Resultatives and the Semantics of Verbal Roots[*]

Ryan Walter Smith, Jianrong Yu

University of Manchester, KU Leuven

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

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1 Introduction

- We propose a compositional syntax and semantics for resultative constructions based on the following tenets:

  1. The root of the manner verb denotes a function from relations between individuals and events to a relation between individuals and events (Smith and Yu 2021; Zhang 2022).

  2. The result component of a resultative is an argument of the verb root.

  3. The object of a resultative, whether selected or unselected, is generated in the same position as direct objects more generally.

- We show that the analysis makes correct predictions about the interaction of resultatives with depictive secondary predication (Bruening 2018), agentless presuppositions with *again* (Bale 2007; Smith and Yu 2021; Zhang 2022) and adverbial modification of the manner event.

- We compare our analysis with previous small clause analyses (Kayne 1984; Hoekstra 1988; Kratzer 2005; Harley 2005, a.o.) and complex predicate analyses (Dowty 1979; Rothstein 2004; Williams 2015, a.o.), demonstrating that these previous approaches make incorrect predictions with respect to the phenomena noted above.

- The broader theoretical point, beyond our particular analysis, is that a *complex predicate* analysis of resultatives is to be preferred over a small clause analysis, as long as the analysis permits adverbial modification of the manner component of the resultative, *contra* arguments to the contrary in the literature (Rappaport Hovav and Levin 2001; Williams 2007, 2015.

2 Background

- Smith and Yu (2021) propose an approach to the semantics of (at least a subset of) verb roots, on which such roots denote functions from thematic role functions of type $<e,vt>$ to functions of type $<e,vt>$.

- On this approach, roots compose with a syntactically projected thematic role, followed by an individual, the result of which is an event predicate (1).

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

- 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.

    (2)   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.

    (3)   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.

- While Bale treated this as a lexicalized difference between verb classes, the same effect can be observed with optionally transitive verbs: the transitive, but not the intransitive, variant permits agentless presuppositions.
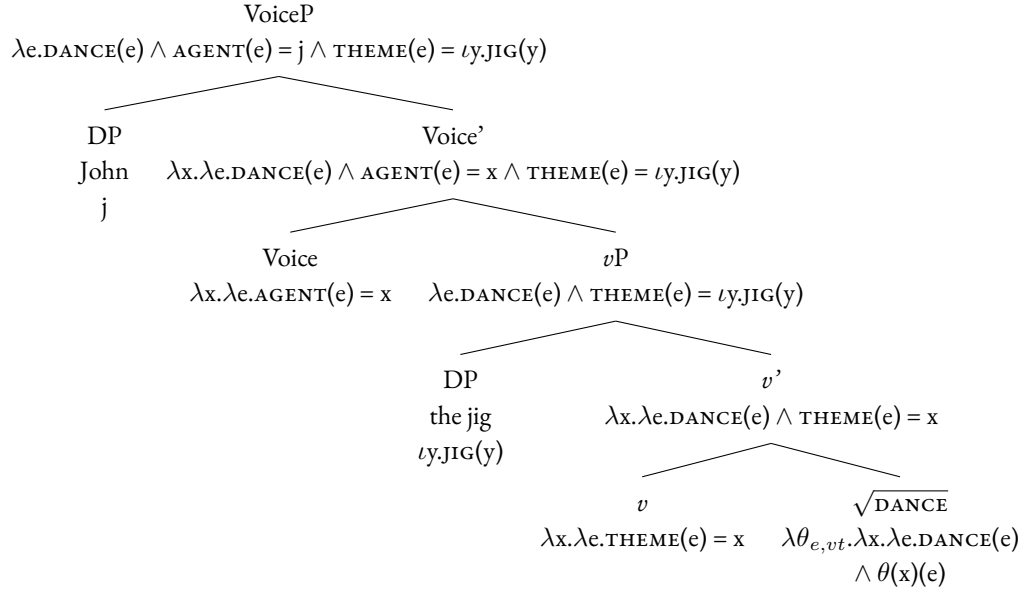
    (4)   At a ball in honor of the king, John danced the Irish jig. The king was so impressed that he had his court dancer James learn this dance, and. . .
    a. **# James danced again.**
    b. **James danced the Irish jig again.**

- Smith and Yu (2021) resolve this issue by treating eventive verb roots as uniformly of the type in (1). 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 (5), along with a DP in its specifier to fill that role.

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

- 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 (6) below.

(6) John danced the jig.

