Resultatives and the Semantics of Verbal Roots

Ryan Walter Smith, Jianrong Yu

ryan.smith-3@manchester.ac.uk, jianrong.yu@kuleuven.be

October 18, 2022

Abstract

This paper develops a novel syntactic and semantic analysis of the English resultative construction, on which resultative phrases are treated as arguments of the verbal root, building on an analysis of verb roots as denoting functions from thematic roles and individuals to event predicates (Smith and Yu, 2021). We demonstrate that the analysis makes correct predictions about the interaction of resultatives with depictive secondary predicates (Bruening, 2018), agentless presuppositions with *again* (Bale, 2007; Smith and Yu, 2021), and modification of the manner event independently of the change of state (Williams, 2007). This improves on previous small clause analyses of resultatives (Kayne, 1984; Hoekstra, 1988; Harley, 2005; Kratzer, 2005, *a.m.o*) as well as previous complex predicate analyses (Dowty, 1979; Rothstein, 2004; Williams, 2015, *a.o*).

Keywords: resultatives, verbal roots, thematic roles, depictives, again, modification

1 Introduction

Resultatives are, descriptively speaking, constructions consisting of a verb describing the manner in which a result state, typically expressed by an adjectival or prepositional phrase, comes to hold of the individual denoted by the direct object. Resultatives are sometimes said to come in two varieties: one in which the direct object is naturally interpreted as the theme of the event expressed by the manner verb, and one in which it bears no thematic relation to this event. An example of the former, termed a *selected object resultative*, is shown in (1), while an example of the latter, termed an *unselected object resultative*), is shown in (2).

(1) Mary hammered the metal flat.

(2) Jeremy ran the shoes ragged.

This paper develops a novel syntactic and semantic analysis of the English resultative construction using the main tenet's of Smith and Yu's (2021) approach to the semantics of verbal roots, namely, that they take constituents of semantic type $<e,vt>$ as their first argument. We propose that the result state component of a resultative, being of the appropriate semantic type, combines first with the acategorial manner-denoting root, before the surface object is introduced via a head acting as a verbalizer, as in DISTRIBUTED MORPHOLOGY (Halle and Marantz, 1993; Marantz, 1997).

The paper is organized as follows. §2 provides the formal background and motivations for the semantics of verbal roots as developed in Smith and Yu (2021), most notably that verbal roots take constituents of type $<e,vt>$ as arguments. §3 extends this analysis to both selected and unselected object resultatives. §4 demonstrates that the analysis makes correct predictions with respect to interactions between resultatives and four other phenomena: depictive secondary predication (Bruening, 2018), agentless presuppositions

with *again* (Bale, 2007; Smith and Yu, 2021; Zhang, 2022), the availability of direct objects in unselected object resultatives, and modification of the manner event independently of the result state or change into that state (Williams, 2007). §5 compares and contrasts our analysis to other approaches in the literature, with particular focus on small clause analyses and earlier complex predicate analyses, including the outside role analysis of Williams (2007, 2015). §6 discusses the status of the DIRECT OBJECT RESTRICTION (Rappaport Hovav and Levin, 2001), and ways to accommodate this generalization on our analysis, with implications for the analysis of unergative motion constructions, which seem at first blush to challenge the DIRECT OBJECT RESTRICTION. §7 concludes with discussion of topics for future research.

2 Formal Background

Smith and Yu (2021) propose an approach to the semantics of verb roots, according to which such roots denote functions from thematic role functions of type $<e,vt>$ to functions of type $<e,vt>$[1]. On this approach, roots compose with a syntactically projected thematic role, introduced by a dedicated verbalizing *v* head, or, in the case of AGENT, VOICE (Kratzer, 1996), followed by an individual, the result of which is an event predicate. (3) provides an example of a root denotation on this analysis, where θ ranges over type-$<e,vt>$ functions.

(3) $[\![\sqrt{\text{ROOT}}]\!] = \lambda\theta_{e,vt}.\lambda\text{x}.\lambda\text{e}.\text{ROOT(e)} \wedge \theta\text{(x)(e)}$

The primary motivation for such an analysis comes from observations about the availability of *agentless presuppositions* with the presupposition trigger *again*, originally observed by Bale (2007): agentless presuppositions are possible with eventive transitive verbs, but not with intransitive verbs.

(4) CONTEXT: Seymour's dryer broke. He called **a repairwoman who simply hit the dryer until it started working**. The dryer broke down two days later. So...
Seymour hit the dryer again.

(5) CONTEXT: Last week, Jon's wife ran all morning. Then after she got home, Jon was able to do some exercise. So...
 # Jon ran again.

For Bale (2007), this differential availability of agentless presuppositions is explained by a type-theoretic difference between transitive and intransitive verbs: the former are functions from individuals, corresponding to the internal argument of the event, to event predicates, and compose with their external argument via a mediating functional head introducing the AGENT role. The latter class of verbs also denote functions from individuals to event predicates, but in this case the individual argument of the function corresponds to the verb's *external* argument. In combination with a suitable definition of *again*, as in (6) below (adapted from Bale 2007), agentless presuppositions are correctly predicted to only be available with eventive transitive verbs, as only these will be of the right type to serve as *again*'s argument prior to the introduction of the external argument.

(6) $[\![\textit{again}]\!]P(e)$ is defined iff $\exists e^1 \exists e^2 [e^1 \prec e^2 \prec e \;\&\; P(e^1) \;\&\; \neg P(e^2)]$.
When defined, $[\![\textit{again}]\!]P(e) = P(e)$. $<<vt>,<v,t>>$

The difference between transitive and intransitive verbs is therefore lexical: intransitive verbs compose with their agent arguments via FUNCTION APPLICATION. A complication for this picture is presented by Smith and Yu (2021), who note that verbs that participate in transitivity alternations allow agentless presuppositions when used transitively, but are incompatible with them when used intransitively, as the pairs in (7) and (8) demonstrate. This fact is difficult to explain if verbs in intransitive uses are lexically specified to combine with their agents lexically, but suddenly lose this requirement when used as transitives.

(7) At a ball in honor of the king, John danced the Irish jig. The king was so impressed that he had his court dancer James learn this dance, and. . .

a. **# James danced again.**

b. **James danced the Irish jig again.**

(8) CONTEXT: John decided to clean up the house he and Mary lived in ahead of a party so he swept the floor. The next day, Mary, thinking John did not sweep the floor, picked up the broom and...

a. **# Mary swept again.**

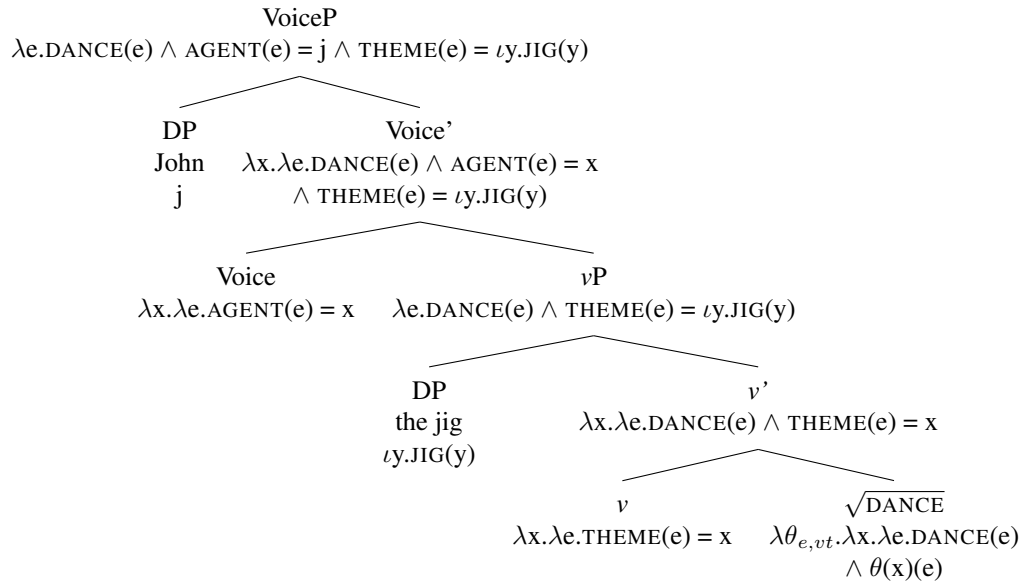
b. **Mary swept the floor again.**

Smith and Yu (2021) resolve this issue by treating eventive verb roots as uniformly of the type in (3). The availability of an agentless presupposition with *again* then turns on whether a thematic role is introduced *v*P internally or not. In the transitive case, *v* introduces the THEME thematic role, with a denotation as in (9), along with a DP in its specifier to fill that role.

(9) $[\![v]\!] = \lambda x.\lambda e.\text{THEME}(e) = x$

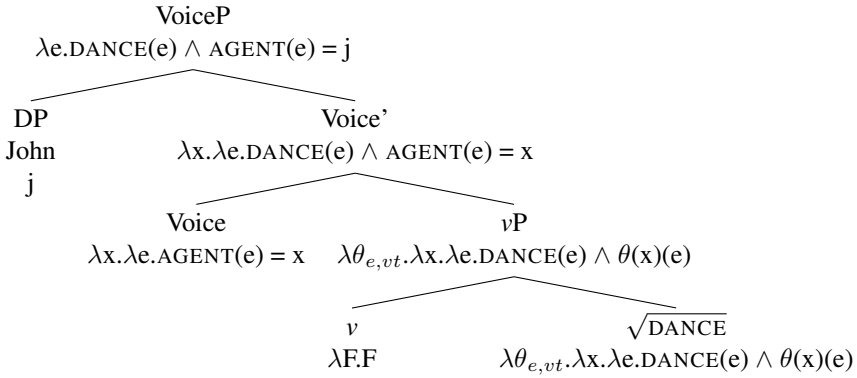
The thematic role introduced by *v* and the individual-denoting DP saturate the thematic role and individual argument of the root, respectively. The AGENT role is introduced in VOICE, as in Kratzer (1996), with the agent argument introduced in the specifier of VOICEP. VOICE composes with *v*P by Kratzer's rule of EVENT IDENTIFICATION, and the individual argument of the output of this rule is saturated by the individual-denoting DP in the specifier of VOICEP. This is summarized in the derivation in (10) below.

(10) John danced the jig.



In the intransitive case, on the other hand, *v* introduces no thematic role, and instead denotes an identity function on root denotations, effectively passing the root's meaning up to the *v*P-level. It is then the AGENT role introduced in VOICE that saturates the the root's thematic role argument, with the DP in spec,VOICEP saturating the individual argument. An example derivation of an intransitive sentence up to VOICEP is provided in (11).

