Manner and result in the roots of verbal meaning

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Abstract

Rappaport Hovav and Levin (2010) argue that verbs fall into (at least) two classes: result verbs (e.g. *break*) and manner verbs (e.g. *run*). No verb encodes both manner and result simultaneously, a truth conditional fact they argue follows from how verb meanings are composed at the level of event structure. However, a key issue in verifying this claim is isolating truth conditional diagnostics for manner and result. We develop and review a number of such diagnostics, and show that there are verbs that encode both meanings together, counterexemplifying their truth conditional complementarity. However, using evidence from scopal adverbs, we argue that when they occur together they are encoded in a single, undecomposable manner+result root at event structure, validating complementarity as a fact about how many and what types of roots may occur in an event structure, though it also argues for a richer typology of roots than typically assumed, including those encoding manner and result simultaneously.

Keywords: Event structure, roots, lexical semantics, scalar change, sublexical scope

1 Introduction

Since at least the early days of Generative Semantics, one of the primary concerns of lexical semanticists has been the question of possible and impossible verb meanings. In many ways, work in decompositional event semantics has been at the heart of this, whether in its lexicalist (Dowty 1979, Pinker 1989, Jackendoff 1990, Levin and Rappaport Hovav 1995, Wunderlich 1997, Van Valin and LaPolla 1997, Davis and Koenig 2000, Davis 2001) or nonlexicalist (Lakoff 1965, Pesetsky 1995, Baker 1997, Marantz 1997, Hale and Keyser 1993, 1997, 2002, Folli and Ramchand 2002, Folli and Harley 2004, Harley 2003, Ramchand 2008) guise. In such approaches, word meanings are assumed to at least partly consist of a grammatical level of representation often referred to as an "event structure," which is

built up from two major components: a small set of basic eventive predicates indicating causation (CAUSE), action (ACT), and change-of-state (BECOME), among others, and a much larger set of idiosyncratic lexical semantic roots that fill in the fine-grained, real world details of these basic event types. These components are combined into complex event structures via a limited, well-defined event calculus. The limited set of basic event types plus the constrained nature of the event calculus determine that only some event structures are possible, and this predicts in turn that only certain verb meanings are possible.

For example, in the event structure typology outlined in Rappaport Hovav and Levin (1998:108-109), only an individual or an action, but not a change-of-state, can be a causer argument of a primitive CAUSE operator. This predicts the nonexistence of a verb *grimp* meaning "x dying caused y to die," since the corresponding event structure is impossible:

(1) John grimped Mary. [[x BECOME $< dead >$] CAUSE [y BECOME $< dead >$]]

Still further, on some theories event structures are actual syntactic constituents built from functional heads denoting basic eventive predicates and morphological roots containing idiosyncratic information. On such theories, event structures are also subject to general syntactic constraints on constituency and movement, which may make additional predictions about possible event structures (an idea dating back to Generative Semantics; see e.g. Dowty 1979:236ff. for discussion). The point is that some event structures are unattested due to properties of how they are constructed, thus constraining possible verb meanings.

In this vein, Rappaport Hovav and Levin (2010) (hence RHL) have recently discussed an interesting fact about possible verb meanings that they argue also follows from properties of event structures (based on observations dating back at least to Levin and Rappaport Hovav 1991). In particular, they claim that eventive verbs fall into (at least) two broad semantic classes: those encoding the manner in which some action is carried out as in (2a), and those encoding the coming about of some particular result state as in (2b).

(2) a. **Manner verbs:** *run, walk, swim, jog, blink, yell, scrub, wipe, sweep*, etc.

b. **Result verbs:** *break, shatter, crush, destroy, dim, clean*, etc.

RHL (p. 25) crucially claim that no single verb encodes both meanings at the same time. Instead, the manner in which something comes to be in some state is unspecified for result verbs — a breaking can be accomplished in any number of manners (e.g. snapping, slapping, etc.) — while the result is unspecified for manner verbs — one can run around and end up back where one started (or run in place). Of course, a complex predicate consisting of two separate lexemes can encode manner and result simultaneously (e.g. resultatives as in *sweep clean*). RHL's claim is that a single, monomorphemic lexeme never encodes both.

RHL propose that this complementarity follows from how event structures are composed, focusing on the number, type, and place of lexical semantic roots. A single lexical semantic root can either modify an underlying ACT predicate, as in (3a), or be an argument of an underlying BECOME, as in (3b), but not both, ruling out (3c). Furthermore, their discussion presupposes that there is only ever one root per lexeme, also ruling out (3d).

(3) a. [x ACT$_{<ROOT>}$]

b. [[x ACT] CAUSE [y BECOME $< ROOT >$]]

c. *[[x ACT$_{<root>}$] CAUSE [y BECOME $< ROOT >$]]

d. *[[x ACT$_{<root_1>}$] CAUSE [y BECOME $< ROOT_2 >$]] (in a single verb)

This predicts that no event structure will ever have both result and manner roots simultaneously, explaining why no verb seems to encode both meanings simultaneously.

This claim has implications beyond just verb classification and a theory of event structures. For example, Beavers, Levin, and Tham (2010) suggest that Talmy's (1972, 1985, 2000) well-known typology of directed motion constructions — distinguishing languages in which path of motion vs. manner of motion is encoded in the verb — may be partly explained by manner/result complementarity, taking directed paths to represent a kind of

result. Talmy's typology in turn correlates either significantly or categorically with other typological facts, including the possibility of secondary result predication (Aske 1989, though see Son 2007), and relative numbers of manner or result verbs in lexical inventories (Wienold 1995, Slobin 2000). Thus complementarity, if true, may have relatively broad implications.

We examine the empirical and theoretical foundations for RHL's proposal, and more broadly what it means for a verb class to be impossible due to a property of event structures. We argue that the manner/result complementarity question has been complicated by the use of diagnostics for manner and result as components in a verb's meaning that are (a) interdependent in ways that make them inappropriate for verifying complementarity, and (b) not linked to either truth conditional or event structural semantics in an explicit way. Thus a significant portion of this paper consists of devising independent truth conditional diagnostics for identifying manner and result in a verb's meaning, and comparing them with standard diagnostics — in particular scopal operators (Dowty 1979, von Stechow 1995, 1996, 2003, Marantz 2007, 2009) — that probe for event structure. We argue that once the diagnostics are so delineated, the question of manner/result complementarity in fact becomes *two* questions, one about truth conditional content and one about event structure.

Crucially, we show that in truth conditional terms — that is, what lexical entailments a verb encodes à la Dowty (1989:75) — there is evidence *against* manner/result complementarity. We focus on manner of killing verbs as in (4) (Krohn 2008), which we argue encode both a result state (of death or a state that conventionally leads to death) and specific manners of bringing it about, as first noted in passing by Dowty (1979:203-204).

(4) Shane drowned/hanged/electrocuted/crucified Sandy.

However, we also use evidence from scopal modifiers to show that verbs cannot have both a manner root and a separate result root simultaneously, so that manner/result comple-

mentarity does hold as a fact about event structures. To accommodate truth conditional manner+result verbs there must therefore exist a class of manner+result roots in which manner and result meanings are "packaged together" as a single unit. This partly calls into question the truth conditional predictions of event structural approaches, since what truth conditional predictions such a theory makes will depend on a well-developed typology of possible roots (a point Dowty 1979:125-129 also makes). But it also points towards a more refined way of making claims about possible and impossible verbs, distinguishing claims about truth conditional content from how that content is packaged in a verb's meaning.

We begin in section 2 by defining the classes of result verbs, manner verbs, and manner of killing verbs. In section 3 we look at diagnostics for result in a verb's meaning, and show that manner of killing verbs pattern like standard result verbs. In section 4 we turn to manner diagnostics and show that manner of killing verbs also pattern like manner verbs. We thus conclude that they are manner+result verbs, counterexemplifying the truth conditional complementarity claim. In section 5 we show that similar facts hold for some manner of cooking verbs (e.g. *sauté, braise*) (Levin 1993:243) and ditransitive ballistic motion verbs (e.g. *throw, toss*) (Gropen et al. 1989:243-244). In section 6 we examine complementarity at event structure, and use evidence from scopal operators to suggest that in manner+result verbs the two meaning components are in a single scopal unit, rather than two separate roots, yielding a type of complementarity, albeit one requiring a class of manner+result roots. We conclude in section 7.

We first offer two terminological preliminaries. The term "root" is ambiguous in the literature, referring either to a morphological root or a lexical semantic object in an event structure. In lexicalist theories of event structure, lexical semantic and morphological roots do not necessarily correspond to one another, but in syntactic theories, such as those in the Distributed Morphology tradition, they do. Nothing we say hinges on whether this correspondence holds, but for clarification, we use the term "root" in the sense of a lexical

semantic root unless noted explicitly. Second, we take a "lexeme" to be minimally the association of a monomorphemic morphological root and a single event structure (however complex). A given morphological root may be polysemous, associated with multiple event structures. But RHL's manner/result complementarity is a constraint on individual event structures, and thus for convenience we reserve the term "lexeme" for a pairing of a morphological root with a single event structure (we return to polysemy briefly in section 4.4).

2 Verbs of Killing: A Typology

Among the verb classes in Levin's (1993) encyclopedic classification are "verbs of killing" (Levin 1993:230-233), which she divides into two subclasses. First are *murder* verbs, which "all describe killing. . . None of the verbs in this class lexicalizes a means component; that is, none provides any information about how the killing came about" (p.231) (a reviewer doubts *immolate* belongs here; we concur, but leave it for completeness):

(5) **Levin's *murder* verbs:** *assassinate, butcher, dispatch, eliminate, execute, immolate, kill, liquidate, massacre, murder, slaughter, slay*

Second, *poison* verbs "relate to actions which can be ways of killing. Thus they each lexicalize a means component, and it is this means which differentiates among them" (p.232):

(6) **Levin's *poison* verbs:** *asphyxiate, crucify, drown, electrocute, garrotte, hang, knife, poison, shoot, smother, stab, strangle, suffocate*

Levin herself observes that her initial observations and classification may oversimplify things, particularly for *poison* verbs, remarking that "In principle, as means verbs, these verbs need not entail that the action they denote results in death; however, some of them do appear to have this entailment" (Levin 1993:232). What we aim to demonstrate is that at least some *poison* verbs do indeed entail both manner and result, namely death or a state that can lead to death. We call these manner of killing verbs, which include those in (7).

(7) **Manner of killing verbs:** *crucify, drown, hang, guillotine, electrocute*

We first develop a suite of result and manner diagnostics, motivated by comparing their application to supposedly canonical result and manner verbs (see e.g. (2) in section 1) and showing that they draw a distinction. For result verbs we use *destroy, break, shatter, clean*, and *dim*, and for manner verbs we use unergatives *run, jog, yell*, and *blink* and transitive surface contact verbs *scrub*, *sweep*, and *wipe*, all of which we take to be uncontroversially result or manner verbs. We then apply our tests to manner of killing verbs and show that they pass all of the tests, and thus represent manner+result verbs. However, as we discuss below, prior classifications of manner and result verbs may have been built on diagnostics that *preclude* the possibility of manner+result verbs, and thus verbs previously classified as either manner or result may actually be manner+result verbs. Our goal is not to "re-do" prior classifications, but rather to demonstrate the existence of a third, mixed class.