VoiceP
$\lambda e.\textsc{dance}(e) \wedge \textsc{agent}(e) = j \wedge \textsc{theme}(e) = \iota y.\textsc{jig}(y)$

DP
John
j

Voice'
$\lambda x.\lambda e.\textsc{dance}(e) \wedge \textsc{agent}(e) = x \wedge \textsc{theme}(e) = \iota y.\textsc{jig}(y)$

Voice
$\lambda x.\lambda e.\textsc{agent}(e) = x$

vP
$\lambda e.\textsc{dance}(e) \wedge \textsc{theme}(e) = \iota y.\textsc{jig}(y)$

DP
the jig
$\iota y.\textsc{jig}(y)$

v'
$\lambda x.\lambda e.\textsc{dance}(e) \wedge \textsc{theme}(e) = x$

v
$\lambda x.\lambda e.\textsc{theme}(e) = x$

$\sqrt{\textsc{dance}}$
$\lambda \theta_{e,vt}.\lambda x.\lambda e.\textsc{dance}(e)$
$\wedge \theta(x)(e)$

- In combination with a suitable definition of *again*, as in (7) below (adapted from Bale 2007), agentless pre-suppositions are correctly predicted to only be available in (6), because the vP is of the right type to be *again*'s first argument.
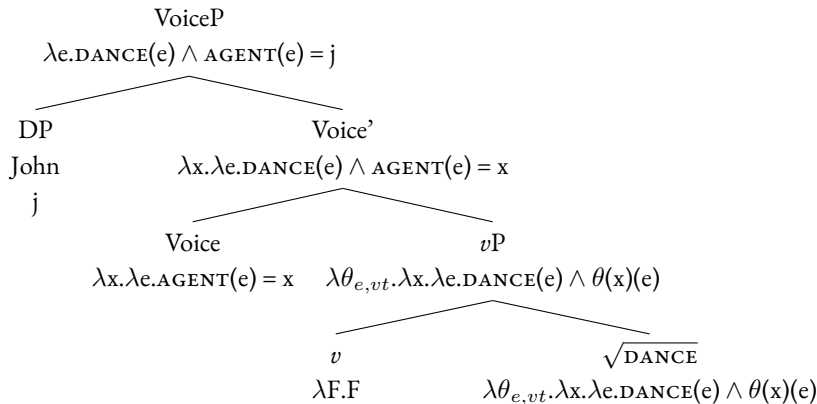
(7) $[\![again]\!]P(e)$ is defined iff $\exists e^1 \exists e^2 [e^1 \prec e^2 \prec e \ \& \ P(e^1) \ \& \ \neg P(e^2)]$.
   When defined, $[\![again]\!]P(e) = P(e)$. $<<vt>,<v,t>>$

- 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 vP-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 (8).

(8) John danced.

VoiceP
$\lambda e.\textsc{dance}(e) \wedge \textsc{agent}(e) = j$

DP
John
j

Voice'
$\lambda x.\lambda e.\textsc{dance}(e) \wedge \textsc{agent}(e) = x$

Voice
$\lambda x.\lambda e.\textsc{agent}(e) = x$

vP
$\lambda \theta_{e,vt}.\lambda x.\lambda e.\textsc{dance}(e) \wedge \theta(x)(e)$

v
$\lambda F.F$

$\sqrt{\textsc{dance}}$
$\lambda \theta_{e,vt}.\lambda x.\lambda e.\textsc{dance}(e) \wedge \theta(x)(e)$

- Here the only node of the right type to serve as *again*'s argument is VOICEP, therefore ruling out agentless presuppositions with *again*.

3 Extension to resultatives

- The optionally transitive unergative verbs considered in Smith and Yu (2021) fall into the class of activity verbs, which are more generally classified by Levin (1993) as *manner* verbs.

- 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.

  (9)   a. Manner verbs:
            hammer, run, sweep, scrub, dance
        b. Result verbs:
            open, redden, break, crack, destroy

- One aspect of the analysis of verbs taking thematic roles as arguments rather than specifying them internal to the root's lexical semantics accords well with two properties of manner roots discussed by Levin (1993).

- First, manner verbs are in general optionally transitive, as already demonstrated above. They readily permit object deletion, whereas result verbs generally do not permit such object drop.

  (10) a. All last night, Kim *hammered / ran / swept / scrubbed / danced*.
        b. *All last night, Kim *opened / reddened / broke / cracked / destroyed*.

- Rappaport Hovav and Levin (2001) suggest this follows from their Argument per Subevent Condition, whereby each subevent in an event structure template must lexicalize an argument. Since manner verbs describe a simple event structure with only one event, so long as the subject argument is realized the object becomes optional and can be freely dropped.

