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On the expression of resultativity in English: The view from multiple resultatives

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We examine an understudied class of *multiple resultatives*, resultatives which possess more than one result phrase, as in *A guard shot him dead off his horse* (Cappelle 2005). We propose that the eventualities introduced by such resultatives are ordered in a nested causal chain, such that the manner event causes the first result state, and the first result state in turn causes the second result state. We implement this by adopting a rule of CAUSATIVE FORMATION, which relates the second result phrase to the first via the CAUSE relation. We contrast our analysis with a previous approach due to Ausensi & Bigolin (2021), which proposes that the second result phrase be analyzed as a *low depictive*. We show that the low depictive analysis makes incorrect predictions about the temporal and causal relations that must hold between the eventualities at play in a multiple resultative. The nested cause analysis, by contrast, correctly captures the properties of multiple resultatives. The proposal has implications for proposed constraints on the expression of resultativity, such as the UNIQUE PATH CONSTRAINT (Goldberg 1991), which restrict the theme of an event to holding one result state per clause. While we deny the existence of any independent restriction of result phrases to one per clause, on our approach, the purported effects of the UNIQUE PATH CONSTRAINT can be understood as arising from the interaction between the causal structure of multiple resultatives and world knowledge, such that examples motivating the UNIQUE PATH CONSTRAINT, e.g., **Sam kicked Bill black and blue out of the room* (Goldberg 1991), involve states that cannot cause the state introduced by the second result phrase.

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1 Introduction

The term *resultative* refers to constructions in which the event contributed by the main verb brings about a result state expressed outside the verb by an independent phrase, commonly referred to as the *result phrase*. For example, in a sentence like *Samantha nailed the door shut*, *the door* ends up in a *shut* state due to an event of *nailing*, i.e., the *nailing* causes the referent of *the door* to become *shut*. Halliday (1967) originally called these constructions *resultative attributes*, and since then, resultatives have sparked great interest, and a considerable number of distinct approaches have been put forward in order to account for their syntactic and semantic properties (for syntactic approaches see Simpson 1983; Hoekstra 1984; 1988; Bresnan & Zaenen 1990; Mateu 2005; 2012; Acedo-Matellán 2010; 2016; Acedo-Matellán & Mateu 2014; Ausensi & Bigolin 2021; for semantic approaches see Van Valin 1990; Goldberg 1991; 1995; Jackendoff 1997; Wechsler 1997; 2005; Wunderlich 1997; Rappaport Hovav & Levin 2001; Broccias 2004; Kratzer 2005; Levinson 2010; Beavers 2011; Rappaport Hovav 2014; Levin 2020). In English, the result state is most commonly expressed by adjective phrases (APs), as in *John wiped the table clean*, or by prepositional phrases (PPs), as in *The toddler broke the vase into a thousand pieces*. The result state can also be introduced by particles, as in *Kim tore a page off*, and, despite not being that common, noun phrases can also serve as result phrases, e.g., *I painted the car a pale shade of yellow* (Simpson 1983: 142). In a resultative, the main verb and the result phrase have been argued to form a complex predicate where each expresses the manner and the result component of the resultative predication, i.e., a resultative of the *hammer the metal flat* sort can be given a paraphrase along the lines of *cause the metal to become flat*_{RESULT} *by hammering*_{MANNER} (for a general overview on resultatives, see Green 1972; Dowty 1979; Randall 1983; Nedjalkov 1988; Goldberg 1991; Pustejovsky 1991; Carrier & Randall 1992; Tenny 1994; Levin & Rappaport Hovav 1995; 2005; von Stechow 1995; Washio 1997; Mateu 2002; 2005; 2012; Boas 2003; Rothstein 2004; Goldberg & Jackendoff 2004; Beavers et al. 2010; Beavers 2011; 2012; Levin & Rappaport Hovav 2019).

