-Garboden (2004b) for further discussion and analysis of the Tongan facts.

taken alongside Dixon's study of languages without adjectives, suggest that property concepts are denoted by morphologically basic forms. They may be lexicalized as either stative verbs, nouns, or adjectives, depending on the language, but are morphologically basic whatever their lexical category encoding. This generalization is stated in (21).[5]

(21) **Generalization 1**: If X is a property concept meaning, then the lexeme Y denoting X is morphologically basic.

Given (21), if there is any overt derivational relationship between words denoting states, non-causative and causative changes of state, then, the words denoting the changes of state will be derived from the word denoting the state, as illustrated in (12) for English, (15) for Quechua, (17) for Eastern Armenian, and (19) for Tongan. The generalization also holds in other languages I have looked at, such as Central Alaskan Yup'ik (Jacobson 1984, 1995), Cora (Vázquez Soto 2001), Spanish, and other Polynesian languages like Maori (Bauer 1993).[6]

[5]An anonymous reviewer notes that words denoting property concepts could be morphologically complex for reasons independent of lexical semantics. For example, there may be adjective specific inflectional morphology, as in e.g. Latin. Things are similar in Mohawk, as another reviewer points out, where, according to the reviewer "...the predicate meaning 'white' is a verb made up of two morphemes, the bound root 'rak' and the "stative" affix -v. Many other state-denoting words are similar." It is for this reason that Generalization 1 in (21) is formulated in terms of the notion of a lexeme. In cases like these, though the word denoting the property concept may be morphologically complex, the complexity is due to the addition of morphology that does not effect any changes at the level of the lexical semantics; the lexeme denoting the property concept states is morphologically basic. As the second reviewer points out, an independent definition of what a lexeme is, is needed. I agree, though providing such a characterization is beyond the scope of this paper (though see Stump (1998) for discussion).

[6]The lexicalization of result states and the COS predicates related to them requires further research, as some languages such as Lakhota (Boas and Deloria 1939; Foley and Van Valin 1984) and Tagalog (Foley and Van Valin 1984) seem to lexicalize result states as morphologically basic forms, with words denoting the non-causative and causative changes of state built on top of them. For this reason, Generalization 1 is stated as a unidirectional conditional, rather than as a bidirectional conditional; further research is required to determine how strongly the converse of Generalization 1 holds crosslinguistically (that if X is a result state meaning, then the lexeme Y denoting X is morphologically derived).

What is noteworthy, though, is that in all languages I have examined, the paradigms involving result states are morphosyntactically distinct from those involving property concepts. For example, only roots with property concept meanings can be used without additional affixes in Lakhota, while roots with result state meanings must combine with the affix *–hã* to give rise to a stative meaning. This contrast is illustrated by the data in (i) and (ii).

(i) Property concepts (Foley and Van Valin 1984:41)
  a. spaya 'be wet, get wet'
  b. čʰãze 'be angry, get angry'
  c. yazã 'feel pain, be sick'

(ii) Result States (Foley and Van Valin 1984:42)
  a. –blaza 'be ripped open'
     blaza–hã 'it is rent, torn open'
  b. –blečha 'be shattered (said of brittle material)'
     blečha–hã 'it is shattered'
  c. –wega 'be fractured (said of a long round object)'
     wega–hã 'it (e.g. a pole) is broken'
  d. –khĩča 'be scraped'
     khĩča–hã 'the outside is scraped off'

Data like these and those discussed above support the idea that property concepts and result states are two fundamentally different types of states, often down to the level of morphological encoding.

3.3 What is the impact of crosslinguistic variation in lexical category inventory?

Diversity in lexical category encoding of property concepts turns out to have an interesting impact on the relationship of words denoting property concept states to words denoting their associated non-causative changes of state. I have observed two types of languages so far as this relationship is concerned. The more familiar kind of language is exemplified by O'odham, Spanish, and Warlpiri in (22)-(24). These are languages in which the word denoting the non-causative change of state is derived from the word denoting the property concept through some sort of morpholexical process overtly marked by morphology. In O'odham, as shown in (22), where property concepts are said to be lexicalized as adjectives, the addition of a suffix derives a non-causative change of state from the property concept state, and the causative change of state is, in turn, derived from the non-causative change of state. In Spanish, as shown in (23), where property concepts are also lexicalized as adjectives, this is done by some combination of prefixes and suffixes. Warlpiri, as shown in (24), where property concepts are lexicalized as nouns, derives words denoting non-causative changes of state from the word denoting the state with a suffix. Words denoting causative changes of state are also derived from the state-denoting word, but with a different suffix.

(22) O'odham (Hale and Keyser 1998:92)

	Adjective	Non-causative COS	Causative COS	
a.	(s-)wegi	weg-i	weg-i-(ji)d	'red'
b.	(s-)moik	moik-a	moik-a-(ji)d	'soft'
c.	(s-)'oam	'oam-a	'oam-a-(ji)d	'yellow'

(23) Spanish

	Adjective	Non-causative COS	Causative COS	
a.	triste	en-triste-cer se	en-triste-cer	'sad'
b.	duro	en-dure-cer se	en-dure-cer	'hard'

(24) Warlpiri (Hale and Keyser 1998:93)

	Noun	Non-causative COS	Causative COS	
a.	wiri	wiri-jarri-	wiri-ma-	'big'
b.	maju	maju-jarri-	maju-ma-	'bad'

This situation contrasts with that observed in certain other languages, such as Tongan. In this language, as discussed above, property concepts are lexicalized as verbs and the same word is polysemous between a state and a non-causative COS denotation, as shown by the data in (25). Words denoting causative changes of state are derived from the state denoting words with a distinct morpheme, *faka–*, as shown in (25c).