Before proceeding, we briefly motivate the need for such a discussion. It may seem obvious that a verb like *guillotine* gives rise to noncancellable inferences of both a result and a means of achieving it. However, as RHL's proposal makes clear this is not necessarily so. Perhaps only manner *or* result is encoded, and the other is inferred through some process of conventionalization (the stance of e.g. Levin and Rappaport Hovav 2008). Or perhaps *guillotine* is polysemous between manner and result uses, giving rise to the impression that it encodes both (as both a reviewer and Beth Levin, pers. comm., suggest). Alternatively, *guillotine* could encode both meaning components, but they are different from those found in canonical manner and result verbs. If event structures constrain noncancellable verbal meanings and are constructed in ways that predict complementarity between two specific meaning components, it is an important question whether the meanings associated with supposed manner+result verbs really are the same as those in manner and result verbs, and thus we devote some time to this. We consider the various alternatives again in section 4.4.

3 Result Meanings and Manner of Killing Verbs

We begin by looking at result diagnostics. First, it is important to define what is meant by a result. Since we are specifically addressing RHL's claim of a manner/result complementarity, we adopt their notion of a result, wherein result verbs are those that:

> [denote] events of scalar change . . . where a scale is a set of degrees—points or intervals indicating measurement values—on a particular dimension (e.g., height, temperature, cost), with an associated ordering relation (RHL, p. 28)

Thus having a result means encoding some change measured along a scale of possible values in some property of the patient (see also Krifka 1998, Hay, Kennedy, and Levin 1999, Kennedy and McNally 2005, Kennedy and Levin 2008, Beavers 2008, 2011b, and Rappaport Hovav 2008 for various formalizations and further discussion).[1] Beavers (2008) (building on Tenny 1992, 1994, Hay, Kennedy, and Levin 1999), proposes that scalar change verbs fall into three broad classes: change along a property scale (e.g. *warm, cool, break*), change along a path (i.e. motion, e.g. *enter, exit, walk to*), and creation/consumption (i.e. change along a volume or existence scale, e.g. *eat, drink, build*). The canonical examples of scalar change verbs are deadjectival "degree achievement" change-of-state verbs such as *warm* in (8), where the soup undergoes a change along a totally ordered temperature scale of degrees of warmth.

(8) I warmed the soup $\approx$ the degree of warmth of the soup increased.

At the end of the event, the degree of warmth of the patient is greater along the temperature scale. However, although RHL give this definition of result, they do not systematically lay out diagnostics for result-hood rooted in it. We develop three such tests below, along the way showing that manner of killing verbs pass these tests and thus are result encoding.

3.1 Result Diagnostic # 1: Denial of Result

In an event of change along a scale ϕ, the patient necessarily has a different degree of ϕ at the end of the event than the beginning. As such, it will be contradictory to follow any predicate headed by a result verb with a denial that the patient has undergone a change in some named property. As Beavers (2011b) suggests (following Kratzer 2000), one test is to see if denying the past participle form of the verb applied to a DP coreferential with the putative patient yields a contradiction, as shown with uncontroversial result verbs in (9) (where the pronoun is to be interpreted as coreferential with the argument being tested for patientivity, here the object in the first clause).[2]

(9) a. #Shane just broke the vase, but it is not broken.
b. #Shane just shattered the bottle, but it is not shattered.
c. #Shane just destroyed his house, but it is not destroyed.

However, it could be argued that this diagnostic does not show that all of these verbs encode the *same* notion of result. Thus we might instead find some single, nonverb-specific inference for all result verbs. Beavers suggests *Something is different about x* for property change and creation/consumption predicates, where *something* is interpreted as an intrinsic physical property (see also Wolff 2003:41, who gives *something happened to x*, citing Shibatani 1976; Beavers gives *x is somewhere else* for motion verbs; see section 5.1). As (10) show, denying this also gives rise to a contradiction with canonical result verbs.

(10) a. #Shane just broke the vase, but nothing is different about it.
b. #Shane just shattered the bottle, but nothing is different about it.
c. #Shane just destroyed the house, but nothing is different about it.

By contrast, prototypical manner verbs fail to generate a contradiction with continuations that deny a result. Precisely this point is discussed for surface contact verbs such as

sweep, rub, and *wipe* by Rappaport Hovav and Levin (1998:101), who remark that:

> ... none of these verbs, in its most basic use, entails a resulting change in the contacted surface. Thus, although a floor is typically swept in order to remove dirt and debris, a floor that is swept need not end up being clean. Although a hearer will infer that a swept floor is a clean floor because the conventional goal of sweeping is to clean a floor, there is nothing contradictory in saying *Tracy just swept the floor, but there are still crumbs on it*.

Of course, their continuation is a specific one pertaining to specific verbs (cp. result participles above). But the more general *but nothing is different about x* has the same effect as in (11), and similarly with other canonical manner verbs such as unergatives as in (12).

(11) a. Tracy just swept the floor, but nothing is different about it.
b. Tracy just wiped the floor, but nothing is different about it.

(12) a. Bob just yelled, but nothing is different about him.
b. Bob just ran quickly, but nothing is different about him.

Thus, unsurprisingly, canonical result verbs, but not canonical manner verbs, have a result entailment.[3] Note that these diagnostics are insensitive to manner encoding; a verb passing one of these tests may also encode manner, a point that will be relevant in section 4.

Turning now to manner of killing verbs, the examples in (13) show that these verbs generate a contradiction in this frame, patterning with canonical result verbs.

(13) a. #Jane just drowned Joe, but nothing is different about him.
b. #Jane just hanged Joe, but nothing is different about him.
c. #Jane just crucified Joe, but nothing is different about him.

Thus manner of killing verbs have a result component. What exactly the result is is not important, though we believe it to be death. Our claim — that these verbs encode both a

manner and a result — is valid so long as they encode *some* result, death or otherwise. For example, our intuitions are that one cannot survive a guillotining, but if for example a zombie can, it has still lost its head (or some appendage; see footnote 9) and thus there is still a result. Similarly for *crucify*, while we have strong intuitions that death must ensure, were one to claim it did not, there is still a change of location (being hung up in a particular configuration), and thus a result. One verb where there has been more equivocation is *electrocute*. We and other speakers we have consulted believe it must describe death, while many others (including one reviewer) have suggested it has a meaning more like *shock*, with no particular result state (the OED offers both definitions). For the latter set of speakers, it is simply not a result verb. Thus although speakers may disagree on the exact result, except for *electrocute*, there is no disagreement that *some* result obtains.

3.2 Result Diagnostic # 2: Object Deletion

Our second diagnostic is a set of related tests that comprise the bulk of those adopted by RHL, namely that transitive manner verbs, but not transitive result verbs, permit their objects to be omitted in certain contexts. RHL do not themselves link this directly to scalar change, but Rappaport Hovav (2008:24) proposes that scalar change verbs disallow object deletion since "…scales require that the participant whose property is measured out by them is overtly realized." This condition may follow from Rappaport Hovav and Levin's (2001:779) "Argument-per-Subevent Condition" whereby there must be at least one overt argument for each distinct subevent in the verb's event structure. If scalar change involves a change-of-state (BECOME) subevent of which the patient is the sole participant, then it must be realized (see Rappaport Hovav and Levin 1998:122 for an earlier argument along these lines). Conversely, since transitive manner verbs do not encode scalar change, there is no additional subevent beyond the manner (ACT), and the object may be deleted.

The facts bear this out. An uncontroversial manner verb such as *scrub* in (14a) may

occur intransitively as in (14b), giving rise to an existentially bound reading for the patient.

(14) a. Kim scrubbed the floor.

b. All last night, Kim scrubbed.

A second object deletion context involves *out-* prefixation, as illustrated in (15), wherein the default patient object is replaced by an object representing the agent of another event.

(15) a. Cinderella scrubbed the floor.

b. Cinderella outscrubbed her stepsisters.

Conversely, result verbs do not allow object deletion (the intended reading of the (b) sentences is object drop, not inchoative, i.e. subject-deletion plus object promotion):

(16) a. Kim broke the vase.

b. *All last night, Kim broke.

(17) a. Kim shattered the can.

b. *All last night, Kim shattered.

(18) a. Kim destroyed the house.

b. *All last night, Kim destroyed.

Similarly, although our judgments are less sharp, they are also odd with *out*-prefixation:

(19) a. ??Kim outbroke the other vase-smasher.

b. ??Kim outshattered the other bottle-shatterer

c. ??Kim outdestroyed the experienced wrecking crew.

Thus this test separates canonical result and manner verbs, and, since it probes only for a result, is insensitive to whether manner is also encoded; we return to this in section 4.

Like result verbs, manner of killing verbs disallow object deletion and *out*-prefixation:[4]

(20) a. *All last night, Shane crucified.

b. *All last night, the executioner electrocuted.

c. *All last night, Shane drowned. (on intended reading)

(21) a. ?My executioner can out-drown your executioner's sorry ass any day.

b. ?My executioner can out-hang your executioner's sorry ass any day.

c. ?My executioner can out-crucify your executioner's sorry ass any day.

These verbs thus pattern like canonical result verbs, suggesting that they too encode a result.

3.3 Result Diagnostic # 3: Restricted Resultatives

Another diagnostic involves the range of possible resultative constructions the verb may appear in, for which manner verbs are generally less constrained than result verbs. For example, Rappaport Hovav (2008:22) claims that "[a] verb with no lexically specified scale can appear with a variety of results. In contrast, verbs which have lexically specified scales . . . are very restricted in the kinds of resultatives they can appear with."[5] This follows if result XPs denote states on scales which must be compatible with the scale determined by the verb (following Wechsler 2005a, Beavers 2008). This is illustrated in (22), where the manner verb *scrub* allows a range of result XPs predicated of the default object of *scrub* as in (22a), plus XPs predicated of nonsubcategorized objects as in (22b-d).

(22) a. Cinderella scrubbed the table clean/shiny/bare.

b. Cinderella scrubbed her knees sore.

c. Cinderella scrubbed the dirt off the table.

d. Cinderella scrubbed her house-cleaning competitors out of business.

This contrasts with result verbs like *dim*. While such verbs do allow result XPs, they must be compatible with the result encoded already in the verb, as in (23a,b) for *dim*. Similarly, result XPs with nonsubcategorized objects are generally not allowed, as in (23c).[6]

(23) a. Then the biologists dimmed the room to the level of starlight . . .
(www.findarticles.com/p/articles/mi_m1134/is_2_112/ai_98254950)

b. *We dimmed the room empty. (Rappaport Hovav 2008:22-23)

c. *Kim dimmed her eyes sore.

There is nothing pragmatically implausible about (23b) or (23c). There could be situations in which one clears a room by dimming the lights until everyone leaves, or that dimming the light strained Kim's eyes to the point of soreness. But these situations cannot be described by (23b,c). Other uncontroversial result verbs such as *break* are similar, where in (24a-b) result XPs compatible with the encoded result are acceptable, but result XPs that are not are unacceptable as in (24c-e), as are results with nonsubcategorized objects as in (25).[7]

(24) a. Kim broke the stick in half.

b. Kim broke the stick into pieces.

c. #Kim broke the stick across the room.

d. #Kim broke the stick purple.

e. #Kim broke the stick into the ground.

