

The Root: A Key Ingredient in Verb Meaning

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1 Introduction: Hitting and Breaking

Fillmore's well-known case study of two verbs, "The Grammar of *Hitting* and *Breaking*" (1970), effectively illustrates two important points about verb meaning:

- A verb's meaning determines its grammatical behavior:
e.g., both *hit* and *break* have transitive uses, but diverge in other argument realization options, due to their different semantics: *break*—change of state; *hit*—contact with a surface.

(1) The boy broke/hit the window with a ball.

(2) Availability of the causative alternation:

- a. The boy broke the window./The window broke.
- b. The boy hit the window./*The window hit.

(3) Availability of body-part possessor ascension:

- a. I broke his leg./*I broke him on the leg.
- b. I hit his leg./I hit him on the leg.

- Verbs fall into semantically coherent classes whose members share grammatical behavior:
e.g., *break* and *hit* belong to larger semantically characterizable verb classes.

- (4) a. *Break* Verbs: bend, fold, shatter, crack (Fillmore 1970:125, (15))
→ verbs of change of state
- b. *Hit* Verbs: slap, strike, bump, stroke (Fillmore 1970:125, (16))
→ verbs of surface contact

2 The Bipartite Structure of Verb Meaning

This organizational property of the verb lexicon suggests a verb's meaning can be factored in two:

— A part shared by all members of the same verb class: the EVENT SCHEMA.

— A part that distinguishes among the members of a class: the ROOT — the focus of this talk.

(e.g., Grimshaw 2005, Hale & Keyser 2002, Jackendoff 1983, 1990, Marantz 1997, Mohanan & Mohanan 1999, Pesetsky 1995, Pinker 1989, RH&L 1998, but see Taylor 1996)

Bipartiteness is well-captured by a representation that takes the form of a predicate decomposition:

- (5) VERBS OF CHANGE OF STATE: bend, break, crack, dim, dry, empty, freeze, harden, lengthen, melt, open, shatter, warm, widen, ...

- (6) Verbs of change of state: [[x ACT] CAUSE [BECOME [y <STATE>]]]
dry: [[x ACT] CAUSE [BECOME [y <DRY>]]]
empty: [[x ACT] CAUSE [BECOME [y <EMPTY>]]]
warm: [[x ACT] CAUSE [BECOME [y <WARM>]]]

THE KEY COMPONENTS OF VERB MEANINGS:

- *Event schema*: structural component of meaning, representing an event type; it comes from a limited inventory encompassing the event types encodable in language; it is often defined in terms of primitive predicates.

Most important distinction is whether an event schema is complex, consisting of two subevents, or simple, consisting of a single subevent (L&RH 1999).

- (7) a. Complex event schema:
 e.g., [[x ACT<MANNER>] CAUSE [BECOME [y <RES-STATE>]]]
- b. Simple event schema:
 e.g., [x ACT<MANNER>]

This distinction receives support from a range of phenomena; e.g., the interpretation of adverbials, the characteristic “grammar” of *break* and *hit*, the distribution of fake reflexives in resultatives, the semantic underpinnings of transitivity and objecthood, and the set of attested object alternations (Dowty 1979, Levin 1999, L&RH 1999, McCawley 1971, Morgan 1969, RH&L 1998).

- *Root*: idiosyncratic component of meaning, characterized by an ontological type, chosen from a fixed set of options (e.g., state, result state, thing, stuff, location, manner); the set of roots is in principle open-ended.

2.1 The Importance of the Root’s Ontological Type

Roots are systematically associated with event schemas:

EVIDENCE: English denominal verbs demonstrate clear associations between the meaning of the base noun and the meaning of the related verb (Clark & Clark 1979). Associations probably are not linguistic, but rather reflect general cognitive principles.

- (8) a. If N names a container, V means ‘put something in that container’.
bag, bottle, cage, garage, pen, pocket, stable, ...
- b. If N names a thing/stuff, V means ‘put that thing/stuff someplace’/
 ‘provide someplace with that thing/stuff’.
butter, carpet, diaper, garland, harness, saddle, salt, ...
- c. If N names an instrument, V means ‘use that instrument for its purpose’.
bicycle, brush, microwave, rake, shovel, spear, staple, ...

Basic event schema(s) associated with a verb is determined by its root’s ontological type.

- (9) a. manner → [x ACT<MANNER>]
 (e.g., *jog, run, creak, mutter, ...*)

- b. instrument → [x ACT<*INSTRUMENT*>]
(e.g., *brush, hammer, saw, shovel, ...*)
- c. container → [x CAUSE [y BECOME AT <*CONTAINER*>]]
(e.g., *bag, box, cage, crate, garage, pocket, ...*)
- d. internally caused state → [x BECOME <*STATE*>]
(e.g., *bloom, blossom, decay, flower, rot, rust, sprout, ...*)
- e. result, i.e. externally caused, state (Hale & Keyser 2002, L&RH 1995) →
[[x ACT] CAUSE [y BECOME <*RES-STATE*>]]
(e.g., *break, dry, harden, melt, open, ...*)

Although instrument roots are distinguished from manner roots above, this is done for illustrative purposes; instrument roots are really a subtype of manner roots, behaving in all respects like them.