(25) Tongan

a. Ko e hala 'oku *lahi*.
PRSTNL the road PRES wide
'The road is wide.'

b. Hili pe 'uluaki fo'i'akau´, kuo *lahi* ia.
after only first medicine, PERF big him
After only one pill, he became big.

c. Na'e *faka-lahi* e he puleanga 'a e hala.
PAST CAUSE-wide ERG the government ABS the road
'The government widened the road.'

Though there is no derivational morpheme signaling the difference between the state and the non-causative COS denotation in (25a,b) above, there is a difference in aspect marking—while the use of the continuous marker *'oku* correlates with an ongoing state denotation, use of the perfect marker *kuo* correlates with a non-causative COS denotation.[7] This kind of polysemy is not unusual—it has been observed elsewhere in the literature on the typology of aspect marking that perfective marking of a stative verb often yields a change of state interpretation. Bybee *et al.* (1994:75-76) and Chung and Timberlake (1985) in particular, have made observations on a quite general scale. Chung and Timberlake's comments are particularly clear.

> Applied to states, closure implies a complete change of state, specifically inception rather than cessation. Thus, languages that have a morphological category (traditionally called perfective) to specify closure for processes often use the same category to signal inception of a state. (Chung and Timberlake 1985:217)

Similar comments are found in Tatevosov (2002:340ff.), Talmy (1985:92), Smith (1997:70), and Wetzer (1996:189). Additionally, various authors have observed similar facts in numerous languages. Comrie's observations on Mandarin Chinese are representative.

> "In Mandarin Chinese ... a number of predicates, both adjectives and verbs, that normally refer to a state can have ingressive meaning in the Perfective, e.g. *tā gāo* 'he is tall', *tā gāo-le* (Pfv.) 'he became tall, has become tall'." (Comrie 1976:19-20)[8]

Similar observations have been made by Lefebvre and Brousseau (2002:88) for Fongbe, Prasithrathsint (2000:262) for Thai, Chung and Timberlake (1985:238) for Mokilese, and Enfield (2003:262) for Lao. Representative data from some of these languages are given below.

(26) Mokilese (Chung and Timberlake 1985:238)

a. Pahrangkije pe pwespwespwes
iron still warm(PROG)
'This piece of iron is still warm.'

b. Ih lioas-ka
he angry-PERF
'He got angry.'

(27) Thai

a. khǎw kamlang ruay ləəy chɔ̂ɔp sɨ́ɨ khɔ̌ɔng phɛɛng
(s)he now rich so like buy thing expensive
'(S)he is rich now. (S)he likes to buy expensive things.' (Prasithrathsint 2000:263, (22b))

b. khǎw ruay lɛ́ɛw chiiwɪt khǎw mây mɨ̌an tɛ́ɛ-kɔ́ɔn
(s)he rich already life (s)he not like past
'(S)he has become rich. His/her life is not like in the past.' (Prasithrathsint 2000:262, (21b))

(28) Lao

[7] Here I am actually simplifying significantly due to space considerations. A COS meaning can arise with *'oku* marked states in the presence of an adverb requiring such a meaning, though the default interpretation of *'oku* constructions is a stative one. This suggests that what determines whether a property concept word has a state or a COS reading goes beyond grammatical aspect marking. Which reading arises depends on the sentential context, which can lead to the coercion of one meaning or another (Zucchi 1998). These issues are discussed extensively in Koontz-Garboden (2004b).

[8] Comrie cites Jaxontov (1957:116) as making a similar observation.

a. ?khòòj5 kamlang2 suung3
   1SG PROG tall
   'I am being/getting tall.' (Enfield 2003:7, (35))
b. khon2 suung3
   person tall
   'the tall person' (Enfield 2003:10, (56))
c. ?khòòj5 daj0 suung3
   1SG ACHV tall
   'I was/got to be tall.' (Enfield 2003:6, (30))

Interestingly, all of these languages are ones in which property concepts are described as belonging to the lexical category verb. Further, it is only in such languages that I have found reports of this kind of polysemy; in languages where property concepts are lexicalized as nouns or adjectives, as in Spanish, Warlpiri, and O'odham, there is no such polysemy. Instead, the relationship between words denoting states and words denoting non-causative changes of state is signaled derivationally. These observations suggest the generalization in (29).

(29) **Generalization 2**: When a single lexical item γ is polysemous between a state and a change of state denotation, γ belongs to the lexical category verb.