(25) *Kim broke her knuckles sore (by breaking the glass with her fist)

This suggests that these verbs already encode specific results, ruling out many result XPs. That said, Beavers (2011b) notes (in contrast to the stronger statement from Rappaport Hovav above) that among result verbs there is variability in how many result XPs are possible, so that *cool* allows only degrees of temperature while *cut* allows a range of outcomes, including degrees of being cut up but also shapes — in other words, things that are not cuttedness states *per se* but follow from or are connected to them. Beavers also suggests that certain manner verbs — surface contact and impact verbs such as *hit* and *kick* — also encode latent scales that limit result XPs (building on Tenny 1992:20, (42); see also Simpson 1983:151), although the constraints are rather loose. The key point again is that result

verbs as a class tend to have more constraints than manner verbs, and in some cases the constraints are rigid.

Manner of killing verbs pattern like result verbs on this diagnostic, in that the result XPs they occur with are more restricted. While they can take result XPs specifying (redundantly) death, as in (26), they cannot take result XPs that specify other end states, as in (27), despite the pragmatic plausibility of these sorts of manner+result combinations.

(26) a. Faulty ground wires in a building electrocuted him to death in 2004. (`buzz.yahoo.com/article/1:y_news:31f4c8213ef1e2e4e5ae60d75a00b97f`)

b. When he came, his semen short circuted (*sic*) the sander and electrocuted him dead. (`www.zcultfm.com/~comic/viewtopic.php?t=27769&f=2&view=previous`)

(27) a. #Shane electrocuted the prisoner to a crisp.[8]

b. #Shane drowned Sandy blue.

c. #Shane hanged the prisoner thin.

d. #The Romans crucified Jesus to the tomb.

Likewise, manner of killing verbs do not permit nonsubcategorized object result XPs:[9]

(28) a. #Shane electrocuted the handle right off the wall.

b. #Shane drowned Sandy's lungs totally full of water.

c. #Shane hanged the noose off.

d. #The Romans crucified the cross in half.

Thus manner of killing verbs again behave like uncontroversial result verbs.

3.4 Interim Summary: Manner of Killing Verbs and Result Diagnostics

We have reviewed several truth conditionally-based diagnostics for result, all based to some degree on the definition of result as scalar change, and all technically independent of whether any given verb also encodes a manner. Crucially, the diagnostics all indicate that

manner of killing verbs encode a result, though we have not yet shown that they also encode a manner. However, before turning to this, we briefly ask whether we can be more specific about what kind of scalar change manner of killing verbs encode. Not all scalar changes are identical. Indeed, there are in general two major types of scalar changes (Kennedy and McNally 2005:346-347, Beavers 2008:250-251). In simplex changes the scale consists of just two values for property ϕ — $\neg\phi$ and ϕ — and the patient transitions from one to the other. States on two-point scales are associated with the category of nongradable adjectives, which are distinguished as being relatively incompatible with comparative morphology, as in (29a). In complex changes the scale consists of more than two values, indicating different degrees of ϕ. States on these scales are associated with the category of gradable adjectives, which are readily compatible with comparative morphology, as in (29b).

(29) a. Nongradable: *break, arrive, pregnant* (cf. *#more broken/arrived/pregnant*)

b. Gradable: *cool, dry, flatten* (cf. *cooler, drier, flatter*)

Using gradability of the deverbal adjective as a diagnostic, (30) shows that manner of killing verbs encode change along a two-point scale, in other words nongradable scalar change.

(30) #more hung, #more drowned, #more electrocuted, #more crucified.

This is not surprising: these verbs encode death, and dying is generally viewed as nongradable change (cp. *#more dead/killed*). We do not dwell on this further here, though it will be important later in defining a manner diagnostic related to the durativity in section 4.3.

4 Manner Encoding and Manner of Killing Verbs

Having shown that manner of killing verbs encode a result, we now show that they also encode manner, and are therefore manner+result verbs, counterexemplifying the truth conditional complementarity hypothesis. Once again, to stay as close to RHL as possible, we adopt their definition of manner as nonscalar (i.e. nonmeasurable) change (RHL, p. 32):

> A nonscalar change is any change that cannot be characterized in terms of an ordered set of values of a single attribute ... The vast majority of nonscalar changes deviate from scalar changes in another, more significant respect: they involve complex changes—that is a combination of multiple changes—and this complexity means that there is no single, privileged scale of change

Thus a manner is a complex sequence of separate changes that collectively define an action, but do not necessarily add up to a single cumulative change along any one dimension. Furthermore, something not made explicit by RHL, these changes are presumably also only temporary, in that there is no entailment that any subset of them holds at and/or persist beyond the end of the event. Otherwise, it would be difficult to defend the position that they do not constitute a result. Perhaps a paragon example of nonscalar change is the movement of arms and legs during running: the various movements of the limbs do not add up to any one particular change along any one specific scale, and the position of the limbs could well be exactly the same at the end of the event as at the beginning. Thus manner and result can be seen as forming a dichotomy of types of changes — nonscalar vs. scalar.

However, while this definition of result admits a relatively coherent unifying factor — change along a scale — it is not so clear what single positive diagnostic might unify *all* manners on this definition, which presumably include not just types of physical motion, but also ways of speaking, making noise, emitting light, and even ways of sitting still. Neither RHL nor Rappaport Hovav (2008) address this issue, and it points to the need for further, more explicit work on what exactly manner is. Nonetheless, since our goal is to investigate manner/result complementarity based on RHL's criteria, we stick to their definition as is (which is sharp enough to have some empirical consequences). The challenge is in finding diagnostics for manner as a unified category, given the heterogeneity of nonscalar change.

Rappaport Hovav (2008:23) proposes that manner verbs can be picked out by acceptability with object deletion: since result verbs disallow object deletion, manner verbs must allow it (see section 3.2). However, this is an erroneous conclusion. First, object deletion is supposedly licensed by *not* encoding scalar change, which is not the same as encoding *non*-scalar change, in other words it is not positively associated with manner. Second, taking object drop also as a manner diagnostic means that it can only pick out manner in the *absence* of result; a verb that encodes *both* should not permit object deletion by virtue of encoding result, despite also encoding manner. In other words, this test as originally formulated presupposes a binary contrast, taking the existence of only two verb types for granted. But we are interested in a three-way contrast between result verbs, manner verbs, and manner+result verbs. Thus if we accept obligatory objects as a positive result diagnostic, as we do, we need separate diagnostics for manner. We develop three such diagnostics below.

4.1 Manner Diagnostic # 1: Selectional Restrictions

First, if a transitive verb has a manner component in its meaning, then it imposes selectional restrictions on its subject. Result verbs can also have restrictions on their subjects, but they impose fewer than transitive manner verbs, permitting inanimates and natural forces as well as animates. Manner verbs, by contrast, generally do not permit natural forces or inanimates (with the exception, in the latter case, of inanimates that are interpretable as animate, as with certain machines, or as instruments under the control of some agent, as with a reviewer's *I like how this mop scrubs the floor*). This contrast between result and manner verbs follows if result but not manner verbs require no specific action of their subjects:[10]

(31) a. John broke/shattered the vase with a hammer.

b. The hammer broke/shattered the vase.

c. The earthquake broke/shattered the vase.

(32) a. John scrubbed/wiped the floor with a stiff brush.

b. #The stiff brush scrubbed/wiped the floor.

c. #The earthquake scrubbed/wiped the floor.[11]

This test has also been proposed by Van Valin and Wilkins (1996:310) for identifying agentivity in a verb's meaning, a notion presumably related to manner, and in the causative/inchoative alternation literature as determinant of which causatives have inchoative forms, namely those that impose no conditions on their subjects other than causation (cf. *The rope snapped/*cut*; Guerssel et al. 1985, Hale and Keyser 1987, Haspelmath 1993, Van Voorst 1995, Reinhart 1996, 2002, Levin and Rappaport Hovav 1995, Koontz-Garboden 2009, *inter alia*).[12]

Manner of killing verbs, like manner verbs, disallow inanimates and natural forces:

(33) a. John hanged/crucified Jesus with sailing rope.

b. #Sailing rope hanged/crucified Jesus.

c. #The wind hanged/crucified Jesus (by opening the trap door/raising his cross).

(34) a. The revolutionaries guillotined the queen with a rusty blade.

b. # The rusty blade guillotined the queen.

c. # The heavy wind guillotined the queen (by loosening the blade).

Thus manner of killing verbs place restrictions on their subjects, just like manner verbs.

4.2 Manner Diagnostic # 2: Denial of Action

A more direct way to diagnose manner would be to look for inferences that follow from verbs encoding it. We could look at verb-specific inferences, as we did in section 3.1 with past participles of specific result verbs. For example, with *jog* or *blink* it is straightforward to isolate particular manners that cannot be denied in each case (e.g. *#John ran, but did not move his arms and legs* or *#John blinked, but did not move his eyelids*). Conversely, with *break* or *destroy* it is harder to isolate such an action (e.g. *John broke/destroyed the vase, but didn't move his arm/drop it off a ledge/kick it with his foot/etc.*). However, like

the past participle test, this approach is potentially open to the criticism that we have not shown that the relevant noncancellable inferences for each verb constitute the *same* notion of manner. So we might look for some single, nonverb-specific inference that holds for all manner verbs, in other words the manner equivalent of *something is different about x*.

Unfortunately, as noted above, manner is a very broad category and is unlikely to have a single set of inference patterns associated with it. Thus we take on a more modest goal: to identify a class of manner+result verbs, it is sufficient to isolate just one type of manner, and if a verb encodes this as well as a result, then we can conclude that manner+result verbs exist. We therefore focus on intuitively the most canonical type of manner, namely moving various parts of the human body in exhibiting a certain action (e.g. in forming some physical pattern or manipulating an instrument), which for convenience we call being an "actor." This implies change (i.e. movement), but it is not scalar since it may involve sequences of unrelated movements and no lasting effect. If someone is an actor, it should be impossible to assert that they performed the action specified by the verb and yet *didn't move a muscle*. As expected, prototypical actor-oriented manner verbs, such as manner of motion verbs as in (35), are contradictory in this frame, showing that they encode actor-oriented manner.

(35) #Jim ran/jogged/blinked, but didn't move a muscle.