Roots are integrated into schemas as ARGUMENTS (e.g., (9c)-(9e)) or MODIFIERS (e.g., (9a)-(9b)) of predicates; roots are italicized and in angle brackets; notated via subscripts when modifiers.

2.2 Consequences of the Bipartite View of Verb Meaning

- Allows for a finite characterization of an infinite set of verb meanings (Carter 1976);
i.e. new verbs fit into the set of types defined by the event schemas.
- Localizes arbitrary complexity in verb meaning in the verb roots.

Grimshaw (2005:85) asks: “How complicated can a verb meaning be?”

- (10) “On the one hand it seems that the answer is: as complicated as you want. For example, suppose there is a manufacturing process that involves pulverizing something then mixing it with molten plastic, allowing it to harden and then encasing it in steel. Of course we can label the entire process with one verb: to *smolt*, for example.” (Grimshaw 2005:85)

Still, she suggests that there are constraints on the complexity of verb meaning: “unlimited complexity” in meaning is confined to the root, while the event schema is “rigidly constrained” (2005:85):

- (11) “However, looked at from another point of view, such a verb [i.e. *smolt*] is semantically no more complex than any other: it is either a causative or an activity predicate.” (2005:85)

- Allows for crosslinguistic similarities in the set of verb classes,
while allowing crosslinguistic divergences in the class members and even class size.

Languages that have change of state verbs might differ as to which states are lexicalized; similarly, for verbs of manner of motion, verbs of sound, and so on.

3 A Dichotomy Attributable to the Root: The Manner vs. Result Distinction

The claim that a root has an ontological type receives support from a generalization about verb meaning and verb behavior: THE MANNER VS. RESULT DICHOLOGY.

3.1 Hitting and Breaking Revisited

Why do *hit* and *break* jointly make for a compelling case study?

The verbs are worth studying together because certain events could be described by either one, yet clearly the choice of one verb or the other has significance.

EXAMPLE: A vandal throws a rock at a store window and the window breaks.

This event could be described with either verb, though each describes a different facet of the event:

- (12) a. The vandal broke the window with a rock.
b. The vandal hit the window with a rock.

(a) asserts that the window is no longer intact, but is silent about how it happened: the window could have been hit, kicked, punched, or pounded and a variety of instruments could have been used: rocks, hammers, fists, sticks, balls, etc.

→ This is because *break* is a change of state verb.

(b) asserts that something forcefully came into contact with the window, but is silent as to whether this contact had any effect on the window. The verb does not entail that the window broke, though it may have, as it describes an action that often results in this change of state.

- (13) The rock that the vandal threw hit the window, but luckily it wasn't damaged.

→ This is because *hit* is a surface contact verb.

Generalizing, verbs that describe events in which physical objects are damaged fall into two classes:

— verbs like *hit* that describe making surface contact with an object via forceful impact;

these MANNER verbs describe ways of potentially damaging objects.

e.g., *hit, kick, punch, slap, whack*

— verbs like *break* that describe changes in an object's "material integrity" (Hale & Keyser 1987);

these RESULT verbs describe specific types of damage that often result from forceful impact.

e.g., *break, crack, shatter, splinter, split*

3.2 Beyond Hitting and Breaking: The Pervasiveness of the Dichotomy

The bifurcation in the "verbs of damaging" class is representative of a more pervasive split in the English non-stative verb inventory (L&RH 1991, RH&L 1998).

Other apparently "semantically coherent" verb classes of English can be similarly subdivided, giving rise to lexical domains with two subclasses of verbs:

— Manner verbs: specify manner of carrying out an action

— Result verbs: specify result of an action

	Manner Verbs	vs.	Result Verbs
— Verbs of Damaging:	<i>hit</i>	vs.	<i>break</i>
— Verbs of Putting — 2-dim:	<i>smear</i>	vs.	<i>cover</i>
— Verbs of Putting — 3-dim:	<i>pour</i>	vs.	<i>fill</i>
— Verbs of Removal:	<i>shovel</i>	vs.	<i>empty</i>
— Verbs of Combining:	<i>shake</i>	vs.	<i>combine</i>
— Verbs of Killing:	<i>stab</i>	vs.	<i>kill</i>

- The verbs in the Manner column share meaning components of the same type, as do those in the Result column.

The classes of verbs defined by these two columns are grammatically relevant despite what might be perceived as the semantic diversity of their members.

- The “semantic classes” in the leftmost column of the table are not grammatically relevant classes; they may be perceived as semantic classes due to intuitions that certain manner verbs and certain result verbs belong together, just as *break* and *hit* do.

The source of this intuition most likely lies in the observation that:

- Many result verbs lexicalize results that are conventionally associated with particular manners.
e.g., *clean* and *clear* lexicalize a state that may result from removing stuff from a surface in a prototypical manner.
- Many manner verbs lexicalize manners that are conventionally associated with particular results.
e.g., *wipe* and *scrub* lexicalize a manner and describe actions involving surface contact and motion; these actions are often used to remove stuff from a surface.
- Beyond the change of state domain, a comparable dichotomy is found in the motion domain.