By *polysemy* in (29), I have in mind a particular kind of polysemy, called *logical polysemy* by Pustejovsky (1995:chapter 3), who makes distinctions between three different types of ambiguity. First is *contrastive ambiguity*, characterized by an "arbitrary association of multiple senses with a single word," as with the different senses of the lexical item *bank* (Pustejovsky 1995:29). A more systematic type of ambiguity goes by the name of *complementary polysemy*, in which the distinct senses of a word share some sort of systematic relationship to one another, often having some of of overlap in meaning with one another. The final type of ambiguity is known as *logical polysemy*, which Pustejovsky (1995:28) defines as "...a complementary [polysemy] where there is no change in lexical category, and the multiple senses of the word have overlapping, dependent or shared meanings." The kind of ambiguity observed for property concept words in Tongan and languages like it is this final kind, logical polysemy. States and changes of state overlap with one another in meaning, since a change into a state entails the state. This point is made clear by the event structure representations introduced below in (31). This overlap in meaning makes the Tongan situation at least one of complementary polysemy. Further, though, in Tongan and the other languages discussed above there is no change in lexical category associated with the different senses. This clearly contrasts with the situation in languages English, where those property concept words that do not allow *–en* suffixation for phonological reasons (Jespersen 1939:53ff.) are polysemous, but only in a complementary fashion rather than a logical fashion, since there is a change in lexical category associated with the different senses. This is illustrated by the data in (30).

(30) a. The sky is clear.
     b. The sky will clear this afternoon before the game.

Despite the fact that a word of the phonological shape *clear* appears in both (30a) and (30b), only verbs appear in the context following the auxiliary *will* (**will red, *will blue, *will large*, cf. *will redden, will become blue, will enlarge*). Further, only the COS sense of *clear* is available in (30b); it cannot have the meaning that when a particular time rolls around, the sky will (already) be in a state of clarity. Instead, (30b) must have the meaning that when the afternoon comes, the sky will undergo a change of state, from being not clear, to being clear. The upshot of this is that for cases like English *clear*, the state reading is associated only with the use of clear in adjectival contexts, while the COS reading is available only in verbal contexts. This is fundamentally different from the situation in languages like Tongan, where both senses belong to a single word of a single lexical category.[9]

The typological generalization, then, is that there seem to be two types of languages as far as the derivation of non-causative changes of state from property concept states is concerned, and that the type of derivation a language uses is in part correlated with how it lexicalizes property concepts. A single word is polysemous between non-causative changes of state and states only where the latter are lexicalized as verbs. What does not exist are languages of two types: (a) languages where a single lexical item belonging to the lexical category noun has both a state and a change of state sense, and (b) languages where a single lexical item belonging to the lexical category adjective has both a state and a change of state sense. Below, I develop an explanation for this generalization rooted in the nature of the mapping between lexical semantics and syntactic categories, hypothesizing that verbs are the only lexical category that can denote changes of state.

4 Deriving the generalizations

In the remainder of the paper I go on to develop an analysis of the observed typological facts rooted in the nature of lexical semantic representation and how word meaning and lexical categories are related to one another. I begin by laying out my theoretical assumptions and then make use of these to derive the typological generalizations discussed above.

4.1 Theoretical assumptions

4.1.1 Event structure representations

Much work has argued in favor of two distinct components of lexical meaning—an idiosyncratic component and a more structural component meant to account for facts such as diathesis alternations and Vendlerian verb classes (Grimshaw 1993; Hale and Keyser 2002; Jackendoff 1983; Jackendoff 1990; Mohanan 1994; Pinker 1989; Rappaport Hovav and Levin 1998; Wierzbicka 1988). In what follows, I assume that words have meanings built up from a universal inventory of semantic operators operating on a semantic constant, the locus of idiosyncratic lexical meaning, that gives each word its unique identity (Grimshaw 1993; Rappaport Hovav and Levin 1998). The combination of these operators and these constants gives rise to various event structures, which are meant to account for similarities in meaning and behavior of different lexical items. Properties of these event structures cutting across different lexical items define lexical classes that account for the behavior of verbs with respect to their arguments (diathesis alternations; Levin 1993) and for the aspectual meanings of interest in this paper—state versus change of state.

Event structures that play a role in the remainder of the paper are those in (31), taken from Rappaport Hovav and Levin (1998:108), and might correspond loosely to the Vendlerian classes.[10] These event structures encode the basic units of meaning of interest in the context of the discussion below, in particular states and changes of state. Changes of state can vary significantly in their degree of lexical semantic complexity, (31c) and (31d) both being changes of state.

[9] See Koontz-Garboden (2004b) for further discussion of the Tongan facts.

[10] Rappaport Hovav and Levin (2002) show that change of state verbs vary in telicity, and argue based on this that "...lexical aspectual class alone does not determine argument expression" (Rappaport Hovav and Levin 2002:4). These findings are evidence that event structure needs information beyond that which is relevant for Vendlerian classification.

(31) Some event structure templates (Rappaport Hovav and Levin 1998:108)

a.	[x $\text{ACT}_{<MANNER>}$]	(activity)
b.	[x <STATE>]	((non-result) state)
c.	[BECOME [x <STATE>]]	(non-causative COS)
d.	[[x $\text{ACT}_{<MANNER>}$] CAUSE [BECOME [x <STATE>]]]	(causative COS)

There are a couple of basic features of the simple ontology in (31) that should be highlighted. First, the basic building blocks are activities (31a) and states (31b), which are the primitive notions corresponding to the semantic content of all event structures. Second, more complex event structures are generated by combining operators like CAUSE and BECOME with the state and activity primitives. Indeed, this is how the event structures corresponding to non-causative (31c) and causative (31d) changes of state are arrived at. The BECOME operator is responsible for adding COS semantics, while the CAUSE operator adds causative semantics, part of which includes the introduction of a causing subevent.