- For Smith and Yu (2021), this is recast as part of the lexical semantics of a manner root, which does not lexically specify an object thematic role like Theme, which in turn correlates with the distribution of subjectless presuppositions with *again*.

- A second property of manner verbs concerns their ability to appear with a wide variety of XPs that express results not entailed by the manner verb itself. Result verbs, on the other hand, seem more constrained and only certain classes can do so (see e.g., Yu et al. 2023). We turn to this second property of manner verbs next.

- 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.

- As long as the root's argument is of the right type ($<e,vt>$), there are no strong restrictions on the kind of object the root can compose with.

- We therefore expect verbal roots to compose with expressions other than thematic role functions introduced in *v*. Given these facts about the analysis, we extend Smith & Yu's approach to an analysis of the resultative construction.

  – The verbal root provides the *manner* component of the resultative.

- The *result phrase* acts as the first argument of the verb root *qua* relation between individual and event, like a thematic role function.

- We build up the analysis on the basis of the selected object resultative in (11).

    (11)   Martha hammered the metal flat.

- At the core of the result phrase is a stative constituent, typically an AP or PP; we analyze these as functions from individuals to predicates of states.

    (12) $[\![flat]\!] = \lambda x.\lambda s.\text{FLAT}(x)(s)$

- This stative constituent composes with an eventive head RES(ULT), which introduces a causative relation between an event and a state (13), as in (12) (Kratzer, 2005).[1]

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

- Composition of Res with a stative constituent yields 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 the RESP as its first argument (14).

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

- The object is introduced in the specifier of *v*P, with *v* itself denoting an identity function on $<e,vt>$-type functions. The DP in the specifier of *v*P then saturates the individual argument, yielding an event predicate. The analysis is summarized in (15).
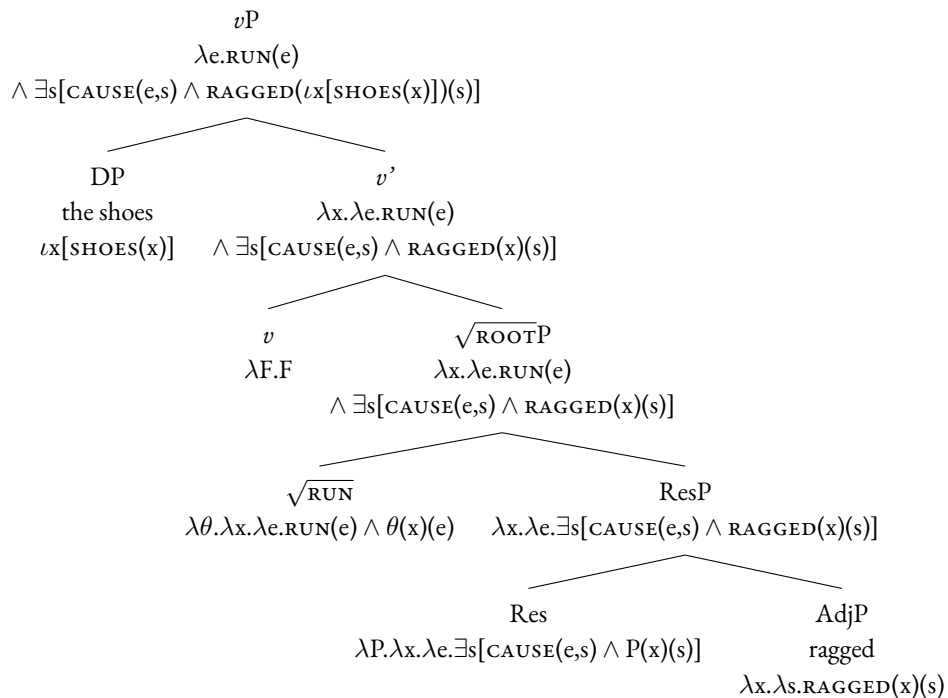
    (15)   Martha <u>hammered the metal flat</u>.