(11) John danced.



Given the denotation of *again* provided in (6), we see that this analysis correctly predicts that agentless presuppositions should be possible in transitive sentences, but not in intransitive ones. In (10), *v*P is a constituent of type $<v,t>$, the appropriate type to be taken as

again's argument, and thus an appropriate node for *again* to modify. The resulting presupposition will exclude the agent, and therefore only presuppose a previous event of dancing the jig. In (11), on the other hand, *v*P is not of the appropriate type to serve as *again*'s argument; the only node of type $<v,t>$ in such cases is VOICEP, and *again*'s presupposition is correctly predicted to necessarily include the agent of the event.

3 Extending the theory to resultatives

Though described as an approach to the semantics of verbal roots *simpliciter*, Smith & Yu's analysis can be seen more specifically as concerning the semantics of roots of *manner verbs* in the sense of Rappaport-Hovav and Levin (1998, 2010). Manner verbs are verbs of *non-scalar* change that specify manners of carrying out actions, and are contrasted with *result* verbs, which specify scalar changes of state. Canonical examples of such verbs include those in (12a), while examples of result verbs are given in (12b).

(12) a. Manner verbs

blink, *jog*, *run*, *scrub*, *sweep*

b. Result verbs

open, *redden*, *break*, *crack*, *destroy*

Smith & Yu's approach lends itself to explaining certain properties of manner verbs that distinguish them from result verbs. One of these differences is the possibility of *object deletion*: transitive manner verbs allow their object to be omitted, while transitive result verbs do not (13) (Rappaport Hovav and Levin 1998; Beavers and Koontz-Garboden 2020). The "deletion" of the object is handled on Smith & Yu's analysis as in §2, where no THEME is introduced locally to the verb.

(13) a. All last night, Kim scrubbed.

b. # All last night, Kim destroyed.

A second property of manner verbs, and most relevant to the goals of this paper, is that they occur in a wide-range of resultative constructions, while result verbs do not.[2]

(14) a. Martha hammered the metal flat.

b. # Martha broke the vase valueless.

How might Smith & Yu's analysis bear on this property of manner verbs? The key to this is that, though designed with composition with a thematic role in mind, Smith & Yu's analysis does not limit verbal roots to composing specifically with thematic role functions. Rather, verbal roots denote functions from expressions of type $<e,vt>$, and are otherwise unrestricted with respect to the kinds of objects with which they can combine. As such, we expect verb roots to be able to compose with expressions other than thematic role functions introduced in *v*. We propose that this is exactly what occurs in the resultative construction: the result phrase acts as the first argument of the verb root in the same way as a thematic role function, with the verbal root itself providing the manner component of the resultative. In this section, we flesh out an analysis based on this core idea, dealing with both selected and unselected object resultatives.

We begin with our analysis of the result phrase, *flat* in (14a). At the core of the result phrase is a stative constituent, typically an AP or PP,[3] for which we adopt a standard analysis treating them as functions from individuals to predicates of states, as in (15).[4]

(15) $[\![\textit{flat}]\!] = \lambda x.\lambda s.\textsc{flat}(x)(s)$

We propose that this stative constituent then composes with an eventive head RES(ULT), which introduces a causative relation between an event and the state argument of the stative constituent (cf. Kratzer 2005). The semantics of RES is given in (16), and the denotation of the RESP resulting from composition of RES with *flat* is given in (17).

(16) $[\![\text{RES}]\!] = \lambda P.\lambda x.\lambda e.\exists s[\text{CAUSE}(e,s) \wedge P(x)(s)]$

(17) $[\![\text{RESP}]\!] = \lambda x.\lambda e.\exists s[\text{CAUSE}(e,s) \wedge \text{FLAT}(x)(s)]$

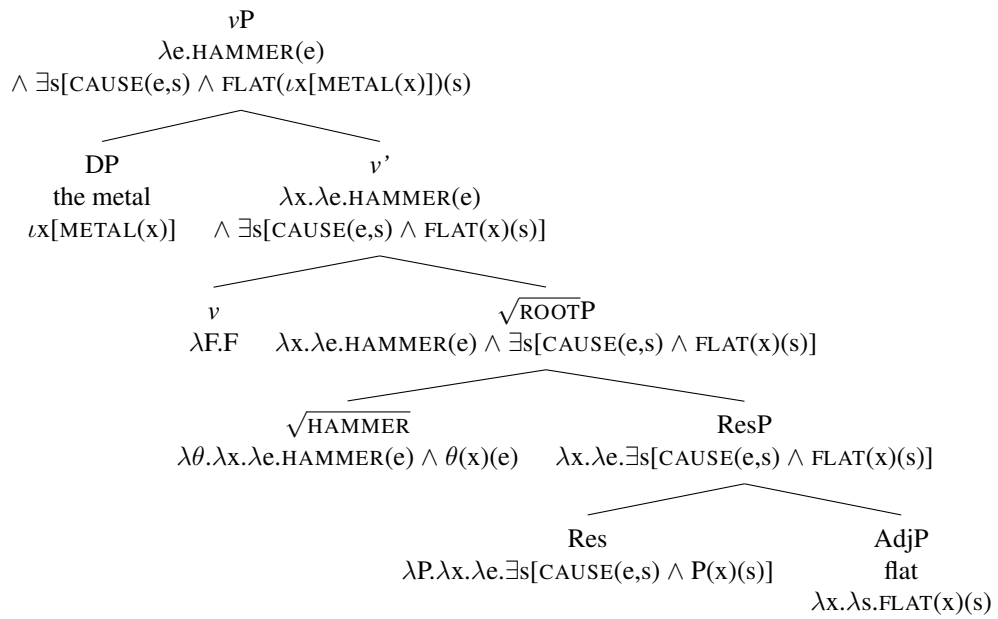
Let us consider what kind of expression RESP denotes. RESP denotes a function from individuals, of type *e*, to an event predicate, of type <*v,t*>. In other words, RESP itself is a function of type <*e,vt*>, exactly the type of the first argument of a verbal root on Smith & Yu's analysis. We propose, then, that the verbal root takes RESP as its first argument, yielding a function of type <*e,vt*>. (18) illustrates this with the root $\sqrt{\text{HAMMER}}$.

(18) a. $[\![\sqrt{\text{HAMMER}}]\!] = \lambda\theta_{e,vt}.\lambda x.\lambda e.\text{HAMMER}(e) \wedge \theta(x)(e)$

b. $[\![\sqrt{\text{HAMMER}}\ \text{RESP}]\!] = \lambda x.\lambda e.\text{HAMMER}(e) \wedge \exists s[\text{CAUSE}(e,s) \wedge \text{FLAT}(x)(s)]$

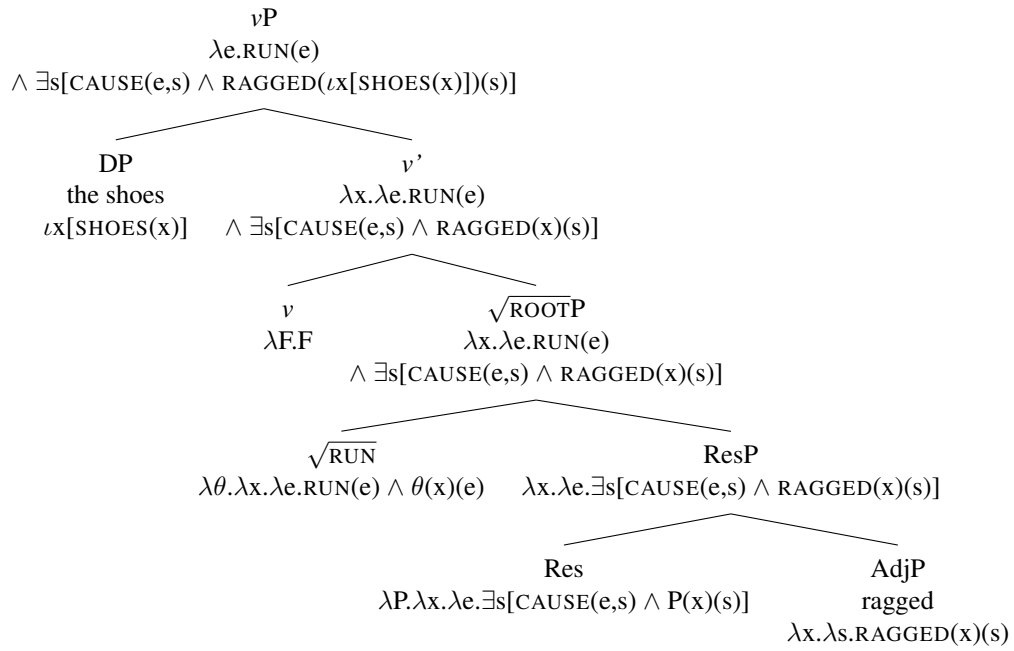
We now need to consider how this structure composes with its object, the DP *the metal* in (14a). We propose that the object is introduced in the specifier of *v*P, with *v* itself denoting an identity function that returns unmodified the meaning of the constituent containing the root and RESP. The presence of *v* here categorizes the acategorial root through head movement of the root to *v*, in line with the assumptions of DISTRIBUTED MORPHOLOGY (Marantz, 1997; Harley, 2005). The DP in the specifier of *v*P then saturates the individual argument, yielding a predicate of events as the denotation of the *v*P. The analysis is summarized in (19).

(19) Martha <u>hammered the metal flat</u>. (selected object)



The structure above reflects that of a selected object resultative. Our analysis handles unselected object resultatives in exactly the same fashion, as can be seen in (20). We thus make no syntactic or semantic distinction between selected and unselected object resultatives (as in Hoekstra 1988; Kratzer 2005).

(20) Martha ran the shoes ragged. (unselected object)



The resulting analysis amounts to a hybrid approach, consisting of an *outside object syntax* (Williams, 2015) with a *result patient semantics* like that of Kratzer (2005). This leads to correct predictions in a number of domains where other approaches fall short, which we turn to in the next section.

4 Predictions of the analysis

4.1 Interactions between resultatives and depictive secondary predicates

A crucial piece of evidence that favors our analysis comes from the interaction of resultatives with *depictive secondary predication*, which serves to describe a state that an individual holds during an event. In (21), for instance, the metal is understood to be wet during the flattening (Bruening, 2018).