By contrast, if all result verbs encode is a result but not (any specific type of) action, then it *should* be possible to deny that action occurred. But, focusing again on manner of causation, how can one cause something without acting in some way? It is not our goal to outline a general theory of causation, but an example might be negligence — failing to act in some (expected) way to prevent a change from occurring, thereby being responsible for it. In fact, exactly such a type of causation is subsumed under the force-dynamic model of causation of Talmy (1976, 1988, 2000), later expanded on by Wolff (2003, 2007), Wolff and Song (2003), and Wolff et al. (2010), who propose a typology of causation types that invoke

not just a notion of causation by action (CAUSE), but also aiding and letting (ENABLE) for cases where a change is in progress and the "enabler" does not stop it and/or aids it in its progress. Negligence falls under an ENABLE-type causation that Talmy (2000:420-421) calls "extended letting" (giving *The plug's staying loose let the water drain from the tank*), wherein some causer that could stop some patient from changing nonetheless remains disengaged from the ongoing change.[13] Of course, not every failure to prevent something is causation — as Talmy (2000:477) points out, *I emptied the tank* cannot be true if the speaker was merely present but doing something totally unrelated to the tank. However, if there is some specific possibility or expectation of preventing a change, that participant could conceivably be said to have caused the change by failing to stop it.

With this in mind, if result verbs encode causation but not actorhood *per se*, then they should in principle be compatible with *didn't move a muscle* in a negligence context, even if other prerequisites for actorhood (e.g. animate, human) are met. This is possible, as shown in the following context with *destroy*, where the owner of a car can be said to have destroyed the car through (deliberate or nondeliberate) negligence, a type of *non*action.[14]

(36) Jim destroyed his car, but didn't move a muscle — rather, after he bought it he just let it sit on his neighbor's lawn on cinder blocks, untouched, until it disintegrated!

Thus, at least some result verbs do not in fact seem to actually encode actorhood.

However, as a reviewer points out, some supposed result verbs seem to resist this frame, including in particular *break*. For example, (37) seems at first to be a contradiction.

(37) #Kim broke my DVD player, but didn't move a muscle.

However, although animate causers are *typically* actors in breaking events, this is not always the case, and even here negligence is possible. This is illustrated by placing (37) in the negligence context in (38), which seems to mitigate the apparent contradiction:

(38) Kim broke my DVD player, but didn't move a muscle — rather, when I let her borrow it a disc was spinning in it, and she just let it run until the rotor gave out!

Thus at least some canonical result verbs allow readings where the causer is not an actor. The reason (37) seems infelicitous is that, absent an appropriate negligence context, the default reading for result verbs with human subjects is that an action was performed. But this is not part of the verb's meaning, and is instead derived pragmatically, in line with the pragmatic principle recognized by Holisky (1987:118-119) for interpreting human causers as agents in the absence of contrary evidence (see also Van Valin and Wilkins 1996).[15]

Manner of killing verbs pattern with manner verbs in that it is contradictory to assert that the causer killed the patient with one of these verbs and to deny any action was performed, even in the sorts of contexts, like those above, where causation is entailed but actor-hood is not. This is illustrated by (39), where, to our ears, one cannot be accused of electrocuting, hanging, drowning, or crucifying someone simply by negligently failing to prevent it, in contrast with the pure result verbs in (36) and (38).

(39) a. #The governor electrocuted/crucified the prisoner, but didn't move a muscle — rather, after taking office she failed to issue a pardon!

b. #The governor drowned/hanged the prisoner, but didn't move a muscle — rather, during the execution she just sat there, tacitly refusing to order a halt!

This is not to say that the governor in (39) could not be held responsible for the prisoner's death, but it is not possible to express this with a manner of killing verb. Thus these verbs entail that their causers have actor-oriented manner, and are therefore manner-encoding.

4.3 Manner Diagnostic # 3: Complexity of Action

A third diagnostic relates to the complexity of the action named by the verb. RHL (p. 32) suggest that "the vast majority" of manners are *complex*, consisting of a series of sepa-

rate changes. Dowty (1979:170-171) further notes that complex manner verbs like *waltz* require nontrivial time intervals to evaluate (i.e. more than two moments; waltzing requires at least three steps). Thus complex manner verbs should be durative, and this can serve as a diagnostic. A standard durativity test is *take/spend an hour* (Kearns 2000:206). *Take an hour* has an *after an hour* reading when it embeds a punctual, telic predicate as in (40a), but either an *after* or *during an hour* reading with durative telic predicates, as in (40b).[16] Durative atelic predicates take *spend an hour*, which has only a *during* reading, as in (40c).

(40) a. **Punctual (telic) predicates:** *take an hour → after an hour*
It took John five minutes to blink/jump/clap (once).

b. **Durative telic predicates:** *take an hour → during/after an hour*
It took five minutes to carve/make/build the toy.

c. **Durative atelic predicates:** *spend an hour → during an hour*
John spent five minutes running/jogging/exercising/playing.

The correlation of complex/simple manners to durativity/punctuality is illustrated in (41a,b) for uncontroversial manner verbs indicating simple and complex actions respectively.

(41) a. It took John five minutes to blink (once). (*after five minutes*; punctual)

b. John spent five minutes running. (*during five minutes*; durative)

Thus we should be able to probe for complex manners by looking at the durativity.

However, as Beavers (2008) has shown, durativity is *also* contingent on the nature of the result: changes along multi-point scales result in durative predicates, and changes along two point scales result in punctual predicates. These two possibilities are illustrated in (42a,b) for uncontroversial result verbs encoding simple and complex change respectively.

(42) a. It took Jim five minutes to break the window. (*after five minutes*; punctual)

b. It took Jim five minutes to clean the table. (*after/during five minutes*; durative)

So what if a verb encodes both manner *and* result? The effects of one on durativity would mask the effects of the other. A punctual predicate could either encode just a simple manner or just a two-point change, or both, but nothing about its punctuality indicates which. A durative predicate allows more possibilities: it may encode either a complex manner (where the change can be simplex, complex, or nonexistent), or a complex change (where the manner can be simple, complex, or nonexistent). But durativity does not tell us which it is.

However, if we know independently that the change for some verb is simple, so that the scale has only two points, then if the predicate is durative, it must be because there is a complex manner. In fact manner of killing verbs do encode two point change: not dead to dead (see section 3.4). Thus by virtue of the change, they *should* be punctual. If they are not, then it *must* be because of a manner component. In fact, many manner of killing verbs are durative, as in (43), where *take an hour* allows both an *after* and a *during* reading.

(43) It took me five minutes to drown/hang/crucify Jim … (*during/after five minutes*)

AFTER: because I lacked the courage.

DURING: because this is how long it takes to kill someone by holding them under water/cutting off their air/nailing them down, hoisting them up, and waiting.

Thus again (at least some) manner of killing verbs have a manner component.[17]

4.4 Manner Diagnostic Summary

In this section, we have taken RHL's definition of manner as nonscalar change and developed truth conditional diagnostics that test for it, independent of any result in a verb's meaning. We have shown on the basis of these tests that manner of killing verbs encode a manner. However, we showed in section 3 that these verbs also pass result diagnostics. Thus manner of killing verbs encode both manner and result, therefore counterexemplifying manner/result complementarity as a truth conditional claim about possible verb meanings.

However, as noted in section 2, some alternatives present themselves. It could be that each verb only encodes a manner or result, and whichever is not encoded arises through some conventional inference based on the specific encoded meaning as per Levin and Rappaport Hovav (2008). However, if this were so, the additional inference should be defeasible; yet in the above tests it was not possible to just cancel away either meaning component. Conversely, as both a reviewer and Beth Levin (pers. comm.) have pointed out, it could be that each verb is polysemous between a pure manner and a pure result reading. On this analysis, the reason they pass all tests for both manner and result is because the result use passes the result tests and the manner use passes the manner tests. Thus (44a) is infelicitous because this variant of *guillotine* is the result one, while (44b) is infelicitous because this variant of *guillotine* is the manner one, with neither variant encoding both at the same time.

(44) a. #The peasants guillotined the queen, but nothing is different about her.

b. #The heavy wind guillotined the queen (by releasing the blade).

However, if *guillotine* were polysemous in this way, it would actually predict the *opposite* pattern to (44). For example, in a neutral context as we have tended to use above, (44a) should admit a *felicitous* reading with *guillotine* interpreted as a manner verb, while (44b) should admit a *felicitous* reading with *guillotine* interpreted as a result verb. In other words, if these verbs were polysemous, they should *fail* all of the tests, rather than pass them. That this is not so suggests they are not polysemous, but instead encode both meanings at once.

It could also be that these verbs do indeed encode both a manner and a result, but they are different somehow from the notions found in pure manner and result verbs respectively, and thus are not subject to complementarity. However, the diagnostics we adopted were rooted in canonical manner and result verbs, and thus it seems clear that the relevant components that give rise to these behaviors are the same. Thus these verbs really do encode exactly the type of content found in both pure manner and pure result verbs, counterexem-

plifying manner/result complementarity as a truth conditional fact of verb meaning. Before we explore how this fact fits into a theory of event structure, though, we briefly consider two additional verb classes that we also show are truth conditionally manner+result verbs.

5 Other Classes of Manner+Result Verbs

In this section we briefly argue that there are verbs in other domains that also pass our diagnostics, suggesting that manner+result verbs are attested beyond Levin's (1993) *poison* verbs. We discuss two such classes here: ballistic motion and cooking verbs.

5.1 Ditransitive Ballistic Motion Verbs

Rappaport Hovav and Levin (2008) argue that there are two broad classes of ditransitives: *give*-type verbs (e.g. *give, hand*), which entail caused possession but not change-of-location, and all others, which do entail change-of-location. Their *throw*-type verbs (the ballistic motion verbs of Gropen et al. 1989:243-244) are in the latter class:

(45) ***Throw* verbs:** *fling, flip, kick, lob, slap, shoot, throw, toss*

This class is of interest since change of location is a result as laid out in section 2 — it is a change along a spatial scale of points along a path (see Beavers 2011a for an extensive discussion). However, they also encode manner. We show this for *throw, toss*, and *flip*.

The fact that these verbs encode a change-of-location is relatively uncontroversial. Indeed, Rappaport Hovav and Levin (2008:135) themselves observe exactly this, noting that "…*throw*-type verbs entail change of location … [s]omething cannot be *thrown* … without changing its location." Unfortunately, because the restricted result XP and object drop result diagnostics of section section 3.2–3.3 both work only for monotransitive verbs, we cannot apply them to *throw*-type ditransitives.[18] But the contradiction diagnostic of section 3.1 does work, and shows that a result is indeed entailed (the relevant entailment covering all of these verbs — and others of change-of-location — is x *is somewhere else*, as

mentioned in section 3.1).

(46) a. #Mary just threw John the ball, but it is not somewhere else.

b. #Mary just tossed John the ball, but it is not somewhere else.

c. #Mary just flipped John the empty can, but it is not somewhere else.

This supports the claim that these verbs entail a result, viz. a change-of-location (in particular leaving physical possession by the subject; see Beavers 2011a).

If these verbs all entail change-of-location, how do they differ from one another? Rappaport Hovav and Levin themselves propose that what distinguishes them is in fact manner:

> . . . *throw*-type verbs entail change of location but not change of possession ... What distinguishes among such verbs is how the force is imparted; they have a manner root (e.g. *lob, throw*) or, perhaps, an instrument root (e.g. *kick, shoot*). (Rappaport Hovav and Levin 2008:135)

Unfortunately, the complexity diagnostic will not work since, as Beavers (2011a) shows, nearly all of these verbs encode two-point changes and simple manners, and thus are punctual. However, *throw*-type verbs do seem contradictory with *didn't move a muscle*, even in a context where the subject could plausibly be said to be a negligent causer as in (47).