4.1.2 The principle of monotonic composition

Following Olsen (1996) and Rappaport Hovav and Levin (1998:103), I assume that event structure representations are constructed monotonically. The idea is that while meaning, in the form of event structure operators, can be added to an event structure as a consequence of word formation processes for example, meaning may not be removed. I call this the Principle of Monotonic Composition, as stated in (32).

(32) The Principle of Monotonic Composition (PMC)
Word meaning is constructed monotonically on the basis of event structure constants and operators.[11]

The PMC makes predictions about how the meanings of words can expand and contract (see Rappaport Hovav and Levin (1998:103ff.) for some discussion). In the domain of investigation here, the relationship between property concept states and the non-causative COS counterparts, the PMC makes an especially interesting prediction—non-causative changes of state can be derived from states, but not vice versa, as the latter derivation would be a non-monotonic one. This can be seen clearly by considering the event structure representations laid out in (31) for states and non-causative changes of state. These are repeated in (33) and (34).

(33) Event structure template for property concept state
[x <STATE>]

(34) Event structure template for non-causative COS
[BECOME [x <STATE>]]

While a BECOME operator could be added to a stative event structure template in order to derive a change of state, the reverse could not happen. This would involve deletion of a BECOME operator, inconsistent with the PMC. The idea, then, is that any derivation can only be meaning adding.

A word of clarification is in order here regarding the domain of the PMC and what is meant by the word *derivation* in this context, a meaning different from how the word is used elsewhere

[11] One reviewer asks whether the PMC forms part of an innate UG. My view is that the PMC is probably consistent with many different types of theories, and I would not think that one would have to accept the existence of UG in order to accept the PMC. It might be that word meaning is constructed monotonically for functional reasons that have nothing to do with UG. I think this is an open question, one worthy of further research.

in the paper. Up until this point, I have been concerned with the derivation of words in the context of morphological derivations; i.e., I have been concerned with the morphological shapes of words. The PMC is not about this kind of derivation, but instead about the derivation of *meanings of words*. This does, however, have an impact on what types of morphological derivations are observed, in particular in relation to the derivation of words denoting states from words denoting the corresponding changes of state, as I discuss below.

4.2 Deriving Generalization 1

Having introduced the event structure representation and the PMC, I now have enough theoretical machinery in order to derive Generalization 1, laid out in (21) above, and repeated in (35).

(35) **Generalization 1**: If X is a property concept meaning, then the lexeme Y denoting X is morphologically basic.

Generalization 1 follows straightforwardly from the PMC, stated in (32). Put simply, there is a way to derive change of state meanings monotonically from basic state meanings, while there is no way to monotonically derive basic state meanings from change of state meanings. To see this, consider the event structure representations of state and change of state meanings in (36) and (37).

(36) Event structure representation of a basic state
[x <STATE>]

(37) Change of state event structure representations
a. [BECOME [x <STATE>]] (non-causative COS)
b. [[x $\text{ACT}_{<MANNER>}$] CAUSE [BECOME [x <STATE>]]] (causative COS)

While the change of state event structures in (37) can be derived from the basic state event structure in (36) via the addition of operators and constants, this would not be true for a derivation from one of the event structures in (37) to the one in (36). Such a derivation would crucially entail the deletion of bits of meaning from the event structure representation and would therefore be ruled out by the PMC. States *can* be derived from change of state event structures, but in order for this to take place in a manner consistent with the PMC, information will have to be added, leaving the change of state information as part of the decomposition. Such a decomposition would be precisely that of a result state. The prediction, then, is that while a result state could be derived from a change of state verb (via the addition of another state operator to a change of state decomposition), a property concept state could not be derived from a change of state, since this would involve the deletion of lexical semantic operators.[12]

Given the PMC, then, it cannot be the case that a property concept state could be derived from a change of state. How does this relate to the morphological shape of the words denoting these meanings, though? I take as a point of departure the idea that there are certain types of morphological operations that concomitantly effect changes on both the phonological shape and the event structure representation of words (see e.g. Levin and Rappaport Hovav 1998; Stump 1998). The

[12] I am sympathetic with an anonymous reviewer who says it would be helpful to see the lexical semantic representation of a result state. I hesitate to give such a representation because it is not clear to me whether these tend crosslinguistically to be derived from non-causative or from causative changes of state, or whether languages vary in this regard. Additionally, further research is needed to work out the right kind of formal interpretation of the lexical semantic operator responsible for giving rise to the result state interpretation. (By this, I have in mind the kind of careful formal research carried out by Dowty (1979) for other decompositional operators.) I leave this typological and formal research for the future, noting that these are areas to expand on the research presented in this paper.

PMC, further, specifies that changes made to an event structure representation can only be additive. Since the PMC holds that *any* operation on event structure representations must be additive, it of course must also be true for morphological operations that effect changes on event structure representations. Despite its being vacuously true, however, it does have interesting implications for morphological typology. In the domain under investigation here, since words denoting property concepts have a proper subset of the event structure constants and operators that their associated changes of state have, it is predicted that words denoting property concepts undergo a subset of the event-structure changing morphological operations that words denoting their associated changes of state undergo. In cases where the morphological operations lead to overt morphological differences between words denoting property concepts and the associated changes of state, as with affixation, there are observable differences between the two types of words in the direction of the prediction.[13]

So far, then, given the PMC it is clear why words denoting changes of state based on property concepts should be derived from words denoting the associated property concept state. Generalization 1, however, is stronger than this—the observation was that words denoting property concepts are morphologically basic, having undergone no meaning changing morphological operations. I believe this stronger generalization also follows from the PMC. This strong generalization follows from an idea that is at least implicit in the pioneering work of Dixon (1982)—property concept meanings are conceptually basic meanings. By this, I mean that property concept meanings are primitive bits of meaning and that the event structure representations of them are underivable from any other event structure representation. The whole enterprise of lexical decomposition rests on the idea that there are certain bits of meaning that serve as primitive lexical semantic constants.