In this paper, we examine an understudied class of resultatives in English which involve more than one result phrase, which we refer to as *multiple resultatives*. Examples include *A guard shot him dead off his horse* (Cappelle 2005), in which there are two independent result phrases introducing distinct result states: that of being *dead* and that of being *off his horse*. Building on Matsumoto's (2006) idea that resultatives involving more than one result state need to represent a single line of development (also Beavers & Koontz-Garboden 2017), we propose that these resultatives involve a *nested causal chain of eventualities*, in which the event denoted by the verb causes the first result state, which in turn causes the second result state. This is formally implemented by adopting a composition rule of CAUSATIVE FORMATION, which introduces a causal relationship between two eventualities (Dowty 1979; Bittner 1999; Kratzer 2005; Williams 2015). In proposing this analysis, we argue against a previous analysis due to Ausensi & Bigolin (2021), which analyzes the second result phrase in a multiple resultative as a *low depictive*, demonstrating

that such an analysis does not capture the interpretative properties of these constructions. Last, we discuss the implications of the existence of multiple resultatives for proposed constraints on resultatives, particularly the UNIQUE PATH CONSTRAINT (Goldberg 1991), which restricts the theme of an event to holding one result state per clause. On our approach, the purported effects of the UNIQUE PATH CONSTRAINT are instead modulated by independent properties of the causal relation interacting with world knowledge, such that examples motivating the UNIQUE PATH CONSTRAINT such as **Sam kicked Bill black and blue out of the room* (Goldberg 1991: 368) involve states that cannot cause the state introduced by the second result phrase (cf. Matsumoto 2006; Beavers & Koontz-Garboden 2017).

We proceed as follows. In Section 2, we discuss previous works that have proposed that there exists a constraint in English that restricts the expression of resultativity since there can only be one result state predicated of a theme in the same clause. We then turn to provide examples of resultatives that challenge such putative constraints, what we call multiple resultatives, as they involve two independent distinct result states being predicated of the same entity. In Section 3, we argue against a previous analysis of multiple resultatives, that of Ausensi & Bigolin (2021), by showing that their analysis is actually unable to account for the interpretative properties of multiple resultatives. We then provide evidence for our analysis that multiple resultatives are true resultatives in that they involve a relationship that must hold between the eventualities at play in a multiple resultative. In Section 4, we lay out our analysis of multiple resultatives, discuss other types of multiple resultatives described in Ausensi & Bigolin (2021) and finish by addressing the implications of the existence of multiple resultatives for proposed constraints on resultatives. We close with a discussion of a gap in the data in Section 5, and provide some concluding remarks in Section 6.

2 Restrictions on Resultatives in English

Work on the expression of resultativity in English has argued that there can only be one result state predicated in a single clause (Tenny 1987; 1994; Goldberg 1991; 1995; Levin & Rappaport Hovav 1995; Tortora 1998; Matsumoto 2006; Rappaport Hovav 2008; 2014; Beavers & Koontz-Garboden 2017; Iwata 2020; Ausensi & Bigolin 2021, *i.a.*). Classic evidence for such a restriction comes from examples like the following, which involve stacking of multiple result phrases that encode distinct result states. For example, in the example in (1-a), the intended reading is that the referent of the object ends up both *bloody* and *unconscious* at the end of the *beating* event, but this does not seem to be a possible resultative.

- (1) a. *They beat the man **bloody unconscious**.
 b. They beat the man bloody.
 c. They beat the man unconscious.

- (2) a. *He hammered the metal **into the ground flat**.
 b. He hammered the metal into the ground.
 c. He hammered the metal flat.

Since the stacking of multiple result phrases involves predicating two unrelated result states of the same entity, this type of example has been argued to be impossible. Several explanations have been put forward to account for this apparent restriction. For instance, Tenny (1987: 190) proposed that “there may be at most one ‘delimiter’ associated with a verb phrase”, where bounds are either provided by verbs which are inherently limited (3), or by result phrases which act as delimiters (4) (cf. Vendler 1957; Dowty 1979; Kearns 2000). This is indicated by the (in) felicity of telic *in*-phrases, which measure how long it takes for the event to reach the bound provided by the delimiting phrase, and atelic *for*-phrases, where the activity persists for some amount of time without entailing that any bound is reached.