Classification of motion verbs in terms of “conflation” of meaning components (Talmy 1975, 1985):

- Motion and path: e.g., *arrive*, *ascend*, *descend*, *enter*
e.g., *ascend* specifies a direction of motion, but not the manner in which the motion is effected.
- Motion and manner: e.g., *amble*, *jog*, *run*, *swim*
e.g., *jog* specifies a manner of motion, but is neutral as to the specific direction of motion.

→ Directed motion verbs, then, can be subsumed under result verbs.

- The notions of manner and result are applicable to verbs that may not be easily put into larger lexical “domains” spanning the manner and result verb classes.

- (14) a. MANNER VERBS: cry, eat, exercise, mutter, scribble, shout, squeak, waltz, ...
b. RESULT VERBS: arrive, dry, come, destroy, gladden, melt, widen, ...

- Manner/result verb distinction crosscuts the transitive/intransitive distinction, yet is grammatically relevant: each type of verb shows own argument realization options (Fillmore 1970, RH&L 1998).

- (15) a. UNSPECIFIED OBJECTS: Kim swept/*broke.
b. NON-SUBCATEGORIZED OBJECTS: Kim scrubbed/*broke her fingers raw.
c. CAUSATIVE ALTERNATION: Kim broke/wiped the window; The window broke/*wiped.

- More generally, manner verbs and result verbs differ systematically in meaning and behavior.
 - Within a language the manner vs. result verb dichotomy figures in:
 - characterizing grammatical behavioral patterns
 - characterizing language acquisition patterns (Behrend 1990, 1995, Gentner 1978)
 - Across languages the dichotomy figures in:
 - characterizing crosslinguistic similarities and divergences

4 Manner/Result Complementarity: A Reflection of a Constraint on Verb Meanings?

This talk focuses on those components of meaning a verb lexically specifies: its lexicalized meaning.

- (16) Lexicalized meaning: Those meaning components entailed in all uses of a verb, regardless of context.

Thus, a verb's lexicalized meaning is distinct from what can be inferred from a particular use of that verb in context. We assume and stress that in the unmarked case:

- (17) What is lexicalized in a verb is kept constant in all uses.

That is, we assume that the default is that a verb has a single sense, so that lexicalization applies to verbs, rather than verb senses. (See section 5 for applications to particular senses of a verb.)

- (18) MANNER/RESULT COMPLEMENTARITY: Manner and result meaning components are in complementary distribution: a verb lexicalizes only one (L&RH 1991, RH&L to appear).

The motivating observations:

- Some result verbs specify results brought about using a conventionally associated manner.
- Some manner verbs describe actions performed to bring about a conventionally associated result.

HOWEVER, such result verbs don't entail the manners, nor do such manner verbs entail the results.

- (19) I just wiped the table, but it's still dirty/sticky/covered in crumbs.
(20) I cleaned the dress by soaking it in hot water/pouring bleach over it/saying "abracadabra".

4.1 The Origins of Manner/Result Complementarity: A Constraint on Lexicalization

The root–event schema associations in (9) suggest the following constraint:

- (21) THE LEXICALIZATION CONSTRAINT: A root can only be associated with one position—in an event schema, as either an argument or a modifier.

A CONSEQUENCE: (21) constrains the meanings a verb can lexicalize; in particular, it rules out verbs flouting manner/result complementarity.

- (22) Since manner roots modify ACT and result roots are arguments of BECOME, a root with both manner and result components would have to modify ACT **and** be an argument of BECOME in a single event schema, thus violating the lexicalization constraint.

- (23) a. [x ACT<MANNER>]
b. [[x ACT] CAUSE [y BECOME <RES-STATE>]]

- An interpretation of manner/result complementarity:
It arises from a real constraint on how much meaning can be “packaged” into a verb since manner and result components contribute to the complexity of a verb’s meaning.
- Another possible measure of “complexity”, number of lexical entailments (cf. Dowty 1991), does not seem to be implicated in constraints on possible verb meanings.

The verb *tango*, which refers to the performance of a specific dance, must be associated with more lexical entailments (i.e. detail) than the verb *dance*, and thus *tango* could be said to have a more complex meaning than *dance*, specifically a more complex manner.

But from the perspective of the lexicalization constraint, *tango* is no less a manner verb than *dance*; there seems to be no constraint on how detailed the content of a manner component can be.

4.2 The Domain of Manner/Result Complementarity

The lexicalization constraint is precisely that: a constraint on what is lexicalized.

- Thus, depending on the language, it may hold of a word, stem, or affix (RH&L to appear).
 — In English complementarity is manifested in words, as most words are morphologically simple.
 — In so-called “bipartite” verb languages like Lakhota manner/result complementarity holds of the pieces of words, rather than the words themselves.

(24) LAKHOTA (Foley & Van Valin 1984: 39-47, based on Boas & Deloria 1939):

- verb stems describe states which are permanent results of actions:
 -blečha ‘be shattered (said of brittle material)’
 -blaza ‘be ripped open’
- prefixes describe manner:
 ya- ‘with the mouth’
 na- ‘with the foot or leg’
 yu- ‘by pulling, with the hands’
 wa- ‘by a sawing motion, with a knife’
 ka- ‘by a sudden impact’
- prefixes and verb stems combine to form verbs:
 ya-blečha ‘break or cut with the teeth’
 na-blečha ‘break by kicking or stepping on’

— Manner/result complementarity is not a constraint on what can be expressed in a VP; in English when a verb lexicalizes one of manner or result, the other can be expressed outside the verb.