[13]Two anonymous reviewers raise the issue of the relationship between inchoatives and causatives, an issue not directly discussed in this paper, but which the PMC makes predictions about. Both observe that the PMC seemingly leads to the prediction that causatives should only be derived from inchoatives. Despite this, many languages show for many predicates what is often called an 'anticausative' alternation, whereby the word denoting the non-causative COS is derived from the word denoting the causative COS. This type of alternation is illustrated for Spanish by the data in (i).

(i) a. Juan cocin-ó el arroz.
Juan cook-3SING.PAST the rice
'Juan cooked the rice.'
b. El arroz se cocin-ó.
the rice SE cook-3SING.PAST
'The rice cooked.'

If the event structure representations of non-causative and causative changes of state are as I have suggested in (37), then data like those in (i) would be a clear counterexample to the PMC. There is, however, a relatively well-established tradition cutting across formal (Levin and Rappaport Hovav 1995:chapter 3) and functional (Croft 1990:65ff.) studies arguing that in cases such as the one illustrated above, the non-causative COS is indeed derived from the causative COS, consistent with the PMC. The thrust of the evidence, following Croft's formulation, is that for pairs with an anticausative alternation, even though an agent is not overtly encoded for the non-causative alternant, it is still entailed that an agent gave rise to the event. Levin and Rappaport Hovav (1995:chapter 3) state things slightly differently from Croft, appealing to the notion of external causative, but the idea is the same—that although syntactically one of the arguments the causative COS has is missing in the non-causative COS alternant, some semblance of this argument is still semantically entailed. Levin and Rappaport Hovav (1995:chapter 3) formalize this idea by representing the event structure of the non-causative COS in pairs such as (i) above as having an existentially bound argument. In this way, the non-causative COS event structure is derived from the causative COS event structure monotonically.

What this means, then, is that the representation of the non-causative COS I have given in (37) is, for some types of predicates, an oversimplification. Since my focus is more on the state/change of state alternation, I gloss over this here. Still, I believe that the facts discussed in this note are not inconsistent with a broad interpretation of my theoretical proposals.

My claim is that property concept meanings are among these primitive constants.[14] This claim is in need of philosophical and linguistic justification, with the linguistic justification ideally coming from a domain outside of morphology (in order to offer non-circular linguistic evidence). Such evidence will most likely need to come from the domain of lexical semantics. This is a project I leave for future research. I note, though, that if this is correct, then the strong version of Generalization 1 clearly follows. If property concepts are primitive constants, then there can be no operation on event structure that derives them from something else, since event structure operations only add meaning. Given this, it therefore follows that there exist no event structure changing morphological operations deriving words denoting property concepts; words denoting property concepts would have to be morphologically basic.

4.3 Deriving Generalization 2

I now return to Generalization 2 stated in (29) and repeated in (38).

(38) **Generalization 2**: When a single lexical item γ is polysemous between a state and a change of state denotation, γ belongs to the lexical category verb.

The explanation for Generalization 2 lies in the mapping between lexical semantics and morphosyntax. Specifically, I believe that change of state semantics can only be realized by words belonging to the lexical category of verb. If true, then it should be clear why Generalization 2 would hold—this generalization is about the conditions under which one word has more than one denotation, specifically, state and change of state.

If states are lexicalized with a category other than verb, and if change of state semantics universally must be realized by verbs, then the single word denoting both of these meanings would belong to the wrong lexical category in order to denote a change of state. In such a case, then, there can be no polysemy; there must be separate (though possibly related) words denoting states and the related changes of state. This kind of explanation is reminiscent of research in the functionalist tradition on lexical categories, which tends to appeal to the idea that the essence of the lexical categories is rooted in lexical semantics. While many have pursued the idea, due to Givón, that the lexical categories follow from some notion of time stability (Givón 1984), others have pursued something more akin to the traditional idea that nouns prototypically name places/things and verbs prototypically name actions (Croft 1991; Croft 2001; Beck 2002). This general line of research rooting the nature of syntactic categories in lexical semantics has been met with some degree of skepticism, especially in the generative literature, in large part due to the fact that the characterization of the meaning attributed to the various lexical categories is never made very explicit, which makes the proposals somewhat difficult to rigorously

[14] Incidentally, this claim is implicit in the event structure representation I have given to property concept states in (36), for example. Claims that certain bits of meaning, e.g. stative meaning, are primitives are implicitly made throughout the lexical decomposition literature, though they are rarely made explicit or their consequences discussed. The literature tends to focus instead on what Rappaport Hovav and Levin (1998) call event structure templates. Much less well-studied are what Rappaport Hovav and Levin (1998) call the *constants* of event structure, namely the primitive units of meaning that event structure operators take as arguments. Bowerman (2004) is one of the only studies I am aware of that looks in any detail at the issue of the primitive constants of event structure, finding crosslinguistic differences, suggesting that languages may differ in interesting ways in the bits of meaning that are taken as primitive constants. Bowerman's preliminary results suggest that languages may in part select bits of meaning to take as primitive constants from a universal semantic space. In this way, primitive constants may be in part language specific, rather than completely universal. I do not believe that such a finding would have a significant impact on the results presented here, though once further research has been carried out, the results should certainly be considered in the context of my findings and theoretical claims.

evaluate. In very recent work, however, Lieber (2004) proposes an idea which opens up the possibility for capturing the best of both the more functional and more formal approaches to the study of lexical categories. Working in the context of a decompositional approach to word meaning similar in spirit to the one adopted above, Lieber (2004:37) makes a link between operators in particular positions of the event structure and syntactic category. The proposal, as stated by Lieber, is as in (39).