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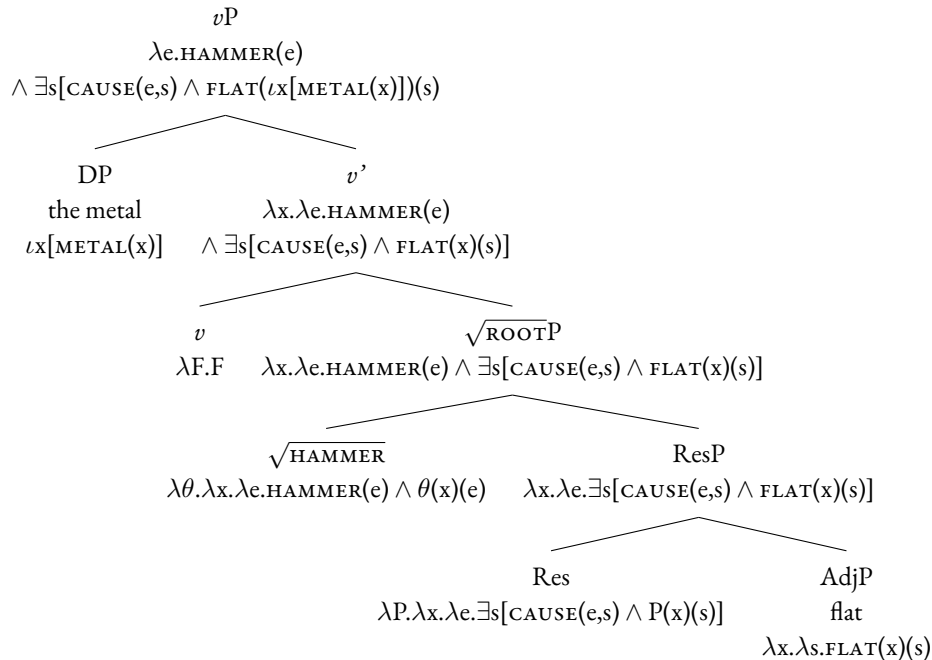
[1]Though we follow Kratzer (2005), among others, in making use of the CAUSE relation, nothing hinges on this choice. Other relations between the manner event and the result state, such as Rothstein's 2004 TP-CONNECT or (a modified version of) Williams's 2015 *K* relation would serve just as well, as long as the event predicate contributed by the root is predicated of the manner event in the resultative.

- Our analysis handles unselected object resultatives in exactly the same fashion, as can be seen in (16). We therefore make no syntactic or semantic distinction between selected and unselected object resultatives in terms of how they are related to the verbal event described by the manner root (e.g., Hoekstra 1988; Kratzer 2005).

(16) Martha ran the shoes ragged.

vP
$\lambda e.\text{RUN}(e)$
$\wedge \exists s[\text{CAUSE}(e,s) \wedge \text{RAGGED}(\iota x[\text{SHOES}(x)])(s)]$

DP
the shoes
$\iota x[\text{SHOES}(x)]$

v'
$\lambda x.\lambda e.\text{RUN}(e)$
$\wedge \exists s[\text{CAUSE}(e,s) \wedge \text{RAGGED}(x)(s)]$

v
$\lambda F.F$

$\sqrt{\text{ROOT}}$P
$\lambda x.\lambda e.\text{RUN}(e)$
$\wedge \exists s[\text{CAUSE}(e,s) \wedge \text{RAGGED}(x)(s)]$

$\sqrt{\text{RUN}}$
$\lambda \theta.\lambda x.\lambda e.\text{RUN}(e) \wedge \theta(x)(e)$

ResP
$\lambda x.\lambda e.\exists s[\text{CAUSE}(e,s) \wedge \text{RAGGED}(x)(s)]$

Res
$\lambda P.\lambda x.\lambda e.\exists s[\text{CAUSE}(e,s) \wedge P(x)(s)]$

AdjP
ragged
$\lambda x.\lambda s.\text{RAGGED}(x)(s)$

- In essence, the analysis consists of an *outside object syntax* (Williams, 2015), where the object DP is introduced external to the result state XP, with a *result patient semantics* like that of Kratzer (2005), in that the object DP is nonetheless interpreted as an argument of the result state XP and not of the verb.

4 Predictions

4.1 Depictive secondary predication

- A crucial piece of evidence that favors our analysis comes from the interaction of resultatives with *depictive secondary predication*.