- (25) a. A manner verb can combine with a result XP:
 Pat wiped the table clean.
- b. A result verb can be accompanied by an adverbial XP expressing manner:
 Pat cleaned the table by wiping it.

4.3 Refining the Notions of Result and Manner

The semantic criteria determining whether a root is manner or result must be lexically encoded.

The relevant notion: SCALAR CHANGE (McClure 1994, Rappaport Hovav 2008, RH&L to appear).

PROPOSAL: Result roots specify scalar change and manner roots specify nonscalar change.

These types of change are the meaning components in complementary distribution in roots.

- A SCALAR CHANGE in an entity involves a change in the value of one of its attributes and presupposes that these values form a scale—a set of degrees—points or intervals indicating measurement values—ordered on a particular dimension (e.g., cost, length, temperature) (Kennedy 2001).

Result verbs, including directed motion verbs, denote events of scalar change and lexically entail an associated scale (e.g., Beavers 2008, Borer 2005, Hay, Kennedy & Levin 1999, Krifka 1998, Ramchand 1997, Rappaport Hovav 2008, Tenny 1994). With directed motion verbs, the path of motion constitutes a scale (composed of a set of contiguous locational points making up the path), with the ordering relation defined by the direction.

EXAMPLES:

— The change of state verb *warm* involves a scale of increasing values on a dimension of temperature; a warming event must have an entity showing an increase in value on this dimension.

— The directed motion verb *ascend* involves a scale in the vertical dimension with the points ordered against the pull of gravity (i.e. a path); an event of ascending must have an entity showing an increase in value on this dimension.

- A NONSCALAR CHANGE in an entity is any change which isn't characterizable in terms of an ordered set of degrees—i.e. values of a single attribute—along a dimension representing this attribute.

The vast majority of verbs of nonscalar change involve complex changes—a combination of multiple changes—and manner verbs, including manner of motion verbs, lexicalize such changes.

exercise, flap, grimace, jog, knead, scribble, shudder, waltz, wave, ...

EXAMPLE: The verbs *jog* and *waltz* both involve a specific pattern of movement of the arms and legs that is repeated an indefinite number of times; collectively, these changes do not represent a change in the values of one attribute, nor is any one element in the sequence of changes privileged as the necessary starting point of motion (cf. Dowty 1979).

5 Putative Counterexamples to Manner/Result Complementarity

Despite the pervasiveness of manner/result complementarity, some potential counterexamples to manner/result complementarity are raised in the literature;

this calls into question whether it is indeed the consequence of a lexicalization constraint, rather than just a preference regarding verb meanings.

ARGUE: The putative counterexamples actually do conform to manner/result complementarity:

— the relevant verbs are manner verbs in some uses and result verbs in others,

— they lack uses that are simultaneously manner and result, despite claims to the contrary.

Thus, we maintain the assumption in (17) that in the unmarked case what is lexicalized in a verb remains constant across all its uses, except in special circumstances, such as those now examined.

5.1 A Potential Counterexample from the Change of State Domain

Guerssel et al. (1985) and Levin (1993:8) suggest *cut* has manner and result meaning components. If this is correct, this verb—and perhaps others like it—violates the proposed constraint.

- (26) *cut* LCS: x produce CUT on y, by sharp edge coming into contact with y
(Guerssel et al. 1985:51, (11))

5.1.1 Reasons Why *cut* Is Apparently Problematic

- EVIDENCE FOR *cut* AS A RESULT VERB:

- Its zero-related nominal *a cut*_N refers only to a result, a property it shares with other result verbs;
- In contrast, nominals zero-related to clear manner verbs lack a result interpretation; they necessarily refer to the action and not the physical result of the action, which can be perceived only after the action is over.

- (27) a. break_V/a break_N, crack_V/a crack_N, split_V/a split_N
b. (give it) a wipe, (give it) a kick, (go for) a walk/run

- EVIDENCE FOR *cut* AS A MANNER VERB:

- It is found in the conative construction, a property shared with manner but not result verbs:

- (28) a. Finally, she got the blade pulled out and started **cutting at** the tape on Alex ...
(www.authorhouse.com/BookStore/ItemDetail~bookid~28127.aspx)
b. It had been a stupid act on her part, I thought to myself as I **cut at** the rope with my knife, aware that Sarnian Lady was sinking further ...
(www.etext.org/Fiction/Warlady/unzipped/warlady-2/2565-62)

- (29) Distribution of the conative construction:

- a. Ok with manner verbs: *claw, hit, kick, pull, splash, ...*
- b. Out with result verbs: *break, crack, split, ...*

- *cut* has been said to lack anticausative uses, which are found with a majority of result verbs, but never with verbs with explicit manner components.

- (30) a. * The cake cut. (cf. The waiter cut the cake.)
b. * The table wiped. (cf. The waiter wiped the table.)
c. The window broke. (cf. The boy broke the window.)