(39) The outermost function of the skeleton [=event structure] determines the syntactic category (Lieber 2004:37)

Lieber's proposal is different from prior semantically based definitions of the lexical categories in two fundamental ways. First, unlike other semantic-based approaches to lexical categories, Lieber's approach admits a unidirectional interpretation. If δ is the outermost function of an event structure, it could easily be that while all δs are mapped into verbs, there is nothing contradictory if not all verbs denote δ. This contrasts with e.g. Givón's approach, which is often criticized by generativists for reasons having to do with bidirectionality. Givón claims, for example, that nouns are the most time stable of the lexical categories, with adjectives being slightly less time stable, and verbs being the least time stable. Given this claim, then, it seems quite odd that languages should have stative verbs. Action nominalizations, such as *birth*, *conception*, etc. are often viewed as counterexamples in the other direction, since these are not at all time stable, but still belong to the nominal domain (see Baker (2003:293) for criticisms exactly along these lines).[15]

Given a decompositional approach to meaning and Lieber's proposal, these concerns can be overcome. Assuming Lieber's proposal in (39), the event structure assumptions laid out above, and the BECOME operator as a representation of change of state semantics (on which see Dowty (1979) for formalization), the idea that "change of state is realized only by verbs" can be made more precise, via the mapping rule in (40).

(40) [BECOME ϕ] $\rightarrow$ V

The idea captured by (40) is that if BECOME is the highest operator in a decomposition, then the word associated with that lexical decomposition must be assigned to the lexical category of verb.[16] As discussed above, the empirical observation in (29) follows from (40)—if a word is to be polysemous between a state meaning and a change of state meaning, then given (40) such a word must belong to the lexical category verb. Otherwise, the state word would belong to a lexical

[15] An anonymous reviewer makes the observation that in Lieber (2004) both adjectives and stative verbs are characterized by the feature [-dynamic]. The reviewer claims that this poses a problem for Generalization 2. In fact, it does not. First, though I adopt Lieber's idea that the outermost function in a lexical decomposition determines syntactic category, I do not necessarily adopt her features (indeed, I make use of BECOME, which Lieber does not use). Further, even if I did make use of Lieber's feature set, this observation would still not be a problem, since the claim is unidirectional, not bidirectional. So, having a single function (or feature) in a decomposition correspond to more than one syntactic category is perfectly consistent with my (and Lieber's) claims. Indeed, the mapping rule in (41) is precisely such a rule.

[16] I agree with two reviewers who remark that the mapping rule in (40) likely has a deeper explanation. At the moment, however, I remain agnostic as to what that might be, though there are certainly proposals in the lexical category literature (cited above) that would help to explain why (40) might hold. Outside of the lexical category literature another, a not unrelated possibility, is that (40) and rules like it, should be thought of as bootstrapping rules that aid the process of language acquisition. If (40) were part of an innate UG, then the child trying to acquire language would know to assign words with change of state meaning to a particular lexical category. I have no particular stake at the moment in how (40) is thought about, though I do believe that it is an important outstanding issue, and unraveling how it fits into the larger picture will entail the development of a comprehensive theory of grammar and language and language acquisition in general. These issues obviously go beyond the scope of this paper, but are areas for exciting future research.

category incompatible with change of state meaning, in violation of the mapping rule in (40).

The mapping rule in (40) is not the only such rule. Indeed, Lieber's proposal suggests a whole family of such mapping rules, one for each operator that can be the highest in a lexical decomposition. So, I assume that there are rules for the other operators commonly discussed in the lexical semantic literature, though more study is needed to determine exactly what the rules look like. In the case of states, the nature of the mapping rule is made clear by past research, especially that of Dixon (1982), who observes that states turn up as nouns, verbs, and adjectives across languages. The mapping rule for states, then, is the one in (41).[17]

(41)

$$\begin{tikzcd} & \mathrm{N} \\ {[\, x \ \langle \mathrm{STATE} \rangle]} \arrow[ur] \arrow[r] \arrow[dr] & \mathrm{A} \\ & \mathrm{V} \end{tikzcd}$$

The idea, then, is that there is a mapping rule for each operator. In the case of states, the mapping rule varies across languages—in some languages they are mapped to adjectives (e.g., English), while in others they are mapped to nouns (e.g., Quechua) or verbs (e.g., Tongan). The situation with the BECOME operator, however, is different. It is universal that if BECOME is the highest operator in an event structure, then the word with that meaning must be mapped to the lexical category verb. This is the idea formalized in (40).

As already discussed, the idea embodied by the mapping rule in (40) explains why Generalization 2 should hold. This rule, however, makes additional predictions that seem to be borne out by local facts from particular languages. For example, consider the contrast in (42).