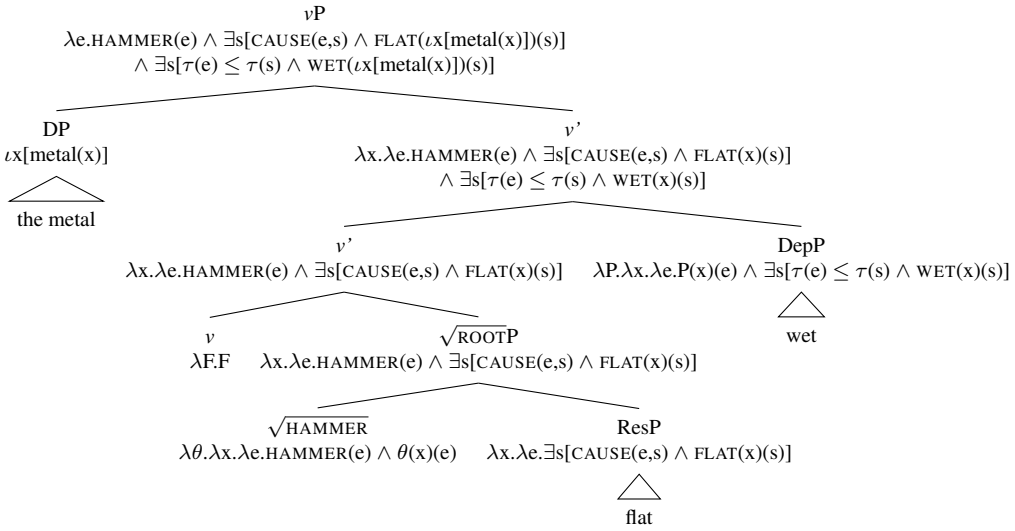
(21) She flattened the metal wet.

For the sake of concreteness, we analyze depictive phrases as adjuncts within *v*P, with a semantics like (22). On this analysis, the function of a depictive is to require that the event's *runtime* (or *temporal trace*), denoted τ(e) (Krifka, 1989), be included in the runtime of a state, τ(s). We denote the inclusion relation among temporal intervals with $\leq$, which is introduced by a dedicated functional head we label DEP(ICTIVE) (see also e.g., Pylkkänen 2008).

(22) $[\![\text{DEP } \textit{wet}]\!] = \lambda P_{<e,vt>}.\lambda x.\lambda e.P(x)(e) \wedge \exists s[\tau(e) \leq \tau(s) \wedge \text{WET}(x)(s)]$

Recall that, on our analysis, the object of the resultative is introduced in the specifier of *v*P, and composes with a function from individuals to event predicates. This makes a critical prediction: depictive secondary predicates should be able to characterize a property of the object that holds *over the course of the causing event, but not one that only holds over the course of the result state*, regardless of whether the resultative involves a selected or unselected object. A derivation for a selected object resultative showing the predicted denotation at the *v*P level is provided in (23) below.

(23) Martha <u>hammered the metal flat wet</u>.



The prediction of the analysis is borne out: as Bruening (2018) demonstrates, depictive modifiers only pick out the state of the object during the causing event, and never exclusively during the result state, as the infelicity of the (b) examples in (24-25) shows. This is true regardless of whether the object of the the resultative in question is selected (24) or unselected (25).

(24) a. It's best to hammer metal flat wet, but it's OK if it has dried by the time it's completely flat.

b. # It's best to hammer metal flat dry, but it's OK if it's wet during the hammering.
(Bruening, 2018, p. 540, ex. 6)

(25) a. That marathoner ran his shoes ragged untied, although he finally tied them once they started falling apart.

b. # Once that marathoner's shoes started falling apart he untied them, so he ran his shoes ragged untied. (Bruening, 2018, p. 549, ex. 42)

4.2 Agentless presuppositions with resultatives

Our analysis further predicts that agentless presuppositions with *again* of the kind discussed by Bale (2007) and Smith and Yu (2021) should be available with resultatives. This follows from the fact that the type of the *v*P, which does not include the agent argument, is $<v,t>$, and is therefore of the appropriate type to serve as an argument of *again*. This prediction appears to be borne out in simple examples like (26) below.

(26) CONTEXT: Mary kicked the door open. Later, **Jim kicked the door open again**.

Examples of this sort need to be treated with care, however. This is because the agentless presupposition diagnostic is confounded by an independently available reading of *again* in resultatives, the *restitutive reading*, which simply presupposes that the object held

the same *result state* previously, without requiring that the result state came about in the same manner (von Stechow, 1996). The restitutive reading of *again* is available in resultative constructions, as (27) shows (Beck and Johnson, 2004), casting doubt on the utility of simple examples in (26).

(27) CONTEXT: A door was built open, and thus has never been closed. The wind blew, and closed the door for the first time. John came up and kicked the door, causing it to regain its open state.

So **John kicked the door open again**.

Fortunately, it is possible to control for the restitutive reading of *again* by setting up contexts in which the restitutive reading is excluded. This can be accomplished by placing *again* to the left of the VP, rather than to the right, which eliminates the restitutive reading while leaving the repetitive reading intact (Beck and Johnson, 2004; Bale, 2007). We can see that even here an agentless repetitive presupposition with *again* is felicitous, while contexts satisfying a restitutive presupposition are not.

(28) CONTEXT: Mary kicked the door open. The wind blew, closing the door, so John got up and...

John again kicked the door open.

(29) CONTEXT: A door was built open, and thus has never been closed. The wind blew, and closed the door for the first time. John came up and kicked the door, causing it to regain its open state.

So # **John again kicked the door open**.

Given that we assign unselected resultatives the same syntax and compositional semantics as selected resultatives, we predict that unselected resultatives should also permit agentless presuppositions. This prediction is borne out: unselected resultatives permit agentless presuppositions, even when the restitutive reading of *again* is ruled out.

(30) CONTEXT: Jimbob's son Billy was having trouble getting to sleep, so he sang a lullaby to him until he fell asleep. Unfortunately, Billy woke up after only a short time, so Jimbob called his neighbor Juan, renowned for his soothing voice, and Juan's singing quickly lulled Billy into a profound slumber.
So **Juan again sang Billy asleep**.

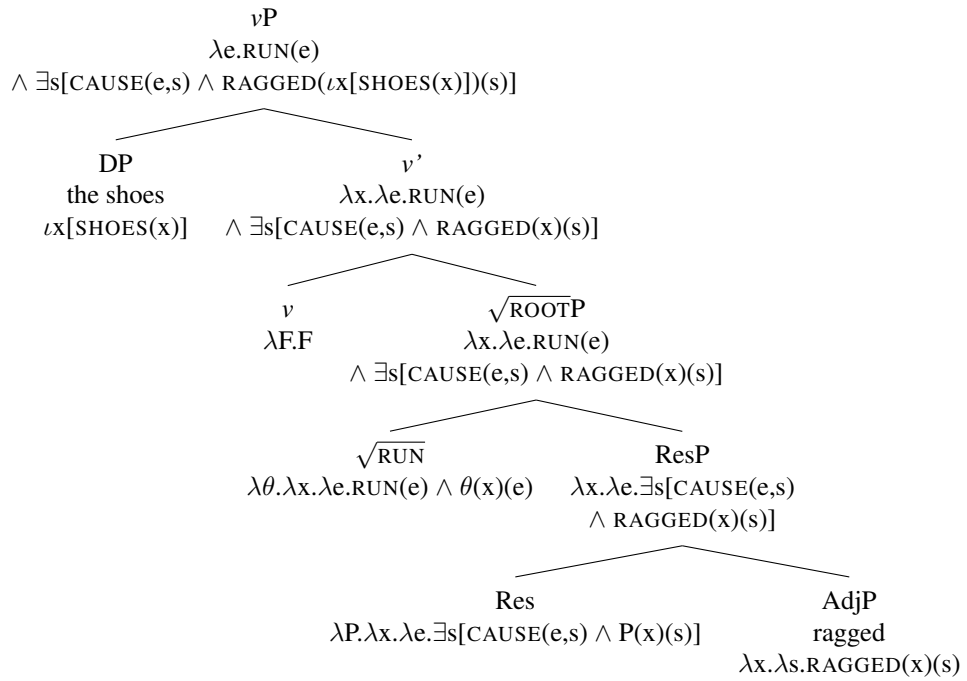
(31) CONTEXT: Billy was sleeping soundly, but was woken up by a thunderstorm. His father Jimbob came in and sang him a lullaby so he could go back to sleep.
Jimbob again sang Billy asleep. (cf. Jimbob sang Billy asleep again)

In sum, our analysis makes correct predictions about the availability of agentless presuppositions with resultatives even when controlling for the restitutive reading of *again*.

4.3 Unselected objects are only possible in the resultative construction

Our analysis further predicts that many verbs that appear in unselected resultatives may only take an object in the resultative construction. Consider again our analysis of unselected resultatives, repeated in (32) for convenience.

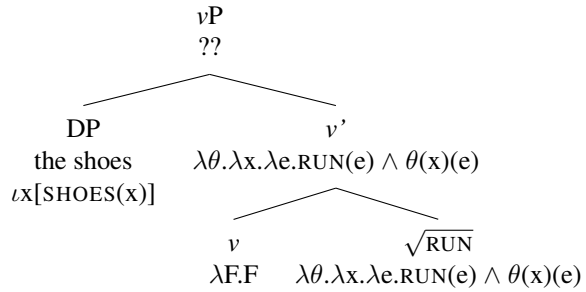
(32) Martha ran the shoes ragged. (unselected object)



Notice again that, on our approach, the result phrase saturates the root's type <*e,vt*> argument, rendering it capable of combining with an entity-denoting DP in the specifier of *v*, with *v* itself simply denoting an identity function.

Now consider the tree in (33), which differs from (32) by virtue of lacking a result phrase complement to the root, but maintaining a DP in the specifier of *v*P.

(33) *Martha ran the shoes.

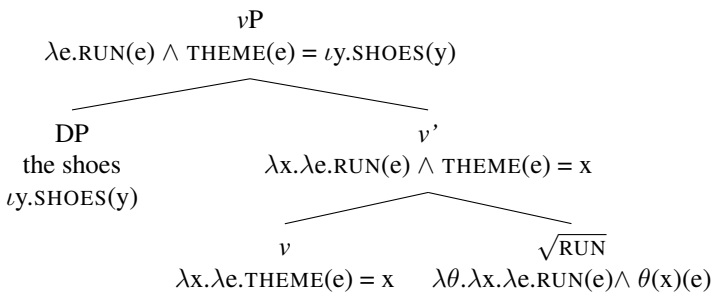


Assuming that *v* here denotes a polymorphic identity function that passes up the tree the denotation of its complement, *v*' will be unable to compose with the DP, as *v*' requires a

function of type <*e,vt*> as its first argument and the DP is of type *e*, providing an explanation of why a result phrase is necessary for an unergative verb to take a unselected direct object.[5]

Nonetheless, the theory we have adopted does, in principle, allow for structures in which semantic composition proceeds successfully, namely, when *v* introduces the thematic role THEME, as in Smith & Yu's (2021) analysis of optional transitives in (10). We could, then, make use of this alternative *v* to arrive at the following compositionally licit derivation for the *v*P in (34).