- (3) a. Mary died in 3 minutes/#for 3 minutes.
 b. Mary broke the vase in 3 minutes/#for 3 minutes.
- (4) a. John wiped the table clean in 3 minutes/#for 3 minutes.
 (cf. John wiped the table for 3 minutes)
 b. John beat the man unconscious in 3 minutes/#for 3 minutes.
 (cf. John beat the man for 3 minutes)

The examples above in (1) and (2) are correctly predicted to be impossible according on Tenny’s proposal, because they contain two delimiters; the two result phrases both delimit the same verb phrase, explaining their ungrammaticality.

Over the years, what has come to be known as Tenny’s (1987) Generalization (cf. Giannakidou & Merchant 1999; Kratzer 2005) has been formulated in distinct ways. To name a few examples, Tenny (1994) further developed the SINGLE DELIMITING CONSTRAINT, whereby a clause can be delimited only once, and Tortora (1998) proposed the FURTHER SPECIFICATION CONSTRAINT, after observing that directed motion verbs, such as *arrive*, *fall*, *come*, *return*, permit result phrases, but only if they further specify the change of location encoded by the verb, as in *John arrived in Barcelona/at the hospital*. However, among distinct formalizations of Tenny’s generalization, the UNIQUE PATH CONSTRAINT (henceforth UPC) due to Goldberg (1991) (see also Goldberg 1995) is possibly the best known constraint on the number of result states that the theme can be predicated of in a single clause, and is defined in (5).

- (5) UNIQUE PATH CONSTRAINT: if an argument X refers to a physical object, then more than one distinct path [= *one result state*, emphasis ours] cannot be predicated of X within a single clause.

(Goldberg 1991: 368)

The effects of the UPC can be illustrated by the further examples below (from Goldberg 1991: 368, 370). In each of these examples, there are two result phrases, each describing a different change resulting from the activity denoted by the verb, and are therefore ruled out by the UPC.

- (6) a. *Sam kicked Bill **black and blue** out of the room.
 b. *He wiped the table **dry** clean.
 c. *Sam tickled Chris **off her chair** silly.

On this view, verbs that encode a change of state or location, *result verbs* in the sense of Rappaport Hovav & Levin (2010), are argued to disallow result phrases that introduce result states distinct from the one encoded in the verb (Rappaport Hovav & Levin 1998; 2010; Rappaport Hovav 2008; 2014; Beavers & Koontz-Garboden 2012; 2020). The following examples are thus also ruled out by the UPC, since the verbs encode either a change of location or a change of state, whereas the result phrases introduce an independent result state.

- (7) a. *She **carried** John giddy. (Simpson 1983: 147)
 b. *Bill **broke** the vase worthless. (Jackendoff 1990: 240)
 c. *The vase **fell** broken. (Rappaport Hovav 2014: 23)

There are examples that at first blush appear to violate the UPC, as they involve result verbs and PPs that introduce a distinct result state, as illustrated in (8) (examples (8-a) and (8-b) from Levin & Rappaport Hovav 1995: 60). For instance, in (8-a) it appears that the referent of *the eggs* both cracks and ends up inside the glass.

- (8) a. The cook **cracked** the eggs into the glass.
 b. Daphne **shelled** the peas onto the table.
 c. He **broke** the walnuts into the bowl. (Goldberg 1991: 376)

However, it is important to point out that the UPC, as defined in (5), does not constrain the number of result states per clause, but rather the number of result states that can be predicated of *a single entity* in the same clause. This is why Levin & Rappaport Hovav (1995) themselves propose that examples of the type in (8) are possible because the two result states are predicated of distinct entities. In particular, in an example like (8-a), *the eggshells* break, whereas it is the *the eggs' contents* that move into the glass. In light of this, Levin & Rappaport Hovav (1995: 60) suggest that “the restriction [= one result state per clause] may be that only one change per entity may be expressed in a single clause” (see also Beavers & Koontz-Garboden 2017).