5.1.2 Resolving the Potential Problem

THE PROPOSAL: *cut* lexicalizes result in most uses, but manner in some uses; however it lacks uses which lexicalizes both manner and result at once. Thus, any single use of *cut* meets the lexicalization constraint. Below, we speculate about when this circumstance—in which a verb has uses lexicalizing different meaning components—arises.

- THE RESULT USE: In its basic use, *cut* lexicalizes only a result: a clean separation.
 - Yet a cutting event is usually understood as brought about by use of a sharp-edged instrument. WHY? This is a perception due to the nature of the lexicalized result state.
 - An examination of cutting events shows that *cut* does not specify the instrument or the action that the instrument is involved in; specifically, an agent need not wield the instrument.

(31) “Cut verbs, too, are rather flexible about the action performed and the instrument used (I can *cut* an orange using anything from a knife or axe to a metal string or laser beam, and I can do it by bringing the blade to bear on the fruit or by dropping the fruit onto the blade from sufficient height).” (Bohnenmeyer 2007:159)

— *cut* does have anticausative uses, despite received wisdom, supporting a purely result meaning.

- (32) a. ... the rope **cut** on the rock releasing Rod on down the mountain.
(<http://www.avalanche-center.org/Incidents/1997-98/19980103a-Montana.php>)
- b. The sheath of the rope had **cut** on the edge of the overhang and slid down 2 feet.
(www.rockclimbing.org/tripreports/eltnino.htm)

Most likely, anticausative uses of *cut* were overlooked as most instances of cutting such as those involving food—the patient of most linguistic examples—violate a constraint on anticausatives: The event must happen without the agent’s continued intervention (Haspelmath 1993, L&RH 1995).

(33) I cut the bread/*The bread cut.

The conditions allowing an anticausative are not purely lexical, but relate to properties of the event described in the sentence with the verb.

- THE MANNER USE: In some uses, including its conative uses, *cut* crucially does not entail a result, but simply the handling of a sharp-bladed instrument as is necessary for its intended use, consistent with the lexicalization constraint.

(34) *cut* Conative LCS: x causes sharp edge to move along path toward y, in order to produce CUT on y, by sharp edge coming into contact with y. (Guerssel et al. 1985:59, (34))

— The conative is said to be licensed by motion and contact meaning components—i.e. some type of manner—and, indeed, in the conative, *cut* entails handling a sharp instrument in a particular way.

Although Bohnemeyer notes that *cut an orange* can be used when “dropping the fruit onto the blade from sufficient height”, this scenario, which does not involve actually wielding an instrument, cannot be described by *cut at the orange*, even if the orange were repeatedly dropped.

— Manner verbs (but not result verbs) allow unspecified and non-subcategorized objects (RH&L 1998); *cut* occasionally shows nonsubcategorized object uses.

(35) Phillips, 44, has been on the run since April, when he **cut** his way out of an Erie County jail with a can opener. (www.msnbc.msn.com/id/14614953/)

- CONCLUSION: *cut* has a manner and a result use; no meaning component is constant across both.

AN ADVANTAGE OF THIS ANALYSIS: It preserves monotonicity of verb meaning: if the verb lexicalizes only manner and not result in the conative, an analysis in which the conative “cancels” the result part of *cut*’s meaning is obviated (cf. Kiparsky 1998:295, n. 23 on Laughren 1988).

5.2 A Potential Counterexample from the Motion Domain

A comparable potential counterexample exists in the motion domain: the English verb *climb*.

climb apparently expresses both manner (‘clambering’) and direction (upward) in some uses, contra manner/result complementarity (Fillmore 1982:32, Jackendoff 1985, Kiparsky 1997:490):

(36) Kelly climbed the tree.

climb has other uses that clearly meet the lexicalization constraint:

either they only entail upward motion or the apparently lexicalized direction is overridden:

(37) a. *climb* expresses an upward direction only:
The plane/smoke climbed.
(NOTE: planes/smoke are inanimate and can’t clamber, so manner isn’t lexicalized)

b. *climb* expresses a clambering manner of motion only:
Kelly climbed down from the roof.
Kelly climbed through the gap in the hedge.
(NOTE: direction is determined outside of verb, so is not lexicalized in verb)

(38) Smoke climbed slowly and the falling sun was coloring it through . . .
(books.google.com/books?isbn=0595002692)

There are no uses of *climb* that involve neither a clambering manner nor an upward direction:
The verb *climb* must have some meaning (besides just translational movement).

Jackendoff (1983) makes much of this pattern, and draws a general conclusion about the nature of concepts associated with words. However, he fails to notice that this pattern is necessarily found ONLY with verbs which apparently lexicalize two meaning components.

PROPOSAL: The uses of the verb *climb* can be explained in the same way as those of *cut*:

- A basic meaning:
 - *cut* encodes a result and has a conventionally determined manner;
 - *climb* encodes a manner and has a default or contextually determined direction (the problematic uses instantiate this option).
 - A second meaning:
 - With *cut*, the manner can get lexicalized, but only if the result drops out;
 - With *climb*, the default direction can get lexicalized, but only if the manner drops out.
- Each meaning shows manner/result complementarity, conforming to the lexicalization constraint.