(34)



There is a separate problem with this derivation, however: the formula derived at the *v*P requires that *the shoes* be the theme of a running event. It is plausible to assume that the theme thematic role is undefined for running events; running involves an agent, but is otherwise an activity with *no theme or patient undergoing a change*. The set of running events and that of events defined for theme are therefore disjoint, and the translation of the *v*P derived in (34) is illicit at a purely conceptual level. The compositional and conceptual issues with the derivations in (33) and (34), taken together, predict that verbs like *run* will therefore only take a direct object in the resultative construction. This is because the result phrase saturates the functional argument of the verbal root, and no THEME role is introduced in the structure. This prediction is borne out: *run*, like many verbs appearing in unselected object resultatives, never appear with a direct object outside the resultative construction.

(35) John ran his shoes *(ragged).

On the other hand, the approach outlined here remains flexible enough to account for the possibility of unselected resultatives with verbs that *are* compatible with a theme, such as the verb *drink* in the following example.

(36) a. Martha drank the water.

b. Martha drank the teapot empty.

c. # Martha drank the teapot.

In contrast to verbs like *run*, we propose that verbs like *drink* are generally defined for the THEME role, and no conceptual constraint prevents them from appearing with a direct object outside of the resultative structure. That said, not any direct object will do in the absence of a result phrase, as the contrast between (36b) and (36c) demonstrates. This contrast can be made sense of straightforwardly: in order for composition to succeed in the absence of a result phrase, *v* will need to introduce the THEME role to saturate the root's functional argument prior to composing with the DP. However, conceptual knowledge rules out teapots as suitable themes of drinking events, explaining the oddness of (36c), while predicting no oddness for the resultative in (36b) as desired.

4.4 Modification of the manner event

Our analysis, like any analysis that equates the manner contributed by the verb and the causing event, predicts that the manner component of the resultative can be modified independently of the result state component or of any change into that state. This prediction is correct, as the examples in (37) shows: (37a) is true if Al's singing was loud, and in fact has no reading on which the baby's *change* to a sleeping state is loud. Likewise, in (37b), the manner adverb can only be read as describing the manner in which Jim performed a

pressing event, and cannot describe the change in the paper's flatness. Finally, (37c) is true if the kick was wild, even if the door opens in a perfectly normal way.

(37) a. Al loudly sang the baby asleep.

b. Jim daintily pressed the paper flat.

c. Maureen wildly kicked the door open.

This point is worth elaborating on, as previous authors have argued that such modification of the manner event is impossible (Rappaport Hovav and Levin 2001, Rothstein 2004, Williams 2007, Williams 2015), largely on the basis of examples like (38).

(38) Al slowly pounded the cutlet flat. (Williams 2007, p. 4, ex. 12)

(38) is true in a situation in which the cutlet undergoes a slow change into a flat state. Crucially, such a sentence can be true even if the *means* by which the flattening is achieved e.g., pounding in (38), is done quickly. In other words, (38) does not entail (39). That (38) does not entail (39) is clearly shown by the fact that (40) is not a contradiction.

(39) Al slowly pounded the cutlet.

(40) Al slowly pounded the cutlet flat, by pounding it rapidly for hours.

(Williams 2007, p. 4, ex. 13)

At first blush, this appears to be a problem for our analysis, and in fact any bieventive analysis of resultatives: the means and causing events are equated, so we do seem to predict that (38) entails (39). On a bieventive analysis, the reasoning goes, *slowly* would need to be predicated of the means event, and (38) should therefore entail that Al pounded the cutlet slowly, contrary to fact. If this argument goes through, this presents a problem for any bieventive analysis that does not distinguish the means event from a causing event, including our own. This argument, however, depends crucially on the proper analysis of

adverbs like *slowly*. In particular, previous authors seems to be assuming, at least implicitly, a treatment of *slowly* as a simple event predicate that describes the causing event. On this view, we do indeed expect the logical form of (38) to be (41), which gives rise to the problematic entailment via CONJUNCTION SIMPLIFICATION.

(41) $\exists e[\text{AGENT}(e) = a \wedge \text{POUND}(e) \wedge \text{SLOW}(e) \wedge \exists s[\text{CAUSE}(e,s) \wedge \text{FLAT}(c)(s)]]$

On closer inspection, however, such an analysis can be seen to be an oversimplification. In fact, *adverbs of space and time* such as *quickly* and *slowly* are known to exhibit an ambiguity between a *ratio reading* and an *extent reading* (Cresswell, 1977; Rawlins, 2013, *a.m.o*). On the ratio reading of *quickly* (42a) below, *quickly* describes the manner of running, and can be intuitively understood as involving a quick succession of steps in the run, and can be paraphrased with "in a quick manner." On the extent reading (42b), the running is instead understood to have taken a small amount of time. Similar remarks apply to *slowly*: on the ratio reading, *slowly* involves a long period of time between steps, while on the extent reading, it means that the amount of time taken was relatively large.

(42) Alfonso ran to the park quickly.

a. *Ratio reading*: Alfonso ran to the park in a quick manner.

b. *Extent reading*: Alfonso ran to the park in a short time.

(Rawlins, 2013, p. 154, ex. 2)

While both readings of *quickly* are available in (42), in many cases only one reading is available. Which reading is available depends in large part on the *Aktionsart* of the VP. For example, some accomplishments, like *win the race*, allow only the extent reading: (43) can only mean that Alfonso won the race in a short amount of time, not that he participated in multiple "winnings" with a short span of time between them. Activity predicates, like *run*, on the other hand, only allow for the ratio reading, such that (44) can only mean that

Alfonso's manner of running was quick, not that he crossed a certain distance running in a short amount of time.

(43) Alfonso won the race quickly. (extent/*ratio) (Rawlins, 2013, p. 155, ex. 3)

(44) Alfonso ran quickly. (ratio/*extent) (Rawlins, 2013, p. 155, ex. 5)

The exact details of the analysis of this ambiguity are beyond the scope of this paper.[6] What matters for our purposes is that, in light of the existence of this ambiguity with adverbs of space and time, the failure of entailment between (38) and (39) receives an independent explanation: the resultative VP in (38) is an accomplishment, like the one in (43), and therefore only admits the extent reading. The VP in (39), on the other hand, is an activity, and thus only permits the ratio reading. In other words, the interpretation of (38) is not evidence against bieventive analyses like our own, but follows from the Aktionsart of the VP independent of its status as a resultative. Once this confound is taken into account and controlled for, as in (37) not involving adverbs of space and time, we observe that the means event is indeed independently modifiable by manner adverbs to the exclusion of the result state component, motivating an analysis equating the means with the causing event.

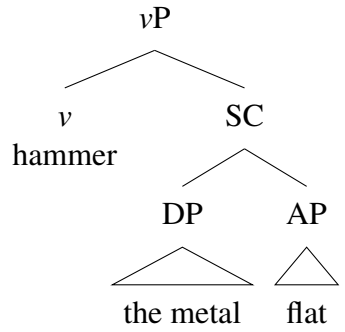
5 Previous analyses

Having discussed various correct predictions of our analysis, in this section we discuss approaches to resultatives in the previous literature, concentrating on two families of analyses: *small clause analyses* (Kayne, 1984; Hoekstra, 1988; Kratzer, 2005), including hybrid analyses making use of small clauses at some level (Bowers, 1997; Ramchand, 2008), and *complex predicate analyses* (Dowty, 1979; Rothstein, 2004; Williams, 2007, 2015). We show that these previous analyses make incorrect predictions with respect to at least some of the phenomena discussed above that our own analysis handles successfully.

5.1 Small clause analyses

On small clause analyses of resultatives, the result phrase component is analyzed as a small clause containing a stative constituent and the object, which acts as a specifier of the small clause, along the lines of the tree shown in (45). This has the consequence that the resultative object bears no relation, syntactically or semantically, to *v*P (Hoekstra, 1988; Kratzer, 2005; Bruening, 2018).

(45)



Small clause approaches are now common in the analysis of resultatives and of other constructions involving change of state, such as causatives and inchoatives (e.g., Harley 2012) and ditransitive double-object constructions (e.g., Harley 2003; Beck and Johnson 2004). However, these approaches are not without issues. As Bruening (2018) notes, on this analysis, the DP in the small clause is never an argument of the verb *hammer*; therefore, depictives should never be able to pick out a state of the individual denoted by the DP during the runtime of the hammering event introduced at the *v*P level. Rather, at best, the prediction is that the state introduced by a depictive should have to hold during the runtime of the *result state* that holds after the event; in other words, on these approaches, we would expect the (a) sentences of (24-25), repeated as (46-47) below, to be infelicitous, and the (b) sentences to be felicitous. This, however, is the exact opposite of the pattern we in fact observe.

(46) a. It's best to hammer metal flat wet, but it's OK if it has dried by the time it's completely flat.

b. # It's best to hammer metal flat dry, but it's OK if it's wet during the hammering.

(47) a. That marathoner ran his shoes ragged untied, although he finally tied them once they started falling apart.

b. # Once that marathoner's shoes started falling apart he untied them, so he ran his shoes ragged untied.

Crucially, Bruening (2018) shows that true small clauses *do* allow for depictive modification (48); the judgments in (46-47) are therefore not due to depictives being incompatible with small clauses in general.

(48) a. I want [the soldiers on the parade ground fully dressed].

b. I consider [him beneath contempt drunk].