In a similar vein, there exists another class of resultatives, exemplified in (9), that appear to pose a similar challenge to the UPC since at first blush they involve two independent result phrases.

- (9) a. He pounded the dough **flat** into a pancake-like state.
 b. The liquid froze **solid** into a crusty mass.

(Goldberg 1991: 371)

On further inspection, however, these resultatives do not involve two *distinct* results. Rather, both phrases serve to describe different compatible properties of the same result state (Rappaport Hovav & Levin 2010; Beavers 2011). These examples are thus not a problem for the UPC, as the two result phrases can be understood as jointly describing a single result state (Goldberg 1991).

2.1 Multiple Resultatives

In the previous section, we discussed how previous work on the expression of resultativity in English shares the assumption that there can only be one result state predicated of a single entity in a resultative construction. Combinations of multiple result phrases that predicate distinct and unrelated states of the same entity are judged ungrammatical, e.g., **Sam kicked Bill black and blue out of the room*. When multiple result phrases appear in the same clause, they must jointly describe the same result state. This renders examples like *The liquid froze solid into a crusty mass* irrelevant for the UPC and similar constraints, since they only involve the realization of one result. Other types of examples that pose similar challenges for the UPC at first blush, such as *break the egg into the glass*, are similarly irrelevant, since the two unrelated results are not actually predicated of the same entity.

Our central aim in this section is to show that the UPC and related constraints do not hold up empirically, even if reformulated in terms of one change per entity. In this respect, our departure point is Ausensi & Bigolin (2021), who identify two classes of actual multiple resultatives (see also Cappelle 2005; Iwata 2020). The first class involves result verbs in Rappaport Hovav & Levin's (2010) sense, e.g., *melt*, *burn*, where they appear to specify the manner component of a resultative construction, with a separate phrase encoding the result.¹

- (10) a. Metal components **melted** into the ground.
 b. Flared gas [...] is directly **burnt** into the atmosphere.
 c. Sailor finishes his beer [...] steps on it, **crushing** it flat.

(Ausensi & Bigolin 2021)

In these cases, one result state is contributed by the verb, while the second is contributed by the AP or PP. This type of examples appear to be true counterexamples to the UPC because they involve the realization of two distinct unconnected result states predicated of the same entity.

¹ We extract the naturally occurring examples presented here from different corpora: *Corpus of Contemporary American English* (COCA) (Davies 2008), *Corpus of Web-Based Global English* (GloWbE) (Davies 2013), and web searches (Web)

For instance, in (10-a), it is certainly the case that the referent of the *metal components* ends up both melted, i.e., a change of state, and in the ground, i.e., a change of location.²

The second class, which will be our primary focus, appears at first glance to be much like the class of cases in (9), e.g., *The liquid froze solid into a crusty mass*. However, in contradistinction to such examples, the two result phrases really do describe conceptually incompatible results: one cannot appeal to an analysis on which the second result phrase is a modifier of the state introduced by the first, since the two result phrases introduce result states that cannot be conceived of as describing the same state. Telling examples have been noted in scant previous work (Cappelle 2005; Iwata 2020; Ausensi & Bigolin 2021), and naturally-occurring examples abound in readily available corpora (more in the appendix). These examples all involve a verb followed by two separate, independent result phrases, and can be seen in (11).