5.2.1 The Manner Use of *climb*

The existence of uses of *climb* which lexicalize manner of motion only is supported by uses with PPs explicitly expressing a direction of motion, including downward, as in (37b).

What is the manner of motion lexicalized by *climb*?

— ‘clambering’, i.e. using hands and feet (Fillmore, Jackendoff)

— movement involving “force exertion against gravity” (Geuder & Weisgerber 2008)

The second option better captures the range of uses of *climb*, including its applicability to certain types of downward motion, which like upward climbing requires motion that resists the pull of gravity; i.e. climbing is what prevents falling.

5.2.2 The Direction-Only Use of *climb*

• What sets *climb* apart from most manner of motion verbs (e.g., *jog*, *ride*, *run*, *swim*) is the availability of a direction-only use as in (39), in addition to the manner of motion use.

- (39) a. The plane/elevator climbed.
b. The smoke **climbed** in a thick black rope, its sundial shadow at the acute angle of late morning. (books.google.com/books?isbn=0060762225)

These must be direction-only uses: the examples lack an overt indication of direction, yet the motion still is understood as upward, suggesting the direction comes from the verb.

Even in the presence of the type of goal phrase in (40) the direction must come from the verb, as the goal could in principle be above or below the theme.

- (40) a. The plane climbed to 9000 feet.
b. The elevator climbed to the tenth floor.

In comparable examples with animate themes, only the manner—and not the upward direction—is strictly entailed, presumably because the associated manner is typical of animates.

- (41) a. The children climbed on the jungle gym all afternoon.
b. The backpackers climbed all day.
(motion needn’t be upward, but simply over a terrain requiring the relevant manner)

• Why does *climb*, unlike most manner of motion verbs, have a direction-only use?

A manner that allows motion while resisting the pull of gravity is typically necessary when an animate entity wants to move upward;

thus, there is a default association of this manner and upward direction.

As a consequence, *climb* has acquired a use that indicates motion in an upward direction, but only with a concomitant loss of the manner component, consistent with the lexicalization constraint.

Most likely, the availability of the direction-only use leads *climb* to pattern like *rise*: it too may be used to describe a change in an increasing direction along a scale; such uses clearly lack manner.

- (42) The prices/temperature climbed/rose.

Only a handful of manner of motion verbs pattern like *climb* because few involve manners that by their very nature are associated with default directions; see section 5.3.3.

5.2.3 Transitive *climb* Does Not Lexicalize Direction

Even if *climb* has some manner uses and some direction uses, transitive uses as in (43), which appear to lexicalize both meaning components, remain a potential problem.

(43) Kelly climbed the tree.

PROPOSAL: Despite appearances, the transitive uses of *climb* ONLY lexicalize manner.

Evidence that Only Manner Is Lexicalized

KEY INSIGHT: Uses as in (43) have a reference object—a Ground—as direct object.

THE GENERAL RULE: The direction of motion in transitive uses is determined contextually from the combination of the manner, the nature of the reference object, and the intention of the agent.

- EVIDENCE THAT DIRECTION IS NOT LEXICALIZED:

The direction of motion is not always understood as upward, as expected if it were lexicalized.

— Typically, motion on the path involving the reference object is understood as upward, as in (43), where the reference object has a prominent vertical dimension.

— When the reference object is a barrier (e.g., wall, fence), the path is understood as over it.

(44) So I thought that if I **climbed** the fence I'd be able to reach the entrance and the machine where I can buy some chocolate. (BNC; JY9 971)

- THE LESSON: The reference object plays a part in determining the direction of motion: it defines a salient path via its inherent nature and the way an agent typically interacts with it.

These transitive uses of *climb*, then, conform to the lexicalization constraint.

NOTE: It could be argued that *climb* specifies both manner and upward movement in (44) with 'over' being inferred. It is more parsimonious, however, to posit that transitive *climb*, which clearly lexicalizes manner, lexicalizes no more than that, since a manner-only sense of *climb* is independently necessary. What makes transitive *climb* special is that direction is inferred contextually rather than being overtly specified in a PP.

Transitive *climb* Patterns Like Other Manner of Motion Verbs

- When other manner of motion verbs take a reference object as direct object, the direction again depends on the nature of the reference object and how it is interacted with.
- This point is not usually appreciated because a limited set of reference objects is commonly cited, suggesting that there is a single, default direction understood with each verb.

(45) a. hike/ride the Appalachian trail — 'hike/ride along the trail'
b. swim the Channel — 'swim across the Channel'
c. run the track — 'run around the track'

- But other directions are possible with alternative choices of reference object:

Even though (46) and (47) involve the same reference object, the larger context indicates that the direction is DOWN in (46) and UP in (47)—neither of which is the default ‘along’ of (45a).

- (46) He was descending a hill of a four-lane arterial, on a bicycle equipped with the all-reflector system of nighttime protection that is required by federal regulation, but not using a head-lamp. . . . I testified to two accurate ways to determine speed on a slope. The first is plain experimentation. **Ride the slope** and see what speed develops.
(<http://johnforester.com/Consult/GreenJM/derby.htm>)
- (47) On light wind days you can fly your thermal plane from the lower North Bench. The launching/landing area is large, flat, and grassy . . . NO rocks. On breezy days you can enjoy classic “Slermal” conditions . . . **ride the slope**; catch a thermal; gain some big altitude; and then make a heart thumping dive to super-sonic speeds!
(http://www.flagstaffflyers.com/flyingsites/flyingsites_merriam.html)

Why Can’t *climb the tree* Mean ‘climb down the tree’?