(47) [A tennis coach sets up a ball machine that sends balls to the students, and puts Isaac in charge of the machine, telling him to stop it at 4:00pm.]

??Isaac threw/tossed/flipped the kids the balls after 4:00pm, but didn't move a muscle — rather, he failed to stop the ball machine at the specified time.

Rather, to say one *threw*, *flipped*, or *tossed someone a ball* requires some manipulation of the ball. Furthermore, *throw*-type verbs show subject selectional restrictions, dispreferring inanimates (except perhaps on an instrumental subject reading) and natural forces:[19]

(48) a. John threw/tossed/flipped Sandy the ball with his new glove.

b. #The new glove threw/tossed/flipped Sandy the ball.

c. #The wind threw/tossed/flipped Sandy the ball.

Thus *throw*-type verbs encode both a result and an (actor-oriented) manner, consistent with Rappaport Hovav and Levin's (2008) claims, and thus are manner+result verbs.

5.2 Manner of Cooking Verbs

There are also verbs in Levin's (1993:243) *cooking* class in (49) that encode both manner and result. Many of these verbs describe manners of bringing about the result that a particular foodstuff go from raw to cooked (in some fashion or to some degree).

(49) *barbecue, blanch, braise, broil, deep-fry, fry, grill, hardboil, microwave, poach, roast, sauté, stew, toast* . . .

We focus on *poach, sauté* and *braise*. First, we consider result diagnostics. As (50) show, for these verbs, denying that the object changed yields a contradiction.

(50) a. #Shane just poached the egg, but nothing is different about it.

b. #Shane just sautéed the onions, but nothing is different about them.

c. #Shane just braised the chicken, but nothing is different about it.

Secondly, these verbs disallow object drop, as shown in (51).

(51) a. *All last night, Shane poached.

b. ??All last night, Shane sautéed.

c. *All last night, Shane braised.

Furthermore, these verbs disallow result XP modification where the result XP is not a further specification of the result encoded by the verb, here a state of cookedness, as in (52).

(52) a. #Shane poached the egg in half.

b. #Shane sauteed the onions straight.

c. #Shane braised the duck to the back of the oven.

(e.g. if the temperature was so hot it somehow caused the pan to move)

A reviewer finds some such examples possible, giving *Ming stewed the beef tendon stiff/soft/to pieces/black* and *You can poach these vegetables green, even though they are pale yellow when raw* (our judgments are that the latter is unacceptable and the former unacceptable with *black*). However, as noted in section 3.3, some result verbs may allow result XPs that are more loosely connected to the verbal result (here cookedness, though this may encompass textures and colors). What matters most is that the possible result XPs are somewhat constrained. Finally, result XPs predicated of nonsubcategorized objects are unacceptable:

(53) a. *Shane poached the water bacteria-free. (e.g. while poaching an egg)

b. *Shane sautéed the seasoning off the pan. (e.g. while sautéing onions)[20]

c. *Shane braised the pan dry. (e.g. while braising duck)

Thus these verbs clearly encode a result, which seems correct given their intuitive meaning.

Turning to manner, the durativity diagnostic is unfortunately hard to apply. As discussed above, this diagnostic relies on the verb encoding a nongradable scalar change, and indeed Levin (2008) suggests that this is true for at least *sautée* and *poach*:

(54) a. #This egg is more poached than that one.

b. #These vegetables are more sautéed than those. (Levin 2008:15)

However, we find these data relatively acceptable. Furthermore, although *more* may be unacceptable or less common with these adjectives, *lightly* or *slightly*, which also convey multiple degrees, are not difficult to find examples for, and such a modifier is generally not acceptable with nongradable adjectives (cp. *#(s)lightly dead/pregnant*):

a. Eating lightly sauteed cabbage and raw granola cereal at 1am. Am I pregnant or

what? LOL (www.twitter.com/KristensRaw/status/7361004218)

b. Chard can also be lightly braised in stock or warm water. (www.wisegeek.com/what-are-some-different-ways-to-cook-chard.htm)

Thus these verbs seem to encode gradable scales, and are therefore expected to be durative (cp. *It took him ten minutes to sauté/poach the ham* allows a durational reading), obscuring any effect of manner.[21] Nonetheless, our other manner tests suggest that these verbs do encode a manner, since the infelicity of (55) shows that it cannot at once be asserted that someone is cooking using one of the these verbs while denying that they are moving.

(55) a. #Shane poached the egg, but didn't move a muscle.

b. #Shane sauteed the onions, but didn't move a muscle.

c. #Shane braised the chicken, but didn't move a muscle.

These examples are not saved by a negligence context like the one in (56).

(56) [A salmon fillet is in a pan waiting to be poached, and John is in charge of making sure nothing happens to it until dinner time. Mary turns up the heat in the apartment so high the water in the pan starts to simmer anyway, cooking the salmon.]
#John poached the salmon, but didn't move a muscle — rather, he just sat there while the heat simmered the water.

To say one has *poached* something requires some direct interaction with the patient (and we believe the same to be true for *sauté* and *braise*). Likewise, these verbs seem to impose some subject selectional restrictions barring inanimates (except perhaps instruments) and natural forces, looking at *braise* and *sauté* for brevity (though again judgments may vary):

(57) a. Shane braised/sauteed the duck in a new Le Creuset pan.

b. ??Shane's Le Creuset pan braised/sauteed the duck perfectly.

c. ??The heatwave/even heat braised/sauteed the duck to perfection.

Thus these verbs are manner encoding as well as result encoding.

6 Manner, Result, and the Architecture of Event Structure

In the preceding sections we developed diagnostics for manner and result in a verb's meaning rooted primarily in their truth conditional content, and argued that there are verbs that have both meaning components, counterexemplifying manner/result complementarity as a truth conditional fact about verb meanings. We now consider the theoretical consequences of this, arguing that complementarity may nonetheless hold as a condition on possible event structures, albeit in ways that allow truth conditional manner+result verbs.

6.1 Complementarity in Event Structures

Rappaport Hovav and Levin's explanation for the manner/result complementarity claim relies on properties of event structures. Recall that we take a monomorphemic verbal lexeme to consist at least minimally of a pairing of a monomorphemic morphological root and a single event structure built of basic event-denoting predicates such as CAUSE, BECOME, and ACT, and a lexical semantic root that fills in the real world details of some aspect of the event structure. The event structure in turn partly determines the truth conditional meaning of the verbal lexeme in terms of the sorts of events it describes à la Dowty (1979). We begin by reconsidering certain aspects of RHL's "Lexicalization Constraint," stated in (58), from which manner/result complementarity is meant to follow as a theorem.

(58) "A root can only be associated with one primitive predicate in an event schema, as either an argument or a modifier." (RHL's (p. 25) Lexicalization constraint)

Thus in any event structure the root either modifies an ACT predicate as in (59a), giving rise to a manner verb, or it is an argument of a basic BECOME predicate as in (59b), giving rise to a result verb. But a single root has one and only one function, ruling out (59c).[22]

(59) a. [x ACT$_{<ROOT>}$]

b. [[x ACT] CAUSE [y BECOME $< ROOT >$]]

c. *[[x ACT$_{<ROOT>}$] CAUSE [y BECOME $< ROOT >$]]

However, there is an furhter (implicit) assumption: a single monomorphemic lexeme cannot have two distinct roots in its event structure, so that (60) is ruled out for a single verb.

(60) *[[x ACT$_{<ROOT_1>}$] CAUSE [y BECOME $< ROOT_2 >$]] (in a single verb)

This event structure is not ruled out *a priori*, as (per Rappaport Hovav and Levin 1998:119) it is found with complex resultative constructions (and perhaps also other complex predicates that Snyder 2001 and Beck and Snyder 2001 assimilate to the same interpretive principle as resultatives). But RHL seem to assume that such an event structure cannot be associated with a single monomorphemic lexeme, otherwise it should be possible to have in essence a "lexical resultative," and this would, by definition, be manner+result encoding.

Thus, manner/result complementarity — as a truth conditional claim — follows on RHL's theory from two theoretical assumptions about event structures:

i. There is only ever one root per lexeme.

ii. A root meaning can either contribute manner or result, but not both.

We have shown, however, that complementarity does not hold truth conditionally. Thus if (i) and (ii) do indeed derive it, at least one of them must be wrong. We argue that (i) is correct and (ii) incorrect. To demonstrate this, it is important to realize that (i) and (ii) are not assumptions of the same order. Crucially, (ii) is a claim about how much and what types of truth conditional content can be encoded in a single root (and by extension, a single lexeme). As such, it can be falsified by looking at truth conditional diagnostics, as we have done (provided we know that we are dealing with a single root in any given predicate, i.e. that (i) holds). Assumption (i), however, is not a truth conditional claim about verb

meaning, but rather a claim about how event structures are (de)composed, namely that all of the idiosyncratic meaning in a lexeme is packaged together into one single unit. As such the diagnostics needed to validate it may differ from those needed for (ii).

To identify diagnostics appropriate for (i), we look to perhaps the key property of event structural approaches to verb meaning, namely the assumption that word meanings have *linguistically significant hierarchical structure* in them, indicated in RHL's representations by bracketing. Standard data motivating a decompositional analysis of caused change-of-state predicates are the ambiguities of scopal adverbs such as *again* as in (61), which generate two readings: restitutive (restoring a prior state) and repetitive (performing an action again that had led to an instance of the given state obtaining) (see Dowty 1979:Ch.5).

(61) a. John opened the door again.

b. John flattened the metal again.

Example (61a) means either that John caused the door to be open and it had been open before, or John caused it to open and this had happened before, and (61b) is similar. The event structural explanation for this lies in the structure of event structures themselves. A larger event of caused change embeds a result root and *again* may scope over either the result root or the larger event. The details of how *again* interacts with the event structure to predict this differ from theory to theory. In theories that take event structures to represent syntactic constituents (von Stechow 1995, 1996, 2003, Marantz 1997, Embick 2004, Folli and Harley 2004, Ramchand 2008; *inter alia*), the scope difference boils down to an attachment ambiguity, where the possible attachment points are constituents, and thus to capture the restitutive/repetitive contrast the event structure must be defined so as to provide constituents that give rise to the appropriate readings. In lexical theories of event structure (Dowty 1979:Ch.5), some additional machinery (e.g. meaning postulates) is needed to ensure that when *again* modifies a predicate headed by a verb associated with the appropriate

event structure, the interpretation is such that it scopes semantically over only the result root or some larger event, though again this builds on the hierarchical structure and in principle any bracketed element can be targeted by *again*. However, in either theory some additional constraints may apply to rule out some readings (and we note one such constraint below).[23]

We remain agnostic between these two types of approaches, and focus only on what readings arise from *again* modification, assuming these two possible attachment points, though for illustrative purposes we continue to use lexicalized event structure representations. Following Dowty (1979:265, (49)) restitutive scope relies on deriving an event structure like the one in (62a) for (61a), and a repetitive reading relies on (62b).