- (11) a. Marcher Amelia Boynton [...] *clubbed **unconscious to the ground*** during the first charge. (COCA, from Iwata 2020)
- b. His mother would often be *beaten **bloody into unconsciousness*** by his drunken stepfather. (Web)
- c. He refused and the men punched him to the head, *knocking him **unconscious onto the footpath***. (Web)
- d. I'm just able to *kick it **flat into the space between the frame rails***. (Web)
- e. They spotted a man waiting in ambush in a tree. J.B. was quick on the draw and *shot him **dead out of the tree!***³ (Web, from Ausensi & Bigolin 2021)

The examples in (11) involve actual cases of multiple resultatives, in that the APs introduce result states (*unconscious, dead*), unrelated to the result states introduced by the PPs (*to the ground, onto the footpath*). It is clear that the proposed constraints on the expression of resultativity as described above will predict all of the examples in (11) to be impossible. For example, Tenny's SINGLE DELIMITING CONSTRAINT is clearly violated here, since the clauses above are all delimited twice by different result phrases, e.g., the *clubbing* activity is delimited by the AP *unconscious* and the PP *to the ground* (11-a). Despite this, all of these examples are perfectly natural and in fact, occur relatively frequently. Note further that because all the above examples involve two distinct changes denoted by the respective result phrases applied to a single entity, the surface object,

² See Goldberg & Jackendoff (2004) who point out the same observation regarding examples involving the result verb *melt* in combination with PPs introducing a change of location.

³ An anonymous reviewer has drawn our attention to the fact that in some dialects of English, an example along the lines of *shoot somebody dead out of somewhere* can have a non-resultative interpretation where *dead* would be a pre-modifier of the PP *out of somewhere* providing a meaning that the result state was especially neat and complete. The anonymous reviewer provides the following example where this non-resultative meaning is involved: *The knight drew his sword, but before he could attack it was knocked dead out of his hand*. These examples are therefore not relevant for the present discussion since they do not involve two actual result phrases, as *dead* is a modifier of the actual result phrase, the PP *out of his hand* in this case. Later in the paper we will be careful to use such examples with explicit contexts to rule out potential confounds like this.

the explanation for the acceptability of the examples of the type in (8), e.g., *crack the eggs into the glass*, will not apply to the examples in (11). For example, there is simply no interpretation of (11-a) on which part of *Amelia Boynton* became unconscious while another part of her landed on the ground because of clubbing, parallel to *crack the eggs into the bowl*. Clearly, these examples involve two changes applied to the same individual and not parts of the same individual that can be regarded as distinct entities.

In addition, the examples in (11) do not involve result verbs in Rappaport Hovav & Levin's (2010) sense. Rather, these all involve manner verbs, verbs of non-scalar change that specify the type of manner of action (Rappaport Hovav 2014). As such, the result phrases do not further specify a result already encoded in the verb. If this were the case, we would be dealing with so-called weak resultatives as in Washio (1997), in which the additional result phrase could be said to simply provide further specification about the result state encoded by the verb, as in *paint the wall blue* or *freeze the soup solid*, which would render such examples irrelevant for the present discussion. The fact that these multiple resultatives systematically involve manner verbs ensures that we are not dealing with the FURTHER SPECIFICATION CONSTRAINT, as put forward by Tortora (1998). Namely, as briefly discussed above, Tortora observed that result verbs like *arrive*, which encode changes along a path, can appear with result phrases that further specify the change of location, as in *arrive in Barcelona*, where the result phrase *in Barcelona* provides the bound to a change of location event. Consequently, the FURTHER SPECIFICATION CONSTRAINT is not relevant for our present purposes, since multiple resultatives do not necessarily need to involve result verbs; in fact, they most often occur with manner verbs.

Taken altogether, the data presented here presents a genuine challenge to constraints like the UPC: a single entity undergoes two unrelated changes, and thus two unrelated result states are predicated of a single entity in the same clause. Any analysis of these multiple resultatives should provide an account that explains the status of the two independent result phrases in examples like (11), and how such an analysis fits into the overall question of the status of constraints restricting the expression of resultativity in English.

In the next section, we discuss one proposed answer to the puzzle that multiple resultatives pose for constraints like the UPC, that of Ausensi & Bigolin (2021). We first show that their analysis faces both empirical and theoretical challenges, and then turn to an alternative account that captures the relevant interpretive properties of these resultatives.