The major factor involved in the absence of a downward interpretation for *climb the tree*:
the nature of the reference object.

EXAMPLES:

Trees, like walls, are perceived as projecting upward from the ground, so both are typically encountered as something to ascend.

In contrast, cliffs may be encountered either projecting upward or downward from ground-level.

EVIDENCE FOR THESE DIFFERENT PERCEPTIONS FROM INTERNET SEARCHES:

- With *the/a tree*, there are over 12 times more *climb(ed) up* than *climb(ed) down*.
- With *the/a wall*, there are about 5 times more *climb(ed) up* than *climb(ed) down*.
- With *the/a cliff*, there are considerably less total examples, with slightly more *climb(ed) up*.

This suggests that if circumstances conspire, downward transitive uses of *climb* might be attested. And an internet search found dozens of them:

- (48) ‘Bring the Governor’s reply straight back,’ shouted Master Mace as Mungo **climbed** the rope ladder into the ship’s rowing boat. (James Riordan and Beaula Kay McCalla, *Rebel Cargo*, Frances Lincoln, 2007, p. 149; books.google.com/books?isbn=1845077741)

into does not contribute information about direction in (48), just as *to* does not in (40):
into is found with both downward motion as in (48) and upward motion as in (49).

- (49) Marian **climbed** the rope ladder into the ship unaided, and was back on board within 15 minutes of jumping. (www.geocities.com/jckinghorn/ATL/content/56Minnekahda.htm)

Interestingly, such examples can cooccur with *down* without seeming contradictory, suggesting that the sense of upward movement in *climb(ed) the/a ladder* is due to a very strong inference.

- (50) You **climb** the ladder down into the crew quarters, and encounter a Protagonist, lying on a cot and brooding. (kol.coldfront.net/thekolwiki/index.php/Random_Lack_of_an_Encounter)

In contrast, there are only a handful of comparable *down* examples with *climb(ed) the/a tree*, suggesting that this reference object is interacted with differently.

- (51) Once a mother came with three or four of her babies and one was stuck on the roof since it was too afraid to **climb** the tree down to join the others . . . (artizek.deviantart.com/art/Racoon-39425624?offset=0)

FURTHER SUPPORT: *scale*, which Goldberg (to appear) suggests lexicalizes both manner and upward direction, shows a downward transitive use with *cliff*.

- (52) A woman escaped with minor injuries after her car plunged over cliffs in East Sussex and landed on a ledge. . . The vehicle landed almost vertically on the ledge about 100ft down from the top of the cliff with the woman inside. A coastguard team **scaled** the cliff to reach the woman who was then winched to safety and taken to hospital. (http://news.bbc.co.uk/1/hi/england/southern_counties/3691952.stm)

Although the relevant manner is again intended for motion against the pull of gravity over vertical surfaces, (52) shows that the motion need not be upward, so that direction is not lexicalized.

5.3 Potential Counterexamples Are Systematic, Even if Sporadic

There is no reason that *cut* and *climb* should be unique, though such verbs would be expected to be only sporadically attested: precisely when there are results that are conventionally brought about in a specific way or manners that are conventionally associated with a specific result (direction).

5.3.1 The verb *slice*

The verb *slice* is like *cut*: It too is a result verb, and like other such verbs, including other verbs describing causing some matter to end up in a specific shape, they have zero-related result nouns.

- (53) cube_V/a cube_N, dice_V/dice_N, slice_V/a slice_N, sliver_V/a sliver_N

However, since an event of slicing, like an event of cutting, is conventionally associated with a particular manner, it too can appear in the conative and *way* constructions.

- (54) She . . . was **slicing** at the tape that held his legs . . . (books.google.com/books?isbn=0060541075)
(55) She pounded and **sliced** her way into the can, winding up with only half the tuna left inside a wickedly sharp six-pointed metal star. (books.google.com/books?isbn=087351324X)

The conative example must be understood as involving an agent using a knife-like instrument in the same way as when slices are cut; it would not be used, say, with a bread-slicing machine.

5.3.2 The verb *clean*: A result verb with two manner uses

- THE RESULT USE: As a deadjectival verb, *clean* takes its name from the associated result state and entails the bringing about of this state.

— (56) cannot be used (even without *beautifully*), if the carpet is not in a clean(er) state after the event described in the sentence.

- (56) With its initial use, the machine **cleaned** the carpet beautifully and was easy to use . . .
(www.amazon.com/review/product/B0002MR7A2?filterBy=addOneStar)

— Unlike many result verbs, *clean* rarely shows anticausative uses, most likely for the same reason as *cut*: transition into a state of cleanness doesn't usually come about naturally without the intervention of an animate agent.

- MANNER USE (I): when *clean* is used in a housecleaning context, which involves a conventional set of actions.

— In this context, it allows unspecified and nonsubcategorized objects:

- (57) I cleaned before I left for work.