- Depictives describe a state that an individual holds during an event. In (17), for instance, the metal is understood to be wet during the carrying event (Bruening, 2018).
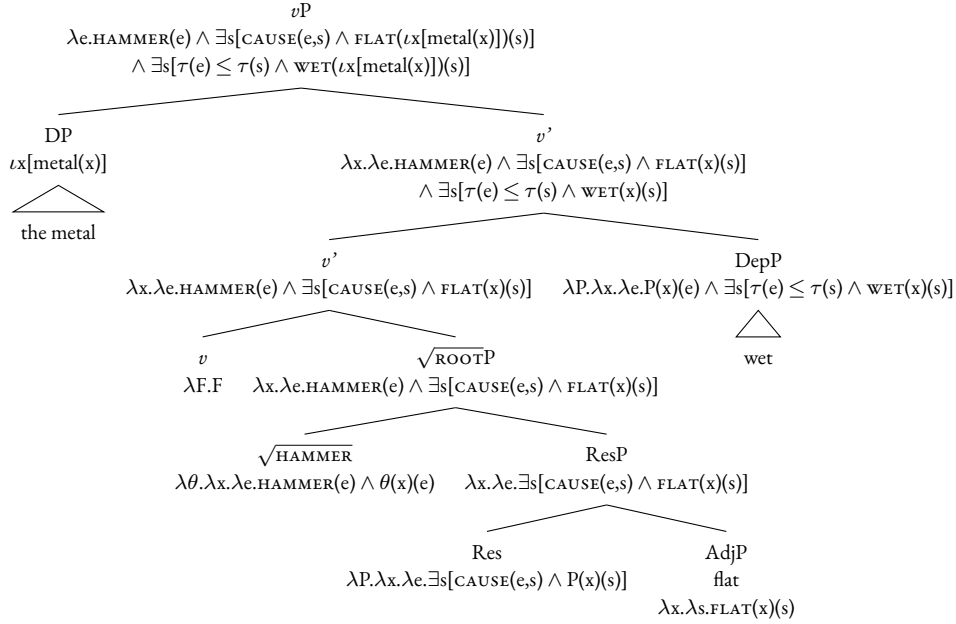
(17) She carried the metal wet.

- For the sake of concreteness, we adopt an analysis of depictives as in (18). The depictive head requires that an event's *runtime* (or *temporal trace*) $\tau(e)$ be included in the runtime of a state $\tau(s)$. $\leq$ denotes the inclusion relation among temporal intervals, which is introduced by a dedicated functional head DEP(ICTIVE) (see also e.g., Pylkkänen 2008).

(18) $[\![\text{DEP } wet]\!] = \lambda P_{e,vt}.\lambda x.\lambda e.P(x)(e) \land \exists s[\tau(e) \leq \tau(s) \land \text{WET}(x)(s)]$

- On our analysis, the object of the resultative is introduced in the specifier of vP, and composes with a function from individuals to event predicates.

- This predicts that depictives 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.

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

vP
$\lambda e.\text{HAMMER}(e) \land \exists s[\text{CAUSE}(e,s) \land \text{FLAT}(\iota x[\text{metal}(x)])(s)]$
$\land \exists s[\tau(e) \leq \tau(s) \land \text{WET}(\iota x[\text{metal}(x)])(s)]$

DP
$\iota x[\text{metal}(x)]$

the metal

v'
$\lambda x.\lambda e.\text{HAMMER}(e) \land \exists s[\text{CAUSE}(e,s) \land \text{FLAT}(x)(s)]$
$\land \exists s[\tau(e) \leq \tau(s) \land \text{WET}(x)(s)]$

v'
$\lambda x.\lambda e.\text{HAMMER}(e) \land \exists s[\text{CAUSE}(e,s) \land \text{FLAT}(x)(s)]$

DepP
$\lambda P.\lambda x.\lambda e.P(x)(e) \land \exists s[\tau(e) \leq \tau(s) \land \text{WET}(x)(s)]$

wet

v
$\lambda F.F$

$\sqrt{\text{ROOT}}$P
$\lambda x.\lambda e.\text{HAMMER}(e) \land \exists s[\text{CAUSE}(e,s) \land \text{FLAT}(x)(s)]$

$\sqrt{\text{HAMMER}}$
$\lambda \theta.\lambda x.\lambda e.\text{HAMMER}(e) \land \theta(x)(e)$

ResP
$\lambda x.\lambda e.\exists s[\text{CAUSE}(e,s) \land \text{FLAT}(x)(s)]$

Res
$\lambda P.\lambda x.\lambda e.\exists s[\text{CAUSE}(e,s) \land P(x)(s)]$

AdjP
flat
$\lambda x.\lambda s.\text{FLAT}(x)(s)$

- This prediction 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 (20-21) shows.

- This is true regardless of whether the object of the the resultative in question is selected (20) or unselected (21).

(20) 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)

(21) 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. 541, ex. 9)

- A word of caution is in order here: type-theoretically, there are three other positions in which a DepP can attach to in the structure in (19): $\sqrt{\text{ROOT}}$P, ResP, and AdjP, which are all of semantic type $<e,vt>$.