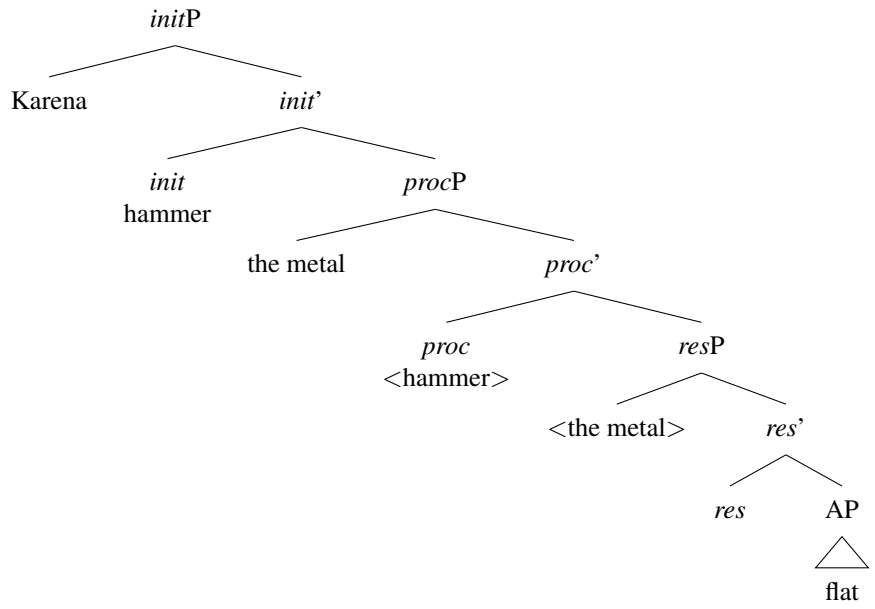
(Bruening, 2018, p. 549, ex. 32a, d)

Small clause approaches to resultatives thus cannot appeal to any ban on the modification of small clauses by depictives that would otherwise salvage the overall approach. By contrast, on our analysis, resultatives do not contain a small clause component, and therefore the state denoted by the depictive is correctly predicted never to hold only during the runtime of the result state.

Similar comments apply to what Bruening calls *hybrid* analyses of resultatives, such as those of Bowers (1997) and Ramchand (2008). These analyses still posit a small clause analysis for the result state component of a selected object resultative, but either move the direct object out of the small clause, as in Ramchand's analysis, or base-generate it outside of the small clause and relate the object to the result state via control of PRO, as in Bowers' analysis.[7] (49) gives Ramchand's analysis of a selected object resultative, using her first-

phase syntax; angled brackets indicate the initial position in which the relevant elements are first merged.

(49)

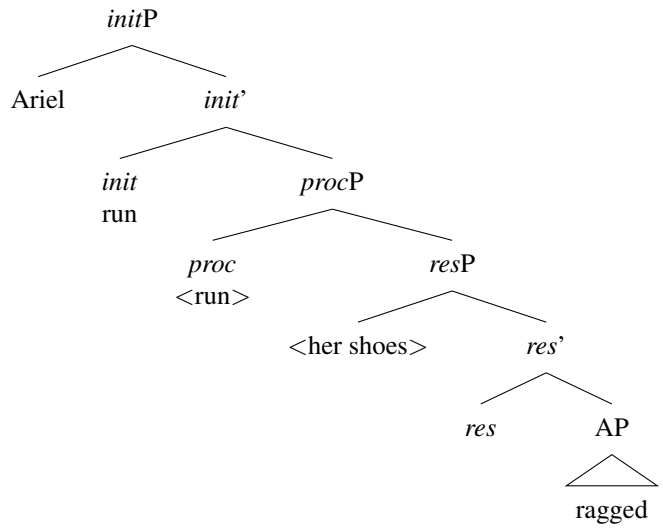


As the direct object is present in the eventive component of the VP on these approaches, hybrid analyses are compatible with the fact that depictives describe a property of the object that holds over the duration of the causing event. However, two problems remain with such accounts. First, and most problematically, hybrid accounts still make use of a small clause component, as can be seen in Ramchand's analysis in (49). As such, while hybrid analyses are able to account for the attested reading of depictives with resultatives, they are unable to rule out the unattested reading in which the depictive describes a property of the object holding over the course of the result state, given that true small clauses can be modified by depictives as seen in (48). This means that, with respect to selected object resultatives, hybrid analyses predict that both the (a) and (b) sentences of (46) should be acceptable, contrary to fact.

The second issue concerns hybrid analyses of unselected object resultatives: on both Bowers' and Ramchand's analyses, unselected object resultatives are given a distinct anal-

ysis from selected object resultatives. On Bowers' analysis, the direct object in such resultatives is base-generated within the result phrase component, and moves to a higher specifier of the VP, while on Ramchand's analysis, it remains within the result phrase component. (50) gives Ramchand's analysis of an unselected object resultative.

(50)



The predictions of these accounts with respect to unselected object resultatives depends on the particular analysis, but both accounts described here make incorrect predictions. Bowers' analysis, for one, incorrectly predicts that both the (a) and (b) sentences of (47) should be felicitous. Ramchand's analysis, on the other hand, predicts that (47b), but not (47a) should be felicitous, the reverse of the attested judgment. We conclude, then, that these hybrid analyses are not viable alternatives to our own analysis, which foregoes a small clause analysis entirely and thereby avoids the incorrect predictions of both traditional and hybrid small clause analyses of resultatives.

5.2 Complex predicate analyses

An alternative to small clause analyses treats resultatives as *complex predicates*. On such approaches, the meanings of the manner verb and the result component are combined in

some way, and then compose with the meaning of the direct object (Dowty 1979, Rothstein 2004, Williams 2007, Williams 2015, a.o.). In fact, as our own approach adopts exactly the strategy of composing the manner and result components prior to introducing the direct object, it too falls into the complex predicate family, with clear precedents in Dowty (1979), though motivated on the basis of different principles and phenomena. That said, our analysis differs from previous complex predicate analyses in important ways. We will focus on three differences here.

First, our analysis makes crucial use only of FUNCTION APPLICATION in the compositional analysis of the resultative VP. Previous complex predicate analyses, on the other hand, typically require additional compositional and interpretative mechanisms beyond FUNCTION APPLICATION to successfully analyze resultatives. With respect to composition principles, for example, Dowty (1979) requires two additional composition rules, one for selected object resultatives, and the other for unselected object resultatives. In a similar vein, Rothstein (2004) invokes a rule of RSUM, given in (51), which is particular to resultatives and serves to derive the sum of the manner and result eventualities standing in the desired culmination relationship. Furthermore, because RSUM is defined only for two functions of type $<e, vt>$, Rothstein must invoke a type-shifting operation over intransitive verbs that renders them transitive, so that they may compose via the RSUM rule.

(51) $\text{RSUM}[\alpha,\beta]=\lambda y.\lambda e.\exists e_1 \exists e_2 [e = {}^{S}(e_1 \oplus e_2) \wedge \alpha(e_1,y) \wedge \beta(e_2,y)$
$\wedge\ \text{TPCONNECT}(\text{Cul}(e_1), e_2, y)])$

Second, unlike our approach, previous complex predicate analyses treat verbs as denoting functions from all of their individual arguments, including their agents, to predicates of events: both Rothstein and Williams, for example, treat English transitive verbs like *cut* and *paint* as functions from their themes and agents to event predicates, or otherwise include a representation of the agent in the lexical entry of the verb.[8]. However, this means

that these previous complex predicate analyses have no way of explaining the availability of agentless presuppositions with *again* with resultatives: in fact, such analyses predict that agentless presuppositions should be generally impossible, contrary to fact. By contrast, our analysis successfully predicts the distribution of agentless presuppositions with *again* with resultatives and more generally by design, as thematic relations are not only generally proposed to be introduced verb-externally, but also compose with the verb root in different ways depending on whether they saturate the first argument of the verb root or are related to the VP via EVENT IDENTIFICATION.

A third point concerns the relationship between the manner event and the result state, and the modifiability of the former independently of the latter. In particular, on some complex predicate analyses, the denotation of the resultative VP is a predicate of an event distinct from the manner and result eventualities contributed by the verb and result phrase, respectively. This is true of Rothstein's (2004) analysis, as can be gleaned from her definition of RSUM in (51), and is brought out especially clearly in the *outside role analysis* of Williams (2007, 2015), to which we now turn.

On the outside role analysis, the resultative contributes an *event of causation* e_c, which is to be understood as an *event of change* "in which some individual *y* changes, entering a state e_r of a type defined by (a result predicate) *R*" (Williams, 2007). The event of causation is distinct from the manner event (or *means* event e_m, in Williams' terminology) introduced by the lexical verb and from the result state e_r contributed by the result phrase. The subject and object then stand in thematic relations to this event of causation, which is in turn related to the overt means and result predicates by a relation *K*. The outside role analysis is therefore *trieventive*, rather than bieventive like our own and small clause analyses. (52) illustrates the outside role analysis for a selected object resultative.

(52) Outside role analysis for *Al pounded the cutlet flat*:

$\exists e_c \exists e_m \exists e_r [K(e_c e_m e_r) \wedge \text{POUND}(e_m) \wedge \text{FLAT}(e_r) \wedge \text{AGENT}(e_c)(al)$

$\wedge \text{PATIENT}(e_c)(\textit{the cutlet})]$ (adapted from Williams 2007, p. 4, ex. 11a)

The outside role analysis requires additional meaning postulates to link the causation, means, and result eventualities to one another, such that, for example, the PATIENT of the event of causation is understood to be the HOLDER of the result state. Despite this, Williams argues that the analysis has merits that motivate such additional interpretative principles. First, for Williams, one of the key virtues of the analysis is that the means event cannot be modified: only the event of causation can. In support of this claim, Williams argues that adverbial modification of the means event is impossible on the basis of examples like (53), which lacks a reading in which the means (the hammering) was quick while the change to a flat state was slow.

(53) Al quickly pounded the cutlet flat slowly.

Second, Williams argues that the outside role analysis has broad cross-linguistic applicability in a way that result patient analyses do not. The issue is that some languages, like Mandarin, possess resultative constructions in which the arguments do not relate to the means event at all. (54) provides some of Williams' examples of Mandarin resultatives illustrating this property. In (54a), the cleaver is not the theme of the cutting event, but undergoes a change brought about by an event of cutting something else. Even more strikingly, the agent of the resultative in (54b) is *not* the agent of the crying event.

(54) a. tā hái qiē dùn -le nǐ de càidāo
3.SG also cut dull -PRFV 2.SG POSS food.knife
'S/he also made your cleaver dull from cutting.'

b. zhèjiàn shìkū hóng -le Lǐsìde yǎnjīng
this matter cry red -PRFV Lisi POSS eye
'This matter made Lisi's eyes red from crying.'

While such sentences are difficult to accommodate on bieventive analyses that equate the means event and event of causation, Williams' analysis provides a successful treatment of them: the direct object of (54a) is the theme of the *event of causation*, and thus undergoes a change into the result state as a result of the causing event. Likewise, the subject of (54b) is the agent of the event of causation, and need not be the agent of the means event.

With respect to Williams' argument from adverbial modification, we have an immediate response: (53) makes use of two adverbs of space and time, which we noted above to have an independent explanation. Furthermore, our examples in (37) showed that the manner event *can* in fact be modified. As the impossibility of modifying the means event is a crucial prediction of Williams' analysis, the outside role analysis is unable to accommodate (37), and therefore makes incorrect predictions about the availability of the means event for modification, unlike our analysis. As for the evidence from Mandarin, we acknowledge that some of these examples, especially those of the sort represented by (54b), would indeed present a challenge for our analysis if it were directly applied to an analysis of the Mandarin resultative construction. This is because, on our account, the means and causing events are equated, so applying our account to the Mandarin data would, all else being equal, incorrectly predict that (54b) should have the strange meaning that the matter cried.