(62) a. [[x ACT] CAUSE [y BECOME $<$ again(open) $>$]]

b. again([[x ACT] CAUSE [y BECOME $<$ open $>$]])

It will be important below to give a more explicit analysis of restitutive readings. Regardless of whether a result root is an object in a separate lexicalized event structural representation or a morphosyntactic object in a syntactically realized one, the analysis is the same, namely that the root is or has a denotation of type $< e, < h, t >>$ (with e the type of individuals, h the type of events, and t the type of truth values), as in (63a) for *open*. Restitutive *again* has a denotation that takes a stative predicate as input and outputs a stative predicate which asserts that the input state holds and held before, as in (63b) (adopting a simplified version of von Stechow's 1996:95 analysis; see also Beck and Johnson 2004:107, (21)). Composing (63b) with (63a) produces (63c) of an open state for some individual x where there had been a prior open state for x (for events e, e', $e' \ll e$ means e' temporally precedes e).

(63) a. open := $\lambda x \lambda e_1 [open'(x, e_1)]$

b. again := $\lambda P \lambda x \lambda e_1 [P(x, e_1) \wedge \exists e'_1 [e'_1 \ll e_1 \wedge P(x, e'_1)]$

c. again(open) := $\lambda x \lambda e_1 [open'(x, e_1) \wedge \exists e'_1 [e'_1 \ll e_1 \wedge open'(x, e'_1)]]$

Embedding (63c) under BECOME as in (62a) generates the restitutive reading that the patient opened and had been open before. We leave aside the exact analysis of repetitive readings, since it turns out to be irrelevant for our ultimate claims. What matters is that there are two attested scope positions for *again* — over only the result or strictly more than the result — which follows in large part from the hierarchical nature of the event structure.

Likewise, given the semantic opacity of roots assumed by all theories of event structure, another consequence of this analysis is that roots are scopal units with regard to *again*, no matter how complex the meaning of the root itself. For example, in *John cleared the table* the result state is complex, involving a series of conditions such that every part of the table is clear. Yet on restitutive *John cleared the table again*, *again* must scope over the entire result, so that once again the entire table has nothing on it. It cannot scope over just a subset of the lexical entailments, for example that again only half of the table has nothing on it.

Thus the key ingredients of decompositions are that (a) they are composed of basic decompositional operators and lexical semantic roots from which (b) they are built up hierarchically. The scope facts with *again* provide evidence for this structure. Assuming the template for manner+result verbs is caused change-of-state, to evaluate whether it is assumption (i) or assumption (ii) above that must be eliminated, we look at these verbs' behavior with scopal modifiers. If manner and result are packaged together in a single root (i.e. assumption (ii) is invalid), scopal modifiers should never scope over one to the exclusion of the other (e.g. restitutive readings should be impossible). If they are encoded in separate roots (i.e. assumption (i) is invalid), then in principle this *should* be possible.

6.2 The Decomposition of Manner+Result Predicates

We consider first the behavior of manner+result predicates that clearly have two morphological roots. The key exemplars are resultative constructions, which crucially have two overt lexemes indicating manner and result respectively. As Beck and Snyder (2001:56-57)

and Beck and Johnson (2004:108-110) discuss in detail, in such cases, *again* can semantically scope over just the result to the exclusion of the manner, as illustrated in (64).[24]

(64) a. Mary has made a sheet of metal that is flat, but it later accidentally became bent. Fortunately, John hammered the metal flat again.

b. Mary bought a new front door for her house, and installed it in an open position. Later, the wind blew it closed, so John kicked it open again.

c. Mary, a natural red head since birth, decided to dye her hair bright green. However, after seeing herself in the mirror she was mortified, so she went to her hairdresser and he dyed it red again.

In each case the reading is restitutive: in (64a) the metal need never have been hammered before, or even flattened, suggesting the event structure in (65), and similarly for (64b,c).

(65) [[x ACT$_{<\text{hammering}>}$] CAUSE [y BECOME $<$ again(flat) $>$]]

This is as predicted if the manner and result are determined by separate roots, with *again* scoping over just the result. The question is whether this analysis extends to monomorphemic manner+result verbs, wherein for example if *drown* is a "lexical resultative" with a structure like the one in (66), albeit violating assumption (i), though consistent with (ii).

(66) [[x ACT$_{<\text{drowning}>}$] CAUSE [y BECOME $<$ dead $>$]]

If so, *again* should be able to scope solely over the result, as with resultatives.

However, *again* necessarily scopes over *both* meaning components. To demonstrate this for a verb entailing death, we must appeal again to the somewhat unusual context in section 3.1 of zombies, which can be killed more than once. Consider an example where a zombie has died and been reanimated, and John drowns him. Crucially, (67) can only mean that the zombie was drowned some previous time he died. It cannot mean that he had been killed some other way and is now dying again, this time by drowning.

(67) John drowned the zombie again.

MEANS John caused the zombie to be dead by drowning again.

CANNOT MEAN John caused the zombie to become dead again by drowning, but the last time the zombie was killed it was with a chainsaw.

Thus *again* scopes over both the manner and the result, and it cannot scope over just the result as with true resultatives as in (64). Other manner of killing verbs are the same:

(68) a. The sheriff hanged the zombie outlaw again.

b. The Romans crucified the zombie leader again.

c. The governor electrocuted the zombie prisoner again.

d. Dr. Frankenstein guillotined the monster again.

If manner of killing verbs are lexical resultatives, this is unexpected.

However, it might be possible to maintain the lexical resultative analysis, but posit that these verbs idiosyncratically disallow restitutive attachment of *again*, leaving only repetitive attachment and thus only a repetitive reading. That certain attachments might be ruled out for some uses of *again* is not unheard of. Von Stechow (1995, 1996, 2003) has argued that German *wieder* 'again' shows different scopal readings with transitive change-of-state verbs depending on its syntactic position; something similar can be seen with presentential *again* in English as in *Again, John hammered the metal flat*, which requires a repetitive reading (see also Beck and Johnson 2004:112 on preverbal *again*). So it is possible that manner of killing verbs require *again* to be in a "repetitive only" syntactic position.

However, this analysis is not unproblematic. First, it is stipulative — why would manner of killing verbs but not resultatives require this if they have the same event structures? Second, *again* in (67) and (68) is post-sentential, a position in English that otherwise never requires a repetitive reading. We could get around this by saying that the repetitive reading is required not by forcing *again* into a "repetitive only" syntactic position, but by disallow-

ing restitutive attachment from any position. However, this is harder to motivate for another scopal morpheme, namely *re-* as in (69), which also has repetitive and restitutive readings.

(69) John reopened the door, and it had been open before/this had happened before.

Dowty (1979:256), Wechsler (1989), and Marantz (2007, 2009) have argued that *re-*, unlike *again*, is not structurally ambiguous with regards to the event structure of the verb, since *re-* never admits a *necessarily* repetitive reading. This follows if *re-* always has restitutive attachment, and thus a restitutive reading is always possible. Since the repetitive reading entails the restitutive reading, the former can be derived pragmatically from the latter in contexts where it also happens to be that the entire action had occurred before. This is unlike *again*, which (sometimes) *only* has a repetitive reading, requiring a genuine ambiguity.

Crucially, if *re-* is always low-scoping and manner of killing verbs are lexical resultatives, *re-* should either show a purely restitutive reading or else to be ruled out with these verbs since they seem to force high attachment of scopal modifiers. However, attaching *re-* to *guillotine* in the zombie-type context produces exactly the same reading as *again* in (67) (we thank Alec Marantz, pers. comm., for pointing this and its significance out to us):

(70) John reguillotined the zombie.
MEANS John caused the zombie to be dead by guillotining again.
CANNOT MEAN John caused the zombie to become dead again by guillotining, but last time he was killed it was with a chainsaw.

This is surprising if *re-* only has restitutive attachment. One could say that *re-* does allow repetitive attachment, and that manner+result verbs categorically require this attachment for the same reason they require it of *again*. However, this still requires some additional mechanism to rule out a restitutive reading, which is otherwise attested with resultatives. We turn next to an alternative analysis that instead maintains assumption (i) but rejects (ii),

and show that it captures all of the above data directly without any additional mechanisms.

6.3 Manner+Result Roots as "Result" Roots

An alternative would be that manner of killing verbs allow restitutive attachment (thus accommodating the standard assumptions about *re-*), but restitutive attachment gives rise to a repetitive reading. How could this be? A straightforward explanation is that these "result" roots also encode manner (rejecting assumption (ii) above, but maintaining (i)). One might object that this requires a "result" root to impose constraints on the verb's subject, despite Kratzer's (1996) claim that external arguments are introduced by distinct functional heads. However, nothing *a priori* rules out a result root from encoding not just a result, but also that (a) the result has a cause and (b) the cause is of a certain type (see Wechsler 2005b for a general critique of Kratzer's proposal along these lines).

Thus a possible denotation for the root of *guillotine* on this analysis could be (71), where it predicates a result $dead'$ of its single individual argument, but also says that it must have a cause, and further that any such cause is of a certain type, namely a guillotining.

(71) guillotine :=

$$\lambda x \lambda e_1 [dead'(x, e_1) \wedge \exists e_2 [cause'(e_2, e_1)] \wedge \forall e_3 [cause'(e_3, e_1) \rightarrow guillotining'(e_3)]]$$

Although this "result" root does not predicate directly of the actual causing event of e_1 introduced by the CAUSE predicate, it does impose a constraint that any event that caused e_1 must have been a guillotining, thus ensuring that whatever *specific* event caused e_1 must have been a guillotining, in essence indirectly constraining the actual manner of causation.[25] Crucially, if (71) were the meaning of the *guillotine* root, applying *again* as defined in (63b) generates the meaning that there is a state of death that is necessarily caused and the causing event is a guillotining, by virtue of the fact that anything that caused this state is a guillotining, and furthermore there had been a prior state satisfying all the same condi-

tions, so that it was also a state of death, it had a cause, and that cause was a guillotining:

(72) again(guillotine) := $\lambda x \lambda e_1[[dead'(x, e_1) \wedge \exists e_2[cause'(e_2, e_1)] \wedge$
$\forall e_3[cause'(e_3, e_1) \rightarrow guillotining'(e_3)]] \wedge \exists e'_1[e'_1 \ll e_1 \wedge [dead'(x, e'_1) \wedge$
$\exists e'_2[cause'(e'_2, e'_1)] \wedge \forall e'_3[cause'(e'_3, e'_1) \rightarrow guillotining'(e'_3)]]]]$

Thus while (71) does not directly predicate of the causing event, its meaning restricts the possible interpretations of that event.[26] Our analysis also allows us to maintain that *again* and *re-* show restitutive attachment with manner of killing verbs, as expected if they have caused change-of-state event structures. Thus unlike the analysis in section 6.2 that maintained assumption (ii) but eliminated (i), no additional mechanisms are needed to rule any readings out; restitutive readings do not arise because restitutive attachment generates a repetitive reading due to the idiosyncratic meaning of the root.