3 A Previous Analysis: Ausensi & Bigolin (2021)

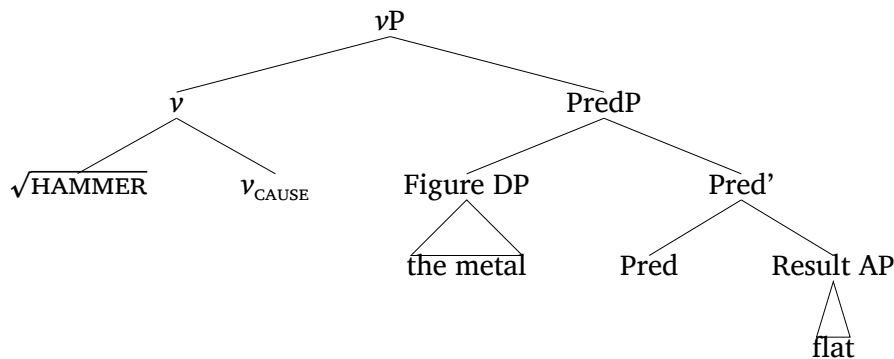
In light of the data challenging the UPC and related semantic constraints, Ausensi & Bigolin (2021), following Acedo-Matellán et al. (to appear), propose to maintain a *syntactic* formulation

of the UPC along the lines of Tenny (1994), but with a different understanding of the status of the additional phrase in examples like (11), repeated below.

- (12) a. Marcher Amelia Boynton [...] *clubbed **unconscious** to the ground* during the first charge. (COCA, from Iwata 2020)
 b. His mother would often be *beaten **bloody** into unconsciousness* by his drunken stepfather. (Web)
 c. He refused and the men punched him to the head, *knocking him **unconscious** onto the footpath*. (Web)
 d. I'm just able to *kick it **flat** into the space between the frame rails*. (Web)
 e. They spotted a man waiting in ambush in a tree. J.B. was quick on the draw and *shot him **dead** out of the tree!* (Web, from Ausensi & Bigolin 2021)

Ausensi & Bigolin's central insight remains the same as that of Tenny (1994): they argue for the existence of a syntactic constraint barring two phrases expressing result within a single clause. Working within a neo-constructionist framework to argument structure broadly in line with DISTRIBUTED MORPHOLOGY (Halle & Marantz 1993), resultative constructions are taken to be on par with lexical causatives. More specifically, resultatives involve a causative little v head selecting for a result small clause, with a root adjoined to little v specifying the manner in which the result is achieved (Harley 2005; Mateu 2012; Mateu & Acedo-Matellán 2012; Acedo-Matellán & Mateu 2015: among many others).⁴

- (13) Kim hammered the metal flat.



The core intuition on this account capitalizes on the assumption that only one result phrase can serve as syntactic complement to v_{CAUSE} . Any additional result phrase must integrate with the resultative structure in a way that ensures it is not a syntactic complement, and therefore cannot

⁴ The following tree representations in (13), (15) and (16) are the syntactic representations laid out by Ausensi & Bigolin, and are provided here for illustrative purposes, since the present paper responds to their particular analysis. However, we wish to emphasize that the particular form of the trees is less important than the combinatorial possibilities, however those are implemented.

be interpreted as being caused by the event introduced by v .⁵ In other words, an analysis along the lines of (13) derives the original insight by Tenny (1987; 1994) insofar as it predicts that there can only be one result phrase associated with a verb phrase acting as a delimiter, as Tenny originally put it.