(42) a. Kim quickly believed Sandy.
'Kim quickly came to believe Sandy.' (COS reading possible)
b. *Quickly cool rooms are always located in the basement.
(COS reading impossible)

Both *believe* and *cool* denote states, yet while the verb *believe* can also have a change of state meaning (42a), the adjective *cool* cannot (42b).[18] This follows from (40), if *believe* is a verb in (42a) and if *cool* in (42b) is not.[19] In this way, then, the theory makes predictions down to the level of individual lexical items—regardless of how the language otherwise behaves, if a stative meaning is lexicalized as either a noun or an adjective, then a change of state meaning for that lexical item is unavailable (as is the case for stative meanings lexicalized as adjectives in English). In contrast, that same language can have single lexical items that are polysemous between a state and a change of state sense, as long as those lexical items belong to the lexical category verb. This is observed

[17] This is a very coarse-grained rule that can probably be made more specific based on the semantics of the particular state being mapped to a syntactic category. For example, it is known from the work of Stassen (1997) that property concepts form an implicational hierarchy in terms of their likelihood to be lexicalized as verbs (at least on Stassen's definition of verbhood).

(i) Stassen's (1997:169) Adjective Hierarchy
Hum. Prop. < Phys. < Dimension/Color < Value/Age/Form < Material/Gender

The stative mapping rule ultimately should be sensitive to a more fine-grained analysis of categories of states, such as the implicational hierarchy discovered by Stassen. Further work should not only focus on making this more explicit, but also investigating the morphosyntactic and semantic consequences of crosslinguistic variation in the state to lexical category mapping rule.

[18] An analysis based on the notion of coercion (Zucchi 1998; de Swart 1998) is developed to account for these facts and for the Tongan pattern more generally in Koontz-Garboden (2004b).

[19] In addition to sounding odd to me and to other native speakers of English I have consulted, *Google* searches like "the quickly cool" and "the quickly red" also fail to turn up plausible examples.

not only in languages like Tongan, Mokilese, and others discussed above, but in English for certain lexical items like *believe*.[20]

The mapping rule in (40) is strong enough to explain Generalization 2 while at the same time making other falsifiable predictions, yet it is also nuanced enough that it doesn't run into the kinds of problems that other lexical semantic definitions of lexical categories run into. Consider one of the "counterexamples" to notional definitions of lexical categories highlighted by Baker above—action nouns like *destruction, conception, explosion,* etc. Nouns like these all intuitively seem to say something about a change of state. *The destruction of the city*, for example, names an event wherein a city is not destroyed at one interval and is destroyed at another, later interval. The fact that *a destruction* names an event (Zucchi 1993 and references there), though, is the crucial point—the noun *destruction* has a denotation different from that of the verb *destroy*, from which it is derived (Zucchi 1993, building on work by Zeno Vendler 1967, 1968, 1975). While a nominalization denotes an event, the verb a nominalization is derived from denotes a function from individuals to propositions. The way to handle this, on the view advocated above, then, is to say that there is an operator, EVENT, added to a decomposition when a verb undergoes nominalization. The nominalization of a change of state [BECOME ϕ], then, would look something like (43).

(43) [EVENT [BECOME ϕ]]

As a result of the nominalization operation, BECOME is no longer the highest operator in the decomposition. Though the decomposition retains its change of state semantics; the change of state semantics are embedded underneath a different operator that has its own different mapping rule. This analysis is spelled out more formally in Koontz-Garboden (2004a), who builds on the analysis of Zucchi (1993).[21]

Much more work obviously needs to be done to determine (a) what other predictions (40) makes, (b) if they are correct, and (c) what sorts of mappings to syntactic categories other event structure operators have. Assuming that (40) holds up to closer scrutiny, it gives an account of the observed impact of lexical category encoding on the derivational relationship between words denoting property concept states and words denoting their corresponding changes of state. More broadly, the general approach suggests a way of wedding notionally oriented approaches to lexical categorization with more formal approaches to linguistic theorizing.

5 A more complicated typology?

So far as I am aware, there are no obvious counterexamples to Generalization 2. However there do appear to be counterexamples to Generalization 1, at least on the surface. The Misumalpan languages of Nicaragua and Honduras are particularly interesting in this regard, as they appear to

[20] It should also be pointed out, as an anonymous reviewer reminds me, that the theory allows for the existence of languages where property concepts are lexicalized as verbs, yet there is no single polysemous word with both property concept state and change of state senses. According to the reviewer, Mohawk is such a language, where there is an inchoative affix deriving change of state verbs from verbs denoting property concept states. The same is true for Central Alaskan Yup'ik (Jacobson 1984, 1995).

[21] In the very brief sketch of the analysis above, I have couched the discussion in terms of events. It should be noted, though, that regardless of whether one adopts a Neo-Davidsonian semantics or not, there are semantic differences between verbs and their nominalizations that any formal theory must capture. These differences are made especially clear by Zucchi (1993). Koontz-Garboden (2004a) also gives some additional empirical arguments for a distinction. These empirical differences show that there must be a semantic difference between verbs and their associated nominalizations, regardless of how one chooses to formalize it. This distinction alone is sufficient to support my proposal that there is an additional operator in the decomposition of nominalizations when compared to the verbs they derive from. So, one could likely reject a Neo-Davidsonian semantic analysis and still accept my conclusions.

have words denoting property concepts and words denoting their associated changes of state that are not monomorphemic. This is illustrated in (44) for Ulwa, an endangered Misumalpan language spoken on Nicaragua's Atlantic coast.