Our analysis also predicts that *again* cannot scope over the manner in a manner of killing verb to the exclusion of the result. This again follows from the fact that the manner is packaged with the result in the root, which acts as a scopal unit. However, a reviewer wonders why, given our assumption that there is always a causing eventuality even for lexical causatives (i.e. an ACT event in (59b)), *again* cannot scope exclusively over this very generic causing eventuality and thereby generate a kind of repetitive reading but without the result (something not possible for any position of *again*, cf. *(Again) John (again) guillotined the zombie (again)*). If *again* can target any bracketed structure in an event structure, this should be possible. However, scoping over just the causing eventuality to the exclusion of the result seems to be generally impossible even for resultatives: *(Again) John (again) hammered the metal flat (again)* also lacks this reading. This suggests that there is some general constraint on event structures ruling out scope over just the causing eventuality. Whatever this constraint is, it carries over directly to manner of killing verbs, but is also more general than and thus orthogonal to our concern about the roots of these verbs.[27]

But is there any independent motivation for assuming a class of manner+result roots? In fact there is. As suggested by Rappaport Hovav and Levin (1998) and as Koontz-Garboden (2005, 2010) shows (building on Dixon 1982), roots that denote states come in two varieties — what Dixon refers to as basic "property concept" roots that denote simple states like colors, intrinsic physical properties, and qualities, and what we call "caused result" roots that denote states that necessarily arise due to a prior event of change, which underlie certain classes of change-of-state verbs such as *thaw*, *melt*, and *rip*. Koontz-Garboden (2005) observes that crosslinguistically, state-denoting words based on each root class fall into two morphologically distinct classes. Those based on property concept roots are generally morphologically simple (adjectives in languages with that category) while those based on caused result roots are generally deverbal, so that for example there is no basic adjective underlying *thaw* (cp. adjective *red* underlying *redden*). Furthermore, basic property concept adjectives do not entail an event of change, but (deverbal) caused result adjectives do (e.g. *The book is red* entails no reddening, but *The ice is thawed* entails a thawing). Finally, as Rappaport Hovav (2011) argues, verbs containing caused result roots also have only repetitive readings with *again*, giving the following for *thaw* and *melt* (p.7, (14)):

(73) a. John thawed the meat again. (necessarily two 'defrostings')

b. John melted the soup again. (necessarily two 'defrostings')

If, as Koontz-Garboden (2011) argues, roots of caused result verbs have special denotations like (74), the necessarily repetitive reading with *again* follows just as with *guillotine*.

(74) thaw := $\lambda x \lambda e_1 [thawed'(x, e_1) \wedge \exists e_2 [cause'(e_2, e_1)]]$.

Thus manner of killing verbs pattern exactly like verbs with caused result roots: there are no underlying basic adjectives (e.g. no adjective for *guillotine*), adjectives that *are* based on them are deverbal and entail a prior event (e.g. *#He was guillotined, but there was no*

guillotining), and *again* has only a repetitive reading. The only difference is that manner of killing roots encode not just that there was a cause, but also a specific manner, and if they sit in result root position (cf. the *re-* facts), the lack of a restitutive reading follows.

As a side note, this root typology may also explain an observation by Chierchia and McConnell-Ginet (1990:359) that not all change-of-state verbs admit restitutive readings, noting that *John cleaned the floor again* only has a repetitive reading. If verbal *clean* contains a caused result root, this would be explained. That said, verbal *clean* would be unusual in that it does have a corresponding basic adjectival form that does not require a prior event, potentially couterexemplifying the generalization that there are no simple adjectives based on caused result roots. An explanation would be that the roots underlying both uses of *clean* are not the same — the adjective has a basic property concept root, and the verb a caused result root. But, as a reviewer points out, this is unexpected given the generalization typically associated with decompositional analyses that the entailment relationship between the verb and basic adjective (i.e. that *John cleaned his room* entails *His room is clean*) follows from the shared root (rather than just by entailment). Furthermore, this begs the question why they share the same form. It is beyond the scope of this paper to address these broader issues, but we simply suggest that if verbs based on both property concept and caused result roots exist independently, it would not be unexpected that some lexical drift may occur between two historically related, lexicalized forms. Nonetheless, this does not impact our claim that manner of killing verbs are built on the previously attested, well-behaved class of caused result roots, albeit encoding not just a cause but also a manner of the cause.

6.4 Manner+Result Roots as "Manner" Roots

Next, we should ask whether the same scope facts obtain for the other classes we discussed in section 5, namely cooking and ditransitive ballistic motion verbs. One issue here is that *again* requires that a change-of-state can occur twice, and while it is possible to construct

such cases with killing using the common understanding that certain mythical creatures can return from the dead, this strikes us as more difficult to motivate for cooking verbs (e.g. that onions, once sauteed, can become uncooked), and thus we set these aside. But for ballistic motion verbs like *throw*, a change of location and/or possession can of course be undone, and so we might ask about the behavior of *again* here. As Beavers (2011a) discusses (see section 5.1), the meaning of ballistic motion verbs is that the agent releases the ball in a particular manner, and it (possibly) comes to be with the recipient.[28] However, as Beck and Johnson (2004:113-116) discuss, applying *again* to ditransitives generates a restitutive reading where a result state of possession obtains (or is at least intended), and that possession had obtained before, but *not* that it had obtained via throwing or releasing:

(75) a. John threw Sandy the ball again.

b. John tossed Sandy the packet of peanuts again.

c. John flipped Sandy the can again.

That the possession but not the throwing is scoped over by *again* suggests that there *are* two roots, counterexemplifying complementarity as a claim even about event structures.

However, there is reason to believe this is not the case. In particular, it is widely assumed (Gropen et al. 1989, Pinker 1989, Harley 2003, Beck and Johnson 2004, Rappaport Hovav and Levin 2008, Beavers 2011a, *inter alia*) that the result state of possession found in double object constructions is contributed not by the root but by the event structure itself via some primitive HAVE predicate, predicting that all double object constructions require possession regardless of the root that occurs in them. The roots of *throw*-type verbs, conversely, contribute the ballistic manner and a separate result of releasing. On this analysis, *again* in (75) scopes over just the result contributed by HAVE, and not anything contributed by the root. This can be easily accommodated if the roots of *throw* type verbs, unlike those of manner of killing verbs, sit in the position of manner roots rather than result roots, giving a

schematized event structure such as the one in (76a), with the scope position of restitutive *again* given in (76b) (assuming a version of *again* that can apply to dyadic states).

(76) a. [[x $\text{ACT}_{<\text{throwing}>}$ z] CAUSE [y HAVE z]]

b. [[x $\text{ACT}_{<\text{throwing}>}$ z] CAUSE ([y again(HAVE) z])]

Thus on the analysis in (76a), there is only one root in the event structure, correctly predicting the behavior of *again* with ballistic motion verbs, albeit with the event structure contributing an additional result that can act as an attachment point for *again*. Interestingly, here the root is a manner root that happens to contribute a result, the opposite of manner of killing verbs, suggesting that manner+result roots may sit in either result or manner position, though more work is needed to determine when these possibilities occur.

6.5 Manner+Result Roots vs. Lexical Resultatives

In sum, the lack of restitutive readings for manner+result verbs is naturally accommodated if we assume that these verbs do indeed only contribute one root meaning at a time, maintaining assumption (i), but this root encodes both a manner and a result simultaneously, dispensing with assumption (ii). This yields at least three different types of root with regards to result and manner — result roots (e.g. for *redden*, *destroy*), manner roots (e.g. for *run, jog*), and manner+result roots (e.g. manner of killing verbs).[29] The alternative — allowing multiple roots in "lexical resultative" structure — requires additional mechanisms to rule out restitutive readings otherwise attested with resultative event structures. Thus, while each approach involves dropping one of RHL's assumptions, the manner+result root approach is preferable, as it requires no additional assumptions. Indeed, given that manner and result are two independently attested types of meanings truth-conditionally, the null hypothesis should be that there are roots encoding both (consistent with Grimshaw's 2005:85 claim that verbs are not constrained in terms of the complexity of the truth condi-

tions they encode). Furthermore, this approach brings manner of killing roots in line with the previously attested caused result roots, explaining also the adjective facts. But what about maintaining assumption (i)? Does this follow from anything? As far as we can tell it is a stipulation, since there is no *a priori* reason why a monomorphemic verb could not be associated with an event structure that idiosyncratically specifies both a manner and a result root. However, whatever determines it, the facts with manner+result verbs follow, since it entails that all of the idiosyncratic meaning of a verb is packaged into a single root. Thus while manner/result complementarity is not a truth conditional fact about word meaning per se, it is a structural one following from the number of roots an event structure can have.

7 Concluding Remarks

Impossible verbs, such as verbs with "too much" real world content, are an important issue in work on lexical semantics, and RHL's claim that there are no verbs encoding both manner and result simultaneously is one that may figure into a range of facts about lexicalization, morphosyntax, and typology. Our point of departure has been to view such a claim as highlighting a tension between what a verb may literally encode — its truth conditional content — and what possible event structures determine that meaning in universal grammar.

We have reviewed and developed diagnostics for manner and result meaning (qua non-scalar and scalar change respectively following RHL) that are crucially (a) independent of one another and (b) based primarily on truth conditional facts about the meanings of these components. These diagnostics also shed some additional light on what exactly these two meaning components are, though many questions are left for future work, including how to formalize the notion of manner. Using these tests, we have shown that some manner of killing, ballistic motion, and cooking verbs encode both manner and result, counterexemplifying RHL's manner/result complementarity hypothesis as a truth conditional fact.

However, we have also shown, using scopal diagnostics for structure in a verb's mean-

ing, that one of RHL's key assumptions about how word meanings are built — that there is only one root per verb — is valid. Thus to accommodate manner+result verbs there must exist a third class of manner+result roots, contra RHL's assumptions. This means that constraints on event structures may not cash out in constraints on possible verb meanings truth conditionally. This is not to say that such correlations do not exist, but only that one cannot necessarily look at properties of event structures to deduce possible/impossible word meanings (see Dowty 1979:125-129 for additional discussion).

Nonetheless, there may still be some validity to truth conditional manner/result complementarity. It could be that, for functional reasons, the default lexicalization pattern in languages is pure manner and result verbs, which can be combined through general combinatoric processes (such as resultative constructions) into predicates with both meanings, and true manner+result roots arise only in specialized domains where certain manner+result combinations are frequent or significant (e.g. killing and cooking). This would not blunt its predictive power. We noted in section 1 that Beavers, Levin, and Tham (2010) derive Talmy's typology partly from manner/result complementarity. However, Talmy's typology is only a tendency, and as Beavers, Levin, and Tham themselves note, the preferences towards manner vs. path encoding in the verb would follow if complementarity were also just a tendency. In any event, much can be learned about the nature of lexical meaning from strong falsifiable hypotheses like RHL's manner/result complementarity hypothesis.

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Endnotes

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[1]This definition is of course relational, involving a scale and a patient. It does not matter whether the patient is realized as a subject or an object, and thus we do not distinguish them below in terms the acceptability of our result diagnostics, unless a particular diagnostic makes explicit reference to a certain grammatical function.

[2]We use *just* in the initial clause to mitigate against the change being done and then subsequently being undone; Kratzer (2000) uses instead x *is still VPed*. Since we are interested in the semantic contribution of the verb to the clause, we avoid negation and modal operators that would obscure the relevant outcome.