7

- Semantically speaking, attaching to $\sqrt{\text{ROOT}}$P produces no difference in meaning with the empirically attested reading in (20), given that v here denotes an identity function. This might be ruled out syntactically by saying DepP needs to attach to a constituent that is categorized, i.e., not headed by an acategorial root, though nothing else hinges on this.

- Attaching to ResP is also not semantically ruled out. While ResP has no manner specification of the causing event, at the truth-conditional level, the causing event will still be specified as a hammering event upon composition with the verbal root. In other words, attachment to ResP delivers the same result as adjunction to vP and $\sqrt{\text{ROOT}}$P.

- What *does* need to be explained is the impossibility of adjunction directly to AdjP, which denotes a function of type $<e,vt>$ that can, in principle, serve as the first argument to DepP.

- Attaching at the AdjP level will predict that the runtime state of flatness is temporally included in the runtime of the state of wetness *to the exclusion of the causing event*; that is, the metal could have been dry during the hammering in (19). This is precisely the sort of reading that is not observed in (20b).

- While nothing rules out this attachment site type-theoretically, there *are* independent constraints ruling this out. First, note that in English, depictives can co-occur with adjectives in *predicative* position; here, there is no eventive layer and thus the depictive characterizes an individual during the state described by the adjective.

  (22) a. John is happy naked. $\Rightarrow$ John is happy *when he is naked*.
        b. Kim is grumpy tired. $\Rightarrow$ Kim is grumpy *when she is tired*.

- However, depictives *cannot* predicate of an adjective in *attributive* position. That is, no depictive reading is observed with adjectives in attributive position.

  (23) a. the happy naked man $\nRightarrow$ the man who is happy while naked
        b. the grumpy tired woman $\nRightarrow$ the woman who is grumpy while tired

- Whatever rules out depictives attaching to attributive adjectives, then, is the likely source ruling out depictive modification of the AdjP in resultatives, e.g, depictives need to attach to some larger functional structure that adjectives are embedded in (e.g., PredP, ResP, vP, etc.).

- In interaction with this independent property of depictive modification, our approach suffers no ill consequences. This will not be true for small clause approaches to resultatives, which we return to below.

4.2 Agentless presuppositions with *again*

- Our analysis predicts that agentless presuppositions with *again* of the kind discussed by Bale (2007) and Smith and Yu (2021) should be available with resultatives, regardless of the selected or unselected nature of the object.

- This follows from the fact that the type of the vP, which does not include the agent argument, is $<v,t>$, and is therefore of the appropriate type to serve as an argument of *again*.

- To test this, we need to control for the independently available *restitutive* reading of *again*, which merely presupposes the existence of a previous state of the same type as the result state independently of any causing event.

- 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 observe that agentless repetitive presupposition with *again* is felicitous, while contexts satisfying a restitutive presupposition are not.

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

(25)   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**. (cf. John kicked the door open again)

- We see that unselected resultatives permit agentless presuppositions as well, even when the restitutive reading of *again* is ruled out, as predicted by our analysis.

(26)   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**.

(27)   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)

4.3   Modification of the manner component of the resultative

- Our analysis, like any analysis that equates the manner contributed by the verb and the causing event, predicts that the causing event can be modified independently of the result state of the resultative or the change into that state.

- This prediction is borne out: in (28), *loudly* can only be understood to modify the singing event, and cannot be understood to modify the baby's being asleep, nor can it describe its transition into a sleeping state. Likewise, *daintily* in (29) can only describe the pressing event, not to the paper's resulting flatness, nor to the process of flattening.

(28)   Al *loudly* sang the baby asleep.
(29)   Jim *daintily* pressed the paper flat.

- This point is worth elaborating on, as previous authors have argued that such modification of the manner event is impossible, on the basis of examples like (30) (Rappaport Hovav and Levin 2001, Williams 2007, Williams 2015).

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

- (30) 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 (30), is done quickly. In other words, (30) does not entail (31), as shown by (32) which is not a contradiction.

    (31)   Al slowly pounded the cutlet.

    (32)   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: the means and causing events are equated, and coupled with an analysis of adverbs like *quickly* and *slowly* as predicates of events, we do seem to predict that (30) entails (31), i.e, the pounding is slow while the change to being flat could be fast.

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

- However, it turns out that sentences like (30) are confounded by an independent property of *adverbs of space and time* like *slowly* and *quickly*: they are scopal adverbs of change that are highly sensitive to the aspectual properties of the VPs they scope over (Cresswell, 1977; Rawlins, 2013; Koev, 2017, *a.m.o*).