As our paper focuses on the resultative construction as it exists in English, we cannot do justice here to a full analysis of the Mandarin facts. However, there is no reason to think that the English and Mandarin resultative constructions should be entirely structurally parallel, and absent a successful argument from adverbial modification, the observed differences could instead be chalked up to structural differences between the two languages. For example, Hopperdietzel (2022) develops an analysis of Mandarin resultatives that *is* trieventive, as in Williams' analysis, though this is in contradistinction to resultatives in English and Samoan, which on his analysis are bieventive. Given independent syntactic and semantic differences between English and Mandarin resultatives, therefore, we do not

take the Mandarin facts to present a crucial problem to our general approach, and leave the analysis of examples like (54b) to future research.

6 The Direct Object Restriction and the status of unergative motion constructions

Resultatives are subject to what has been called the DIRECT OBJECT RESTRICTION, according to which the controller of the result phrase must be the underlying direct object of the clause (Simpson, 1983; Levin and Rappaport-Hovav, 1995; Williams, 2007, *a.m.o*). As such, the controller must be either the surface direct object, as in (55a), or the subject of an unaccusative, as in (55b), but crucially cannot be the subject of an unergative, as the ungrammatical (55c) shows.

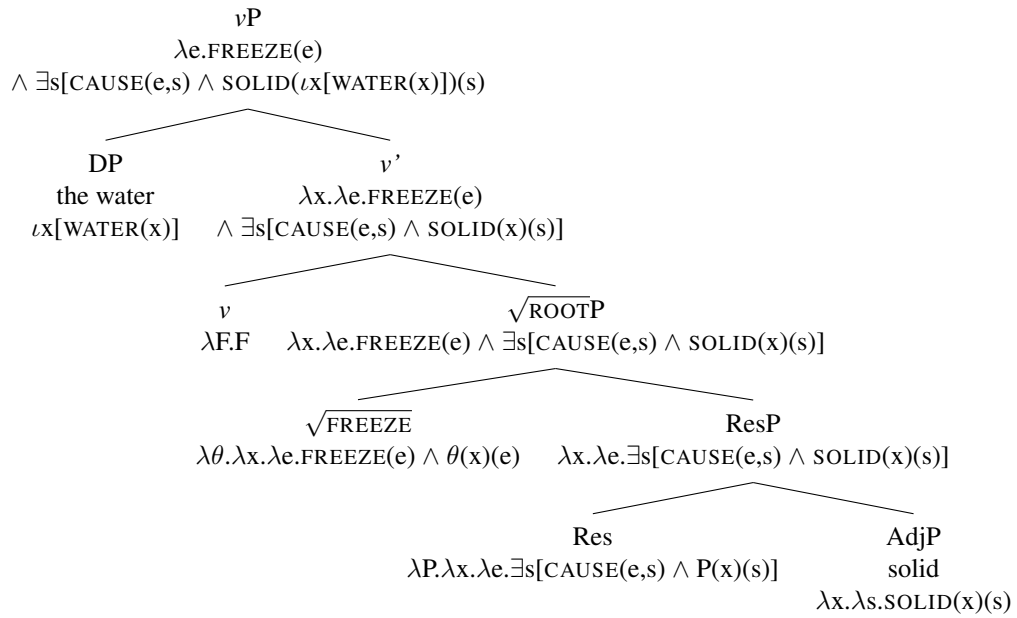
(55) a. John kicked the door open.

b. The water froze solid.

c. *John danced tired. (cf. John danced himself tired)

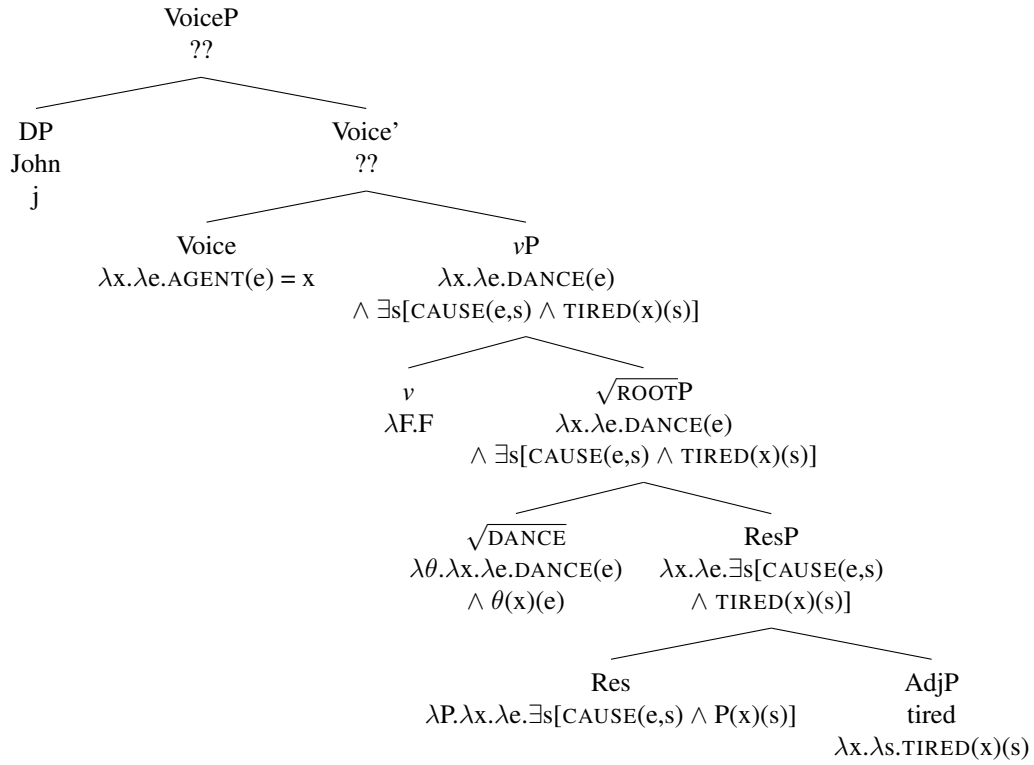
Our analysis is able to derive the DIRECT OBJECT RESTRICTION, given certain assumptions about the analysis of unaccusatives and unergatives on the one hand, and the set of semantic composition rules on the other. First, unaccusative subjects are base-generated in the direct object position, which on our analysis is the specifier of *v*P. The analysis of an unaccusative resultative like (55b) would then be as in (56), which is exactly like the derivation of the portion of a transitive resultative excluding the agent argument.[9] The DP in the specifier of *v*P then moves to the specifier of TP and becomes the surface subject of the clause.

(56) The water froze solid.



Unergative subjects, *qua* agents, are generated in the specifier of VOICEP. The structure of a putative unergative resultative would therefore need to be that in (57), with no argument projected in the specifier of *v*P.

(57) *John danced tired.
Intended: John danced and the dancing caused him to be tired.



Thus far in our analysis, we have relied on the existence of two composition rules: FUNCTION APPLICATION, an analytical staple of compositional semantics that composes expressions of type $<a,b>$ and a to yield an expression of type b, where a and b are arbitrary types, and EVENT IDENTIFICATION (Kratzer, 1996), which composes expressions of type $<e,vt>$ and $<v,t>$ to yield expressions of type $<e,vt>$. Against this backdrop, consider the types of VOICE and *v*P in the tree in (57): both are of type $<e,vt>$, functions from individuals to event predicates. As such, they cannot compose via either of the composition rules invoked in our analysis. If no rule can compose functions of type $<e,vt>$ with one another, then our account offers an explanation of the DIRECT OBJECT RESTRICTION: the controller of the result phrase *must* be introduced in the specifier of *v*P to compose with the rest of the resultative structure; otherwise, composition is impossible, and the structure is illicit due to a type-clash.

This is not to say that such a rule composing two functions of type $<e,vt>$ has not been formulated in the previous literature. Indeed, a rule of this sort, termed EVENT AND VARIABLE IDENTIFICATION and defined as in (58), has seen some use in certain cases in the syntax-semantics literature (Higginbotham, 1985; Doron, 2003; Rothstein, 2004; Alexiadou et al., 2014).

(58) EVENT AND VARIABLE IDENTIFICATION

$EV_{ident}(f_{<e,vt>})(g_{<e,vt>}) = \lambda x.\lambda e.f(x)(e) \wedge g(x)(e)$

EVENT AND VARIABLE IDENTIFICATION derives a new type $<e,vt>$ function from two functions of the same $<e,vt>$ type by conjoining the result of fully saturating both functions, and then lambda abstracting over their event and individual arguments, thereby *identifying* the variables. If this rule is admitted in the grammar, VOICE and *v*P would be able to compose, and we would lose our explanation of the DIRECT OBJECT RESTRICTION. We therefore adopt the position that EVENT AND VARIABLE IDENTIFICATION is *not* an available composition rule. This allows us to explain the DIRECT OBJECT RESTRICTION in our system, though at the cost of requiring that phenomena modelled by derivations that make use of EVENT AND VARIABLE IDENTIFICATION be reanalyzed. While space prevents us from considering the proposals in need of reanalysis, we consider such alternatives to be worth pursuing in light of the other successful properties of our proposal.[10]

Our proposal to eliminate EVENT AND VARIABLE IDENTIFICATION from the inventory of composition rules leads to a consequence for the analysis of certain constructions that are *prima facie* similar to resultatives, particularly unergative motion constructions like (59).