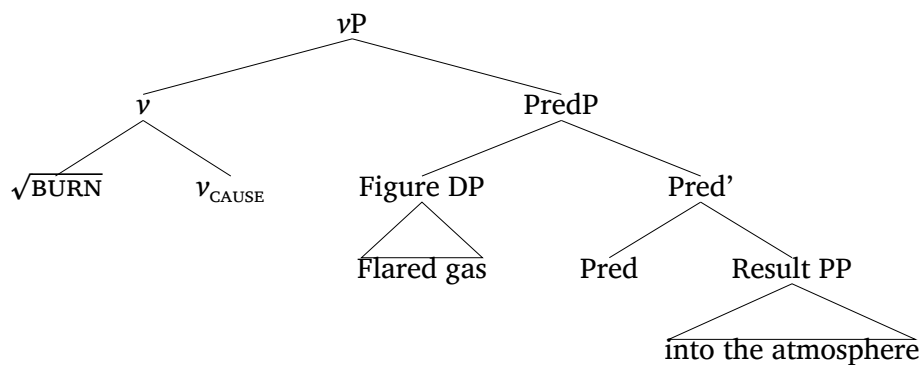
We can now see how Ausensi & Bigolin would deal with cases of multiple resultatives. Consider the first class, where a result verb appears to specify the manner component of a resultative, repeated below.

- (14) a. Metal components **melted** into the ground.
 b. Flared gas [...] is directly **burnt** into the atmosphere.
 c. Sailor finishes his beer [...] steps on it, **crushing** it flat.

(Ausensi & Bigolin 2021)

For Ausensi & Bigolin, these are clear cases where a semantic formulation of the UPC cannot hold, given there are two distinct changes predicated of the same entity. For instance, in (14-a) it is understood that the referent of the subject undergoes both a *melting* process and a change of location introduced by the prepositional phrase *into the ground*. However, a syntactic reformulation of the UPC would predict these to be licit. The key intuition is that these result verbs are integrated in a ‘manner’ position, i.e., adjoined to v (see also Yu et al. 2023). If so, then there is only one result phrase serving as complement to little v and no violation of a syntactic UPC occurs.⁶

- (15) Flared gas is directly burned into the atmosphere.



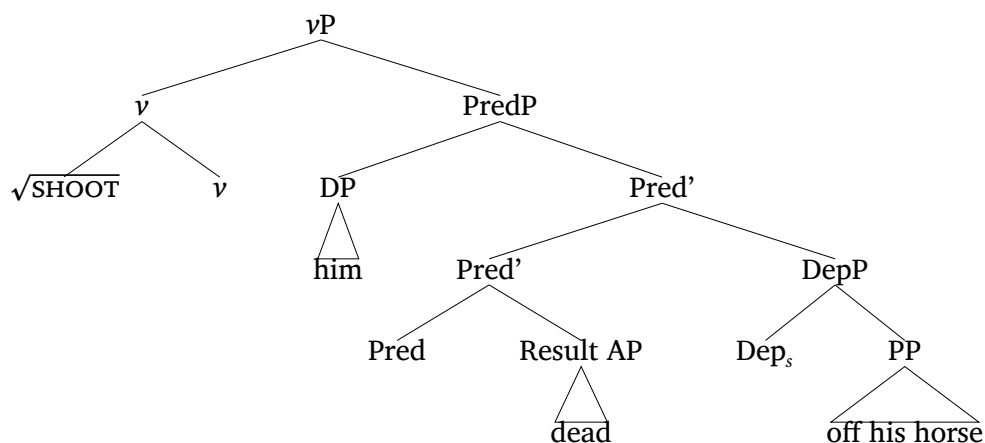
⁵ As an anonymous reviewer notes, the idea that any phrase that is not a complement to v cannot be interpreted as caused by the event v introduces is essentially a stipulation. While this idea forms the key intuition behind Ausensi & Bigolin’s syntactic reformulation of the UPC, it plays no role in our own analysis developed later in this paper.

⁶ On Ausensi & Bigolin’s approach, there is no meaningful difference in the syntax of the trees of the type in (13), i.e., *hammer the metal flat*, and those in (15). The only difference is in the type of verbal root adjoined to v : examples of the sort in (13) involve manner roots, whereas the ones in (15) involve result roots. The key intuition behind Ausensi & Bigolin’s approach, then, is that verbal roots can be adjoined to v regardless of their conceptual content as manner or result roots (Mateu & Acedo-Matellán 2012; Acedo-Matellán & Mateu 2014).