- The so-called *manner* reading of *slowly* in (31) is better characterized as a *rate* reading; it intuitively describes the speed at which Al pounded the cutlet, which must then mean that the interval between each 'pound' is long and so the overall speed at which the cutlet was pounded was slow (Koev, 2017).

- As noted by Rawlins (2013) and Koev (2017), rate readings are most readily available with *activities*. Koev (2017) shows that these adverbs do not lead to true manner readings with activities and are really describing the rate at which an event unfolds.

    (34)   Selena ran on ice. She was moving her legs fast, but due to the little friction she was advancing with a low velocity.
            Selena ran ?#quickly$_{manner}$ / slowly$_{rate}$.

- The relevant observation here is that *accomplishment* predicates systematically lack rate readings and only have duration readings, which concern the temporal extent of whole events.

    (35)   Selena ran to the park quickly. $\Rightarrow$ Selena ran to the park in a short amount of time.

- As Koev (2017) shows (contra Rawlins 2013), explicitly ruling out the duration readings renders the following sentences degraded, indicating that rate readings are not readily available with accomplishments.

    (36)   a. ?Alfonso ran to the park quickly, but it took him a long time to get there.
            b. #The plane fell to the ground quickly, but it took a long time before it crashed.

- Consequently, on Koev's 2017, adverbs of change target *culminations of atomic parts of an event that themselves satisfy the event predicate denoted by the VP*. Formally, *quickly* is given the semantics in (37), where **atom(e,P)** holds of atomic P-events, A_c is the set of contextually relevant events, δ is a function that returns the temporal distance between two events, and σ_c is some contextually supplied standard distance.

  (37) $[\![quickly]\!]^c$: $\lambda P.\lambda e.P(e) \land \forall e' \in \mathbf{atom}(e,P) \, \exists a \in A_c[\delta(a,\mathbf{cul}(e',P)) <_{\epsilon_c} \sigma_c]$

- In words, *quickly* requires that the distance between the culmination of every atomic P-part of a P-event and some contextually relevant *anchor* event be very small relative to the standard.

- This means that with activities like running, which have atomic parts that culminate in individual steps, i.e. with each foot touching the ground, adverbs of change describe the temporal distance between the end of one step and the start of the next, leading to a rate reading.

- Accomplishments, on the other hand, have only one culmination at the end of the entire event; an accomplishment like *run to the park* only has a culmination specified by *to the park*, and does not have relevant atoms each with its own culmination. Adverbs of change therefore measure the temporal distance between the sole culmination of the entire event and the beginning of the event, i.e., the duration reading.

- It should be unsurprising then that resultative constructions, when combined with adverbs of change, only receive a duration reading and not the rate reading, given that aspectually, they pattern exactly like accomplishments.

- *Pound the cutlet flat*, for example, does not culminate with each of the individual 'pounds'. Instead, its culmination is defined by the result phrase, i.e. when the cutlet enters a flat state. Adverbs of change therefore describe the distance between the culmination of the entire event and the initial part of the event.

- Thus, the fact that (30) does not entail (31) receives an independent explanation: the resultative in (30) is an accomplishment, and thus only admits the duration reading with adverbs of change, while in (31) the adverb of change scopes over an activity, and thus quantifies over individual poundings.

- This renders the interaction between resultatives and adverbs of change an ineffective argument for the claim that the means event cannot be modified by adverbs.

- On the other hand, true manner adverbs (that do not describe change) such as those in (28-29) that cannot modify the resulting state but can modify the means event provide positive evidence that the means event *can* be modified, and thus that a predicate of the means event must be available for compositional purposes.

5   Previous analyses

5.1   Small-clause analyses

- On small clause analyses of resultatives, the apparent object of a resultative is analyzed as the subject of the small clause containing the AP or PP result state component, along the lines of the tree shown in (38) (Kayne, 1984; Hoekstra, 1988; Kratzer, 2005).

(38)

vP
- v
  - hammer
- SC
  - DP
    - the metal
  - AP
    - flat
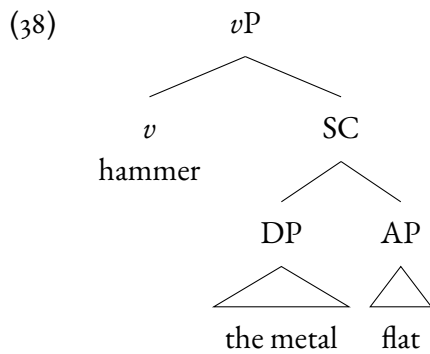
- On such analyses, the resultative object bears no syntactic or semantic relation to *v*P. Note that our proposed analysis also does not assign any semantic relation between the object DP and the manner verb, but differs in that the object DP is introduced at the eventive layer outside of ResP in (19).