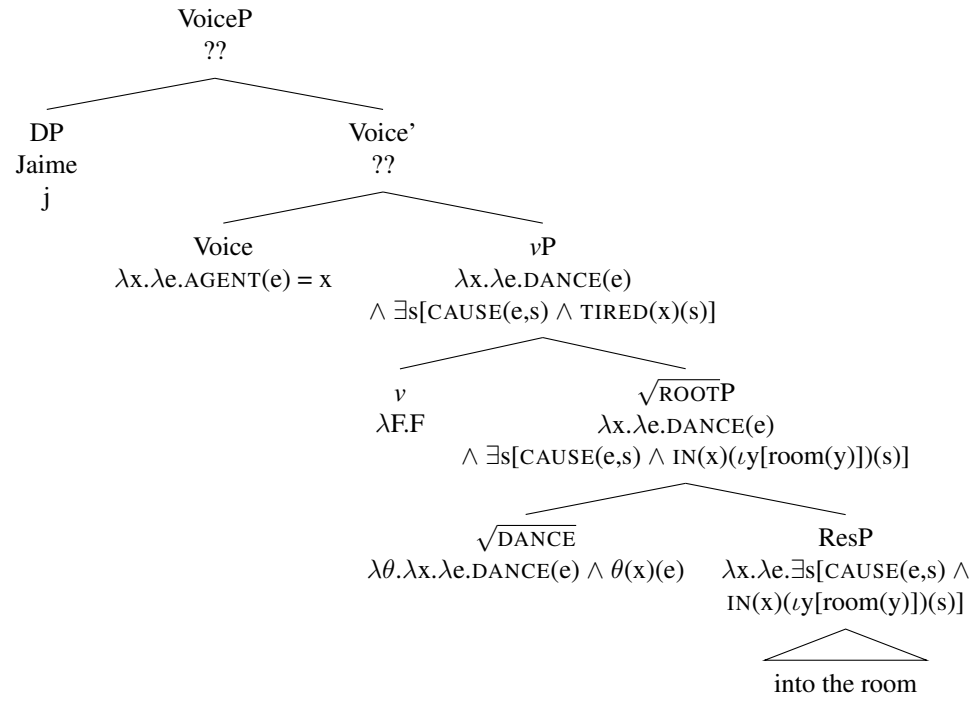
(59) a. Jaime danced into the room.

b. Marianne jumped onto the ledge.

Intuitively, the sentences in (59) have semantic properties parallel to resultatives: the event of motion causes a result state in which the agent of the motion event ends up in a particular location. It is thus tempting to analyze them as a certain kind of intransitive resultative, as, for example, Wechsler (1997) and Folli and Harley (2005) do.

Our analysis, however, does not extend straightforwardly to these constructions. Consider what a resultative analysis for (59) would amount to on our approach, with the goal of motion PP treated as the result phrase in (60).

(60)



As one can see, adopting our approach to resultatives for (59) results in a type-clash between *v*P and VOICE, the same problem faced in (57) above. Of course, adopting the rule of EVENT AND VARIABLE IDENTIFICATION discussed above would allow for successful composition of the VOICE and *v*P nodes, but, as previously discussed, the addition of such a rule would force us to abandon our explanation of the DIRECT OBJECT RESTRICTION. We therefore must reject the analysis of (59) in (60).

Fortunately, there are independent reasons not to treat constructions like (59) on a par with resultatives. Williams (2007), who also rejects a resultative analysis of unergative motion constructions, notes that such constructions differ from *bona fide* resultatives in that the former permit adverb phrases to intervene between the verb (along with its objects, if present) and the putative result phrase, while true resultatives do not.

(61) a. John danced (jigs) merrily down the hall. (Williams, 2007, p. 13, ex. 57)

b. *Al pounded the cutlet spastically flat. (Williams, 2007, p. 13, ex. 58)

While Williams provides only these two examples, our own examples below show not only that the same contrast can be replicated for any number of verbs, but also that the status of a resultative as selected or unselected plays no role in whether an adverb can intervene between the object and the result. We therefore see a general difference between resultative constructions proper and unergative motion constructions with respect to available positions for adverbs.

(62) Mary ran/swam/flew/glided quickly into the cave.

(63) a. *Jimbob wiped the table suddenly clean.

b. *Sara kicked the door quickly open.

(64) a. *Joanna ran her shoes slowly ragged.

b. *Bill drank the teapot gradually empty.

Another point of difference between unergative motion constructions and resultatives has to do with whether there are sub-events that are temporally contiguous but do not overlap. Resultatives, by virtue of the causative relation that exists between the means event and the result state, ensure that the two sub-events do not temporally overlap. Rather, the result state is understood as coming to hold at the culmination of the means event (see for example Levin and Rappaport Hovav 1999; Rothstein 2004). On the other hand,

Levin and Rappaport Hovav (1999) observe that unergative motion constructions describe *cotemporaneous* events, unlike resultatives. This can be illustrated with the same unergative manner of motion verb *dance* in both a resultative construction with an AP result and a motion construction with a directional PP. (65) sets up a context in which the means event of dancing and the result state in which Susan's feet are sore do not occur at the same time, though they are temporally contiguous; a resultative with *dance* felicitously describes this scenario. By contrast, the scenario in (66), which the means event introduced by the verb and the motion event introduced by the PP are temporally contiguous (motion into the club did not involve dancing), crucially *cannot* be described by the uergative motion construction.[11]

(65) CONTEXT: Susan was dancing all day at a dance competition. Her feet did not feel sore while she was dancing, but after the competition ended, her feet began to swell from all the dancing.

Susan danced her feet sore.

(66) CONTEXT: Susan was trying to enter a club. The bouncer outside the club refused her entry. Exasperated, Susan began dancing by herself outside the club comically. The bouncer was eventually amused enough by her dancing and decided to grant her entry and so Susan smugly walked into the club.

 # Susan danced into the club.[12]

We do not aim to give a precise analysis of unergative motion constructions here (see Levin and Rappaport Hovav 1999 for discussion of a possible analysis). We merely note that the cotemporaneity of the two events of an unergative motion construction, along with the possibility of post-verbal adverbs preceding the putative result phrase in such constructions, militates against an analysis that treats such constructions as resultatives, which neither require subevent cotemporaneity nor permit adverbs to intervene between the verb

+ direct object and the result phrase. Such a difference in analysis is expected on our approach, as a resultative analysis of unergative motion constructions is untenable for compositional reasons.

7 Conclusion

We have developed an analysis of resultatives building on the semantics of verbal roots proposed in Smith and Yu (2021), showing that the analysis makes correct predictions about the interaction of resultatives with depictive secondary predication, agentless presuppositions with *again*, the availability of unselected objects with otherwise intransitive verbs, and modification of the manner event to the exclusion of the result state and any change into that state. We further showed that the analysis improves on previous small clause and complex predicate analyses with respect to these predictions, and offers an account of the DIRECT OBJECT RESTRICTION in combination with the elimination of EVENT AND VARIABLE IDENTIFICATION from the inventory of available composition rules.

The approach we have developed here leaves us with several questions to be addressed in future research. First, there is the issue of extending the analysis to resultative constructions in other languages: how do languages differ in the range of possible resultatives available to them, and does our analysis shed light on these differences? As we stated in our discussion of Mandarin, languages may differ in the structure of their resultative constructions, but may nevertheless be profitably analyzed in terms of our approach once structural and other differences are controlled for.

The question of cross-linguistic differences with respect to the range of available resultatives arises in a another way as well. In particular, our analysis can be seen as an approach to *strong* resultatives in the sense of Washio (1997), in which the meanings of the manner verb and result phrase are independent from one another. As Washio (1997) shows,

strong resultatives are not available in many languages, such as the Romance languages and Japanese. However, such languages do permit what he calls *weak* resultatives, in which the meaning of the result phrase is closely related to the meaning of the manner verb, such that the former entails or implies a result state even in the absence of an independent result component. (67) showcases the contrast between strong and weak resultatives in Japanese (Washio, 1997).

(67) a. *John -ga kinzoku -o petyanko -ni tatai -ta.
John -NOM metal -ACC flat -DAT pound -PST
Intended: 'John pounded the metal flat'

b. John -ga kabe -o buruu -ni nut -ta
John -NOM wall -ACC blue -DAT paint -PST
'John painted the wall blue.'

There is already a sizable literature devoted to understanding cross-linguistic restrictions relevant to the strong/weak distinction, (Washio 1997; Beavers et al. 2010; Beavers 2011; Acedo-Matellán 2016, *a.o.*). Given our analysis in terms of root denotations, we might propose our own tentative hypothesis for one reason languages differ in this way: languages can differ in the type of their verbal roots, such that the roots of weak resultative languages do not have a type $<e,vt>$ argument. This would rule out strong resultatives of the kind found in English and other languages, and would require that weak resultatives receive a different analysis in languages that have them. Depending on the exact implementation of verbal root meaning in weak resultative languages, we would expect further differences between weak and strong resultative languages outside of the analysis of resultatives, such as in the availability of agentless presuppositions. While space prevents us from elaborating on this theoretical possibility further, we hope to develop this line of reasoning and test its predictions in future research.

References

Acedo-Matellán, V. (2016). *The morphosyntax of transitions: A case study in Latin and other languages*, volume 62. Oxford University Press.

Alexiadou, A., Schäfer, F., and Spathas, G. (2014). Delimiting voice in Germanic: On object drop and naturally reflexive verbs. In Iyer, J. and Kusmer, L., editors, *Proceedings of the 44th Meeting of the North East Linguistic Society*, pages 1–14, Amherst, MA. GLSA.

Bale, A. (2007). Quantifiers and verb phrases: An exploration of propositional complexity. *Natural Language & Linguistic Theory*, 25:447–483.

Beavers, J. (2011). On affectedness. *Natural Language & Linguistic Theory*, 29(2):335–370.

Beavers, J. and Koontz-Garboden, A. (2020). *The Roots of Verbal Meaning*. Oxford: Oxford University Press.

Beavers, J., Levin, B., and Tham, S. W. (2010). The typology of motion expressions revisited1. *Journal of linguistics*, 46(2):331–377.

Beck, S. and Johnson, K. (2004). Double objects again. *Linguistic Inquiry*, 35(1):97–123.

Bowers, J. (1997). A binary analysis of resultatives. In *Proceedings of the Texas Linguistics Society Conference*, volume 38, pages 43–58.

Bruening, B. (2018). Depictive secondary predicates and small clause approaches to argument structure. *Linguistic Inquiry*, 49(3):537–559.

Cresswell, M. (1977). Adverbs of space and time. In Guenthner, F. and Schmidt, S.,

editors, *Formal semantics and pragmatics for natural languages*, pages 171–199. Dordrecht/Boston: Reidel.

Doron, E. (2003). Agency and Voice: The semantics of the Semitic templates. *Natural Language Semantics*, 11:1–67.

Dowty, D. (1979). *Word meaning and Montague Grammar*. Dordrecht: D. Reidel Publishing.

Folli, R. and Harley, H. (2005). Flavors of *v*. In Kempchinsky, P. M. and Slabakova, R., editors, *Aspectual inquiries*, pages 99–120. Springer, Dordrecht.

Halle, M. and Marantz, A. (1993). Distributed Morphology and the pieces of inflection. In Hale, K. and Keyser, S. J., editors, *The view from Building 20: Essays in honor of Sylvain Bromberger*, pages 111–176. Cambridege, MA: MIT Press.

Harley, H. (2003). Possession and the double object construction. In Pica, P. and Rooryck, J., editors, *Linguistic Variation Yearbook 2*, pages 31–70. Amsterdam: John Benjamins.