- (58) Margaret Anderson, played by Jane Wyatt, vacuumed, dusted, cooked, and **cleaned** her way through episodes of *Father Knows Best*. (books.google.com/books?isbn=0226886719)

— It no longer entails a result of cleanness (cf. (56)):

- (59) You wouldn't know she cleaned her room; it is as dirty as it was before she started.

— Conjunctions as in (58), which include *clean* with various manner verbs involving housekeeping suggest *clean* describes one of these activities. It is not very specific, making it similar to the verb *exercise* (compare *jog*, *swim*, both specific types of exercise).

— Although many things can be cleaned, the understood object in the unspecified object use must be a room or something in a room.

- (60) a. The soldier cleaned his gun. ↯ The soldier cleaned.
b. The hygienist cleaned my teeth. ↯ The hygienist cleaned.

- MANNER USE (II): *clean* means something close to 'swab'.

— On this use, it is a motion and contact verb, and acts like such a verb, e.g., showing the conative:

- (61) I stopped talking, just watched as quietly she **cleaned** at the cut.
(<http://www.winglesscrow.com/doyle/cordelia/wounds.txt>)

— It shows alternate object choices, again like manner verbs and unlike result verbs, which only allow the theme of change of state as object (RH&L 1998, 2005).

(62) How do you **clean** the dirt under your laptop keys?
(http://www.answerbag.com/q_view/460100)

(63) sweep the leaves/the walk

5.3.3 Other manner of motion verbs

Some manner of motion verbs which by their very nature have conventional associations with specific directions of motion show meaning shifts comparable to *climb*: e.g., *dive*, *plunge*, *scale*, *soar*.

THE VERB *scale* (see section 5.2.3)

THE VERB *dive*

Like *climb*, some uses of *dive* seem to involve both a manner (move through a medium headfirst) and a direction (downward); others seem to involve only manner or only direction.

— Prototypical uses of *dive*: both manner and direction

(64) The contestant dove into the pool.

Despite the preposition *into*, the contestant is understood to move downward as s/he enters the water headfirst. The downward direction must be associated with the diving event since *into* cannot contribute this notion (cf. *step/run into a room*).

— *dive* may appear with prepositions indicating directions other than down, suggesting that direction of motion is not lexicalized in these uses:

(65) Watch the dog **dive** across the goal and stop a shot . . . (youtube.com/watch?v=0mDWNGbbAHs)

(66) You will have to jump over, slide under and **dive** across the animals that can hurt you.
(<http://www.myfreegamespot.com/online-games/22700/Play-Nothing-can-Stop-Me!.html>)

— *dive* shows uses with inanimate themes, where only direction is entailed, suggesting manner is not lexicalized in these uses:

(67) The greatest sales and price declines, however, were in the High Desert region further east of the scorched earth where sales crashed by 62.7 percent and prices **dove** by 17.4 percent.
(http://realtimes.com/rtpages/20071029_pricedecline.htm)

PROPOSAL: Like *climb*, *dive* involves a manner which is naturally associated with a particular direction of motion, giving rise to apparent counterexamples to manner/result complementarity; however, again like *climb*, it lexicalizes only one meaning component in a given use in conformance with the lexicalization constraint.

HOW *dive* DIFFERS FROM *climb*: Its transitive uses are more sparsely attested.

• A very few attested uses maintain the punctuality found with most intransitive uses of *dive*.

(68) “I was horror struck. Everything happened so fast. The car skidded off to the left and seemed to **dive** the fence only 10 yards from me.” (www.motoresenv.com/notas_biografias.htm)

- Transitive uses tend to emphasize the ‘move through a medium’ (as in scuba diving) rather than the punctual ‘plunge into (headfirst)’ interpretation: this may be because reference objects usually have spatial extent, requiring the event to have duration.

- (69) a. **Dive** the depths of a secret reef where 10-foot sharks, fierce barracuda and graceful stingrays glide through amazing coral formations.
(www.chattanoogasummer.com/Newsroom.htm)
- b. I had the opportunity to **dive** the rapids below the Hoover Dam on Saturday ...
(www.scubaboard.com/forums/archive/index.php/index.php/t-200817.html)

5.4 The Generalization for Problematic Verbs

An examination of apparent violations of manner/result complementarity reveals:

- When a manner has a conventionally associated result, the result may get lexicalized in some uses of the verb, but only if the manner component drops out (as with *climb*, *scale*, and *dive*).
- When a result verb has a conventionally associated activity, the associated activity may get lexicalized in some uses of the verb, but only if the result drops out (as with *cut*, *slice*, and *clean*).

A CONSEQUENCE OF THE ANALYSIS: There are certain instances of polysemy.

6 Conclusions

- The root/event schema distinction is essential to understanding the nature of possible verb meanings and the organization of the verb lexicon.
- Manner/result complementarity as a generalization about possible verb meanings follows from a lexicalization constraint, which can be understood as limiting the complexity of verb meanings.
- Purported exceptions to manner/result complementarity, including *climb* and *cut*, do not provide grounds for rejecting it. Rather, they involve forms of polysemy that are natural consequences of such complementarity and are insightfully understood in the context of such complementarity.

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