- Because the object DP is introduced low within the result small clause, Bruening (2018) notes that under these analyses, depictives targeting the object DP 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, since the object DP is introduced precisely in the small clause that denotes the result state.

- In other words, small clause analyses make the opposite prediction of our own analysis: small clause treatments incorrectly predict that the (b) sentences of (20-21) should be felicitous, contrary to fact.

- Crucially, Bruening (2018) shows that true small clauses *do* allow for depictive modification (39); these facts are therefore not due to depictives being incompatible with small clauses in general.

    (39)   a. I want [*SC* the soldiers on the parade ground] *fully dressed*.
            b. I consider [*SC* him beneath contempt] *drunk*.   (Bruening, 2018, p. 549, ex. 32a, d)

- Thus, while direct modification of AdjPs by depictives is ruled out, per our discussion above, such modification of small clauses is *not*.

- Small clause approaches to resultatives therefore cannot appeal to any ban on the modification of small clauses by depictives, and the observed interpretations of (20-21) go unexplained.

- By contrast, on our analysis, resultatives do not contain a small clause component at all. The object DP is introduced externally to the result constituent, and therefore any depictive targeting it will necessarily predicate of the object DP during the causing event.

- The state denoted by the depictive is predicted never to hold only during the runtime of the result state, as shown by (20-21).

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).

- Our own approach falls into the complex predicate family, with clear precedents in Dowty (1979), though motivated on the basis of different principles and phenomena. This said, our analysis differs from previous complex predicate analyses in important ways.

- First, due to the common assumption among these authors that verbs denote functions from all of their arguments, previous complex predicate analyses have no way of explaining the availability of agentless presuppositions with *again* with resultatives and, more generally, with VPs headed by the manner verbs often used to form them.

- Our own approach, on the other hand, is essentially designed to deal with exactly this fact. Admittedly, this point is more a bug than a feature, and modifications of previous complex predicate approaches can certainly be designed to deal with the *again* facts.

- A second, and more significant, point concerns the relationship between the manner event and the result state, and the modifiability of the former independently of the latter.

- On the *process semantics* of Williams (2015), for example, a resultative contributes a *process event* 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, Williams 2015).

- This process event is distinct from the manner or means event e_m contributed by the manner verb, as well as from the result state e_r contributed by the result phrase.

- The subject and object then stand in thematic relations to this process event, and are related to the overt means and result predicates by a relation K.

  - The process semantics for resultatives is therefore *trieventive*, rather than bieventive like our own and small clause analyses, as can be seen in (40).

(40)   Process semantics for *Al pounded the cutlet flat* (adapted from Williams (2007), ex. 11a):
$\exists e_c \exists e_m \exists e_r [K(e_c e_m e_r) \wedge \textsc{pound}(e_m) \wedge \textsc{flat}(e_r) \wedge \textsc{Agent}(e_c)(al) \wedge \textsc{Patient}(e_c)(\textit{the cutlet})]$

- On Williams' analysis, the means event cannot be modified: only the process event can. Williams argues that this is a correct prediction of his analysis.

- However, his supporting evidence comes from adverbs of change like *quickly* and *slowly*, which were shown above to be subject to a confound due to the fact that these adverbs are independently known to produce different readings with accomplishment and activity predicates.

- Furthermore, our examples in (28) and (29) show that the manner event *can* be modified. These issues lead us to conclude that Williams' process semantics makes incorrect predictions about the modifiability of the means event, unlike our own analysis.

6   Conclusion and future research

- We have developed an analysis of resultatives building on the semantics of verbal roots proposed in Smith and Yu (2021).

- We showed that the analysis makes correct predictions about the interaction of resultatives with other constructions, and that it improves on earlier small clause and complex predicate analyses.

- More broadly, we argue for a complex predicate analysis of resultatives that crucially permits modification of the manner event.

- Ongoing and future work will aim to address the following research areas:

    1. Extension of the analysis to resultative constructions in other languages.

        – How do languages differ in the range of possible resultatives available to them, and does this analysis shed light on those differences?

        – More specifically, our analysis can be seen as an approach to *strong* resultatives in the sense of Washio (1997). How do strong resultatives differ from *weak* resultatives in other languages, on our style of analysis?

    2. Further exploration of the analysis of verbal roots in independent directions, such as the analysis of the conative alternation (cf. *John kicked/swept at the floor*).

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