Harley, H. (2005). How do verbs get their names? Denominal verbs, manner incorporation, and the ontology of verb roots in English. In Erteschik-Shir, N. and Rapaport, T., editors, *The syntax of aspect: Deriving thematic and aspectual interpretation*, pages 42–64. New York: Oxford University Press.

Harley, H. (2012). Lexical decomposition in modern syntactic theory. In Hinzen, W., Machery, E., and Werning, M., editors, *The Oxford handbook of compositionality*, pages 328–350. Oxford: Oxford University Press.

Higginbotham, J. (1985). On semantics. *Linguistic Inquiry*, 16:547–593.

Hoekstra, T. (1988). Small clause results. *Lingua*, 74(2-3):101–139.

Hopperdietzel, J. (2022). Talmy's typology in serializing languages: Variations on a vp. *Glossa: a journal of general linguistics*, 7(1).

Kayne, R. (1984). Principles of participle constructions. In Guéron, J., Obenauer, H.-G., and Pollock, J.-Y., editors, *Grammatical representation*, pages 101–140. Dordrecht: Foris.

Kennedy, C. (2007). Vagueness and grammar: The semantics of relative and absolute gradable adjectives. *Linguistics & Philosophy*, 30:1–45.

Kennedy, C. and Levin, B. (2008). Measure of change: The adjectival core of degree achievements. In McNally, L. and Kennedy, C., editors, *Adjectives and adverbs: Syntax, semantics and discourse*, pages 156–182. Oxford: Oxford University Press.

Kratzer, A. (1996). Severing the external argument from its verbs. In Ann Zaring, L. and Rooryck, J., editors, *Phrase structure and the lexicon*, pages 109–137. Kluwer, Dordrecht.

Kratzer, A. (2005). Building resultatives. In Maienborn, C. and Wöllstein, A., editors, *Event arguments: Foundations and applications*, pages 177–212. Tübingen: Niemayer.

Krifka, M. (1989). Nominal reference, temporal constitution and quantification in event semantics. In Bartsch, R., van Bethem, J., and van Emde Boas, P., editors, *Semantics and contextual expression*, pages 75–115. Dordrecht: Foris.

Levin, B. and Rappaport-Hovav, M. (1995). *Unaccusativity: At the syntax lexical-semantics interface*. Cambridge, MA: CMIT Press.

Levin, B. and Rappaport Hovav, M. (1999). Two structures for compositionally derived events. In Matthews, T. and Strolovitch, D., editors, *Proceedings of Semantics and Linguistic Theory 9*, pages 199–223, New York, NY. CLC Publications.

Marantz, A. (1997). No escape from syntax: Don't try morphological analysis in the privacy of your own lexicon. In Dimitriadis, A., editor, *University of Pennsylvania Working Papers in Linguistics*, volume 4(2), pages 201–225. Penn Graduate Linguistics Society.

Pylkkänen, L. (2008). *Introducing arguments*. Cambridge, MA: MIT Press.

Ramchand, G. (2008). *Verb meaning and the lexicon: A first phase syntax*. Cambridge: Cambridge University Press.

Rappaport-Hovav, M. and Levin, B. (1998). Building verb meanings. In Butt, M. and Geuder, W., editors, *The projection of arguments: Lexical and compositional factors*, pages 97–134. Stanford, CA: CSLI Publications.

Rappaport Hovav, M. and Levin, B. (1998). Building verb meanings. In Butt, M. and Geuder, W., editors, *The projection of arguments: Lexical and compositional factors*, pages 97–134. Chicago: University of Chicago Press.

Rappaport Hovav, M. and Levin, B. (2001). An event structure account of english resultatives. *Language*, pages 766–797.

Rappaport-Hovav, M. and Levin, B. (2010). Reflections on manner/result complementarity. In Doron, E., Rappaport-Hovav, M., and Sichel, I., editors, *Syntax, lexical semantics, and event structure*, pages 21–38. Oxford: Oxford University Press.

Rawlins, K. (2013). On adverbs of (space and) time. In Arsenijević, B. et al., editors, *Studies in the composition and decomposition of event predicates*, pages 153–193. Dordrecht: Springer.

Rothstein, S. (2004). *Structuring events: A study in the semantics of aspect*. Wiley Blackwell.

Simpson, J. (1983). Resultatives. In Levin, L. et al., editors, *Papers in Lexical Functional Grammar*, pages 143–157. Bloomington, IN: Indiana University Linguistics Club.

Smith, R. W. and Yu, J. (2021). Agentless presuppositions and the semantics of verbal roots. *Natural Language & Linguistic Theory*, 40(3):875–909.

von Stechow, A. (1996). The different readings of *wieder* 'again': A structural account. *Journal of Semantics*, 13(1):87–138.

Washio, R. (1997). Resultatives, compositionality and language variation. *Journal of East Asian Linguistics*, 6(1):1–49.

Wechsler, S. (1997). Resultative predicates and control. In *Proceedings of the 1997 Texas Linguistics Society Conference (Texas Linguistic Forum 38.)*, pages 307–321.

Williams, A. (2007). Objects in resultatives. Manuscript, University of Maryland.

Williams, A. (2015). *Arguments in syntax and semantics*. Cambridge: Cambridge University Press.

Zhang, N. N. (2022). Agentless presupposition and implicit and non-canonical objects in Mandarin. *Cahiers de Linguistique Asie Orientale*, 51(1):81–104.

Notes

1. We assume an ontology consisting of four basic types: *e*, the type of individuals, *v*, the type of events, *s*, the type of states, and *t*, the type of truth values. We further allow for function types from any type to any other type, and denote them with angle brackets: $<a,b>$ is the type of functions from objects of type *a* to objects of type *b*. In cases where this notation becomes difficult to read, we sometimes abbreviate certain function types by omitting angle brackets and commas, such that, for example, $<e,<v,t>>$ is abbreviated as $<e,vt>$.

2. Result verbs do occur with certain result XPs, but these are generally restricted to those XPs that are semantically compatible with the result entailed by the verb, typically called *weak resultatives* (Washio, 1997). Beavers and Koontz-Garboden (2020) give the example of the result verb *dim*, which only allows for result XPs denoting properties of states having to do with the level of light in a room.

   (68) a. Then the biologists dimmed the room to the level of starlight

   b. *Kim dimmed her eyes sore

3. Evidence for the phrasal status of the result phrase comes from the fact that such phrases may be modified by various adverbials (Williams, 2007).

   (69) John hammered the metal completely flat.

4. This semantics abbreviates a more complex treatment of the semantics of gradable adjectives in terms of degrees e.g., Kennedy 2007; Kennedy and Levin 2008, *a.m.o*.

5. If *v* is taken to denote a specific identity function from functions of type <*e,vt*>, composition with *v* will simply be unable to proceed.

6. See Cresswell (1977) for the earliest analysis of this phenomenon, and Rawlins (2013) for an analysis couched in a Neo-Davidsonian event semantics.

7. Bowers (1997) makes use of a control strategy for selected object resultatives, but a movement strategy for unselected object resultatives. The analysis of both kinds of resultative involve a small clause component.

8. Williams proposes a difference between English and Mandarin verbs, such that the latter denote predicates of events as in *qiē* 'cut' in (70), with all arguments being added by verb-external material. This difference is proposed to explain certain differences between English and Mandarin resultatives.

   (70) $[\![qi\bar{e}]\!] = \lambda e.\textsc{cut}(e)$

9. One may note that on this analysis the unaccusative subject is not interpreted as an argument of the freezing event, but only of the result state. We do not consider this to be a problem for our approach. We can understand the relationship between the freezing event and the water in the formula under the *v*P node of (56) to arise from world knowledge: the only way for a freezing to directly bring about a change in the water's phase from liquid to solid would be if the freezing held of the water. This reasoning in fact holds of the

transitive examples as in (19) and (20) as well, what Hoekstra (1988) calls 'shadow interpretation' (see also Kratzer 2005).

10. To consider just one case, Alexiadou et al. (2014) make critical use of EVENT AND VARIABLE IDENTIFICATION in their analysis of verbs that permit reflexive readings with *object drop*, such as *shave* in the example below.

    (71) John shaved.

    On Alexiadou et al.'s analysis of sentences like (71), the *v*P is translated as the type <*e,vt*> function λx.λe.SHAVE(e) $\wedge$ THEME(e) = x, which composes with VOICE via EVENT AND VARIABLE IDENTIFICATION. This has the effect of identifying the agent and theme arguments, thereby deriving the reflexive interpretation of such structures without positing a syntactically projected reflexivizer. As attractive as this analysis is, it must be supplemented with additional principles to prevent EVENT AND VARIABLE IDENTIFICATION from occurring with verbs that permit object drop but lack reflexive readings, such as *eat* in (72).

    (72) John ate.

    For this sentence, Alexiadou et al. propose that a rule of EXISTENTIAL CLOSURE applies to saturate the theme argument of the verb and to avoid a type-clash with VOICE. However, given the availability of EVENT AND VARIABLE IDENTIFICATION in their system, applying this rule in such cases should avoid type-clash, predicting a reflexive interpretation should be available for such verbs which is clearly unattested. Additional principles are therefore required to prevent such an unwelcome compositional result. This problem does not arise if EVENT AND VARIABLE IDENTIFICATION is not an available composition rule, and reflexive readings are handled via some other means sensitive to the particular roots involved. We leave further consideration of this issue to future work.

11. Levin and Rappaport Hovav (1999) illustrate this observation with a different diagnostic, namely adverbs of space and time like *quickly* and *slowly*. They claim that examples akin to Rawlins' (2013) (42) are not ambiguous between a ratio and extent reading. In the example below, it is claimed that an interpretation in which the progress across the field was slow while the trotting was quick is impossible.

    (73) The pony slowly trotted to the far side of the field.

    We disagree with this judgment and agree with Rawlins' judgment of an ambiguity. It seems possible that slow progress across the field most typically involves trotting in a slow manner (an interpretation reinforced

by conceptual knowledge), though not necessarily so. One might set up contexts where the trotting might be quick but progress across the field was nonetheless quite slow, due, for example, to the pony taking small steps; in our judgment, the sentence above can be felicitously used to describe such a scenario. Given the differing judgments and general confounds presented by adverbs of space and time discussed in §4.4, we illustrate the cotemporaneity of unergative motion constructions using the examples in (65) and (66) instead.

12. Such a scenario *can* be described by the "fake reflexive" motion construction *Susan danced herself into the club*, motivating a causative and resultative analysis of such sentences, but not for what Levin and Rappaport Hovav (1999) call the "bare resultative" construction in (66).