(44) Ulwa (Hale and Keyser 2002:122-123)

state	non-causative COS	causative COS	gloss
sang-ka	sang-da	sang-pa	green/blue
yûh-ka	yûh-da	yûh-pa	long, tall
baras-ka	baras-da	baras-pa	black, dark

As the data in (44) show, Ulwa appears to have words denoting property concept states and their corresponding changes of state that are all derived from a more abstract root. Particularly interesting from the perspective of Generalization 1 is the fact that this is true even for words denoting property concept states, which appear to be composed of a root plus suffix. The obvious question that needs to be explored is what the nature of the *–ka* suffix in the first column of (44) is. If it is an inflectional affix, then it is not part of the lexeme, and therefore does not bear on Generalization 1. If it cannot be shown to be inflectional, however, then its status relative to Generalization 1 becomes more of an issue.

The available data do not at the moment offer a clear answer as to the status of the *–ka* suffix. It turns out that possessive nouns in Misumalpan languages are inflected for person and number. The paradigm is given in (45).

(45) Nominal possessive paradigm (Green 1999:78)

CNS1.SING	-ki	CNS1.PL.EXCL	-ki-na
CNS2.SING	-ma	CNS2.PL	-ma-na
CNS3.SING	**-ka**	CNS3.PL	-ka-na
		CNS1.PL.INCL	-ni

As illustrated in (45), the marker of the 3rd person possessive has the same phonological shape as the suffix showing up on words denoting property concept states (i.e., it is *–ka*). Some examples of *–ka* in its function as a possessive marker of nouns are given in (46).

(46) a. dai-ka
brother.in.law-CNS3
'his/her brother-in-law' (Green 1999:32)

b. pan-ka
tree-CNS3
'his/her tree' (Green 1999:38)

c. aidingh-ka
watchamacallit-CNS3
'his/her watchamacallit' (Green 1999:39)

Facts like these suggest the possibility that words denoting property concepts are nouns in these languages, and that the *–ka* marker is simply the normal nominal inflectional marker showing up on nouns.

Things are more complicated than this, however, as words denoting property concepts seem to have certain syntactic properties that *–ka* marked nouns do not have. For example, the semantic headedness of a phrase syntactically headed by a *–ka* marked word denoting a property concept is different from the semantic headedness of a phrase syntactically headed by a *–ka* marked word with a more referential meaning.

(47) a. Yang **kuh pan-ka** buk-payang.
PRN1 firewood stick-CNS3 split-PRES1
'I am splitting a stick of firewood.' (Green 1999:70)

b. **yang û-ki**
PRN1 house-CNS1
'my house' (Green 1999:82)

(48) a. muih yam-ka
person good
'good person' (Green 1999:136)

b. damaska sik-ka
jungle great
'deep forest' (Green 1999:135)

c. pukka bara-ka
night dark
'dark night' (Green 1999:139)

While the semantic head of the highlighted phrases in (47) is the possessive marked noun, the semantic head of the phrases in (48) is the word preceding the *–ka* marked word. Study of available materials suggests that there are further asymmetries in the behavior of *–ka* marked words that bear on the questions discussed here. For example, while some property concept words require *–ka* affixation, according to Green (1999:134), it is optional with others. Further, preliminary fieldwork on the language suggests that there are still other property concept words which do not take *–ka* at all. These facts are complicated and not yet well understood. They require further research focusing on noun phrase syntax, adjectival semantics, and the nature of the lexical category system of the language before their implications for Generalization 1 can be determined.

6 Conclusion

Though the research I have reported is still in its preliminary stages, several important empirical generalizations have already emerged. First, I have shown, following Dixon (1982) that there are (at least) two different types of states from a lexical semantic perspective—property concepts, which entail no prior event, and result states, which do entail a prior event giving rise to a result state. This lexical semantic distinction was found to have an impact on how words with these types of meanings are lexicalized. While property concepts are lexicalized as morphologically basic forms, this is not always the case for result states. I have argued that these facts follow from the Principle of Monotonic Composition, a principle that holds that the construction of meaning is carried out monotonically. Secondly, I find that some languages have words that are polysemous between a state and a change of state denotation. Due to a constraint on the mapping between lexical semantic and syntactic categories that only verbs can denote changes of state, polysemy arises only in languages where property concepts are lexicalized as verbs.

From a theoretical perspective, these observations suggest that theories of event structure that give homogeneous representations to all COS predicates (e.g. Hale & Keyser 2002; Baker 2003) need to be revisited. There seems to be a contrast in the behavior of words denoting property concept states and result states that seems in part attributable to the fact that these are fundamentally different kinds of states, with different types of meanings. Further, I also find that there are differences in how non-causative changes of state are derived from property concepts, depending on the lexical category of property concepts, which varies crosslinguistically. These are typological differences that theories of event structure should seek to capture, regardless of the nature of the theory (i.e., syntactically or semantically based). I have developed analyses for these observations within a decompositional approach to lexical meaning. Future work should focus on further investigation of the empirical observations made here and the predictions of the theory. As well, further research is needed exploring how competing theories of event structure (Hale and Keyser 2002; Baker 2003) might capture the same set of facts.

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