[3]A reviewer questions this test with surface contact verbs, giving judgments like *#Bob just dusted/scratched/scrubbed/polished the table, but nothing is different about it.* However, we reiterate our comment in section 2 that if a verb previously classified as a manner or result verb does not pattern as such according to our tests, the original classification may be incorrect. That said, regarding these specific verbs, *dust* could be lexicalized differently for different speakers, with a result meaning "to remove dust from" or a manner meaning "to touch with a duster" (or even "to remove dust by touching with a duster"), and similarly for *scrub* and *polish* (though to us the former is a manner verb and the latter a result verb). As for *scratch*, we believe that there are two homophonous lexemes, one that takes inanimate objects and refers to the result of producing a scratch, and one that takes animate (body part) objects and refers to a manner of skin contact. (See also Washio 1997:12-16 for a similar point about *wipe* verbs in Japanese, where "removal" and "surface touching" senses are lexicalized into different, nonhomophonous verbs.) What matters to us is simply

that some verbs pattern one way with these diagnostics and others a different way.

[4]Our judgments are again not that sharp, though this is true also for canonical result verbs as in (76), thus not arguing against our point, though perhaps calling into question *out-* prefixation as a diagnostic.

[5]This distinction bears some similarity to the proposal of Washio (1997) that resultative constructions be split into what he calls "strong" and "weak" resultatives, the former roughly those that occur with verbs that do not independently entail a result, the latter with those that do. Among "weak" resultatives, the possible result XPs may be constrained by what change the verb already encodes (see also Beavers 2011b).

[6]A reviewer notes that such examples may be good in other languages, citing Mandarin as a possibility. We agree that it is an open question whether this test generalizes across languages, but focus on English here.

[7]Although RHL and Rappaport Hovav do not discuss this, there do appear to be a limited set of cases where result verbs indicating damage allow nonsubcategorized objects in the context of result XPs indicating separation, as with *John broke the branch off*, where the branch comes off rather than being broken per se. However, this does require the existence of a larger entity which is now broken as a result, and the direct object must be a subpart of this entity. Otherwise, nonsubcategorized objects in general are not possible.

[8]A reviewer who judges *electrocute* to mean *shock* (i.e. to be a manner verb) finds *electrocute* acceptable with non-death result XPs, giving the (naturally occurring) *Spider-Man has to fight Rhino in a generator room, defeating him by making him smash into six generators that electrocute him into submission* (`en.wikipedia.org/wiki/Rhino_(comics)`). For such speakers this is the expected behavior. Another reviewer finds *electrocute to a crisp* acceptable, though this may again be a *shock* reading.

[9]As a reviewer points out, this is expected of any verb that does not allow object deletion — if the object is nondeletable, then we also do not expect it to be replaceable. That

said, as another reviewer points out and as noted above, it is possible to say *The executioner guillotined the man's arm off,* demonstrating the same sort of part/subpart nonsubcategorized object property seen with *break off* in footnote 7 is possible with these verbs as well. This in fact further supports the claim that manner of killing verbs are like result verbs.

[10]For simplicity, we restrict this test to transitive result verbs, where we assume that selectional restrictions relating to manner will be imposed on the causer subject indicating the type of action that caused the change, though in principle such restrictions could also be imposed on the object (see e.g. the event structures of Rappaport Hovav and Levin 1998:113). As Fillmore (1970:128-129) notes, patienthood may also involve selectional restrictions, but for transitive result verbs these will be localized to object position and thus should have no effect on the choice of subject. However, this test cannot distinguish intransitive result and manner verbs, since all selectional restrictions of any sort will (of necessity) be imposed on their single arguments.

[11]A reviewer suggests that (32c) might be independently disallowed due to a more general constraint that lexical causatives encode "direct causation" (building on Bittner 1999:12), where an earthquake cannot directly cause scrubbing or wiping without some intervening chain of events. We disagree — a plausible direct causation scenario would be one in which a towel was on the floor and the earthquake caused it to move around, thereby scrubbing/wiping the floor. In this case, it is still odd to say (32c). Rather, *wipe/scrub* involve a particular method of applying the instrument to the patient. (See Wolff 2003, however, for evidence that direct causation is not categorically required for lexical causatives, as Bittner (p.2) herself suggests.)

[12]A reviewer does wonder if result verbs may have some constraints nonetheless, giving for example *???John's right arm/hand broke the vase* (judgments are the reviewer's). We do not find this example unacceptable, and attested cases are not difficult to find (cf. *Finally, on the fourth try, his left arm broke the glass*; `http://articles.sun-sentinel.`

com/1995-07-01/news/9507010108_1_car-plunge-canal-police-officers). Nonetheless, as noted above, it may be that some verbs previously classified as result verbs do have manner components, at least for some speakers.

[13]This in turn corresponds to what Wolff and Song (2003:44-45) call FAIL TO PREVENT and Wolff (2007:88) calls ENABLE. Most particularly, in a recent experimental study Wolff, Barbey, and Hausknecht (2010) outline and motivate the general linguistic relevance of various types of "causation by omission," including cases where something prevents itself from preventing something (pp.205-210), although their particular scenarios involve an active attempt at preventing that is suddenly stopped short, rather than wholesale failing to act at all.

[14]However, this reading of *destroy* relies on the expectation that the causer would or should have acted to stop the change, but failed to. One could instead say that result verbs *do* encode an (unspecified) action, but unlike manner verbs, it need not obtain in the real world (e.g. it is embedded under a sublexical modality à la Koenig and Davis 2001, or is a "virtual force" à la Wolff, Barbey, and Hausknecht 2010:206). In this case, there is still a distinction between manner and result verbs — the former require action in the real world, the latter do not.

[15]A reviewer notes that subject choice may have an effect as well, giving *#The army destroyed the city, but didn't move a muscle* in contrast to (36), where necessary actorhood may be a contingent fact about armies destroying cities. However, given that negligence is possible with other uses of *destroy*, *destroy* does not itself require actorhood. Conversely, no context will change the outcome of this diagnostic with pure actor-oriented manner verbs; in these cases it must be the verb itself that determines the behavior in this diagnostic.

[16]*Take an hour* is more acceptable with telic predicates while *spend an hour* is more acceptable with atelic predicates, though *spend an hour* is somewhat more acceptable with telic predicates than *take an hour* is with atelic predicates. Punctual predicates are always

telic since, being instantaneous, they encode an endpoint.

[17]A few manner of killing verbs are punctual as in (77), which could involve a beheading via one quick slice.

(77) It took me five minutes to guillotine Jim (with one slice). (*after five minutes*)

However, this does not show that *guillotine* lacks manner, only that it is not a complex manner.

[18]A reviewer suggests that we could look at the monotransitive variants for these diagnostics. We are hesitant do this, as we do not necessarily want to commit to saying that the monotransitive and ditransitive variants have the same root. However, it would be very surprising if they did not, and thus it is worth noting that monotransitive variants fail to permit object drop (e.g. *#All last night, Kim threw/tossed/flipped* on the intended readings), do not permit result XPs not directly related to motion (e.g. *#Kim threw/tossed/flipped the ball to pieces*), and do not permit nonsubcategorized object resultatives (e.g. **Kim threw/tossed/flipped his arm sore*), all consistent with them encoding result, as we claim to be the case for their ditransitive variants.

[19] Some machines, such as pitching machines, are possible, consistent with the widespread observation that machines can behave like actors (see e.g. Cruse 1973:16). As noted in section 4.1 more broadly, judgments here may vary widely depending on how one conceptualizes of the relevant subjects.

[20]A reviewer finds this sentence acceptable. We disagree and note in (weak) support of our judgements the fact that there are no hits in *Google* for either "sauteed the seasoning off" or "sauteed the teflon off" (by contrast with "burned the seasoning off" and "burned the teflon off," for which there are indeed examples).

[21]Levin (2008) uses the observation that *sauté* encodes nongradable change as evidence against its encoding a result. As discussed in section section 3.4 and 4.3, however, scalar

changes, and hence results, can be nongradable — this is the case for any achievement verb. As such, the conclusion that *sauté* does not encode a result on the basis of the inability of an adjective derived from it to take a gradable modifier is unwarranted. Rather, the more refined result diagnostics that we laid out above show that it does encode a result.

[22]We represent the cause in (78b) as an eventuality on the part of the causer x, although Rappaport Hovav and Levin (1998:107-109) equivocate on whether causation in lexical causatives is a relationship between a caused event and causing event (as with resultatives) or just an individual (e.g. [x CAUSE [y BECOME $< ROOT >$]]). For consistency we adopt (78b), but assume that the causing eventuality, if there is no manner modifier, is extremely unspecified and may not require any action in the strict sense as noted for *destroy* in section 4.2 (e.g. if it is a causing state as per Beavers and Zubair to appear; see also Van Valin and Wilkins 1996 and Koontz-Garboden 2009 on so-called "effector" subjects).

[23]A separate question is how many repetitive readings there are, or rather how many larger constituents include the result root that can be targets of *again*. For our argument it is only relevant whether the reading is restitutive or repetitive in general, so we assume for expository purposes just one repetitive attachment point.

[24]We leave open how resultatives are formed, but assume (with Dowty 1979:308-309 and Rappaport Hovav and Levin 1998:119) that the rule makes reference to (and augments) the event structure of the verb.

[25]Note that it is not sufficient for the root to say of e_2 that it be a guillotining, since there is no assurance that the actual causing event introduced by the predicate denoting causation will be equated with e_2.

[26]An analysis of this sort is not unheard of. Marantz (2009) makes an analogous argument for an apparently repetitive *re-* reading with *read*:

(78) The man reread the book.

The default reading is that the same man read the book before, as though *re-* scopes over the subject. However, Marantz suggests that this arises because the *read* root encodes a separate, unexpressed "reader" participant that is (almost always) interpreted coreferentially with the subject. This gives the appearance that *the man* is in the scope of *re-*, when it technically is not. This is similar to our analysis for manner of killing roots, where the relevant entity is the causing event. Our analysis is thus also compatible with a severed external argument analysis, either a traditional one in which causation and the causer's thematic role are introduced via one syntactic head à la Kratzer (1996), or one in which they are introduced separately à la Pylkkänen (2008).

[27]The reviewer also notes that this is a place where lexicalist and syntactic accounts of event structures differ. On a Dowtyan lexicalist account, the lack of a scopal reading over the ACT predicate must be analyzed as the absence of a meaning postulate generating that reading, something that is not independently motivated. On a syntactic theory where causation is introduced by some causal head *v* and manner roots are analyzed as incorporated or head-adjoined to it, *again* modification is ruled out independently since it targets phrasal constituents, and the causal head is an X^0 category. We are sympathetic to the syntactic account on these grounds, though ultimately the analysis of this fact is independent of our analysis of manner of killing roots.

[28]As discussed by Beavers (2011a), *actual* possession by the recipient need not obtain, though it must be the case that the recipient is capable of possession (see also Beck and Johnson 2004). We ignore this here.

[29]How exactly this finding fits in with claims about the broader typology of roots (e.g. as per Rappaport Hovav and Levin 1998, Harley 2005; Levinson 2007) is an area worth exploring in future research.