However, this strategy is not obviously available for dealing with the second class of examples, with two separate result phrases in combination with a manner verb. If the UPC is to be maintained as a syntactic constraint, and an analysis on which the second result phrase further specifies the state introduced by the first phrase is not tenable, then a separate explanation must be sought for how the second phrase is integrated into the structure. To this end, following Acedo-Matellán et al. (to appear), Ausensi & Bigolin propose that there is indeed only one result phrase serving as complement to little *v*, the phrase immediately adjacent to the verb. The second apparent result phrase is integrated not as a modifier, but as a *low depictive*.

Intuitively, low depictives are similar to regular depictives that modify verb phrases, as in *eat the meat **raw***. The only difference is that while a typical depictive modifies the *vP* and is predicated of the event contributed by the verbal root, a low depictive is predicated of the result state in a resultative construction, as shown in (16).

(16) A guard *shot* him **dead** off his horse.



(Ausensi & Bigolin 2021: 592)

This low depictive analysis, as Ausensi & Bigolin argue, captures the fact that there is no need for the two result phrases to be compatible as descriptions of a single result state, because they are never in a modification relationship, and can therefore be predicated of conceptually unrelated states, in contrast to examples like *freeze solid into a crusty mass*. Ausensi & Bigolin further claim that this explains why the second phrase is interpreted as overlapping with the first result phrase to the exclusion of the manner event. Most importantly for their purpose, a syntactic account of the UPC can be maintained, since there is only one result phrase that is interpreted as a true syntactic result *qua* complement of an eventive little *v*.

3.1 Against a Low Depictive Analysis

In what follows, we argue that a low depictive analysis, *contra* Ausensi & Bigolin, in fact makes incorrect predictions about the interpretive properties of multiple resultatives. On Ausensi &

Bigolin’s analysis, in resultatives with two result phrases introducing conceptually unrelated results, the second result phrase modifies the first one as a (*low*) *depictive*. While Ausensi & Bigolin do not provide an explicit compositional semantics, given they follow the analysis that Acedo-Matellán et al. (to appear) propose for similar constructions in Old Spanish, and they allude at several points in their paper to the explicit semantics proposed in Acedo-Matellán et al., it is fair to say that Ausensi & Bigolin have in mind a semantics of the Dep(ictive) head as in (17), where the variables e , e' , etc. range over eventualities (events and states), $\tau(e)$ represents the *runtime* of e , and the runtimes of e and e' must overlap (e.g., Pylkkänen 2008: adopted by Acedo-Matellán et al. to appear).⁷

$$(17) \quad \llbracket \text{Dep} \rrbracket: \lambda P_{e,vt}. \lambda x. \lambda e. \exists e' [\tau(e) \circ \tau(e') \wedge P(x)(e')]$$

A run-of-the-mill depictive, such as *eat the meat raw*, would be analyzed as in (18), where the event of eating temporally overlaps with the meat’s state of being *raw* (Pylkkänen 2008; Acedo-Matellán et al. to appear).

$$(18) \quad \llbracket [\text{the meat} [[v \text{ eat}] [\text{Dep} [\text{raw}]]]] \rrbracket: \\ \lambda e. \text{EAT}(\text{the meat})(e) \wedge \exists e' [\tau(e) \circ \tau(e') \wedge \text{RAW}(\text{the meat})(e')]$$

Turning to the low depictive analysis, taking an example like *shot him dead off his horse*, we may represent the semantic relationship between the two result phrases as follows in (19) (PredP in (16)) applying PREDICATE MODIFICATION, and assuming Pred introduces the argument of the AP. As desired, this asserts that the runtime of the state of being *dead* overlaps with the runtime of the state of being *off the horse*.

$$(19) \quad \llbracket [\text{him} [[\text{Pred} \text{ dead}] [\text{Dep} [\text{off his horse}]]]] \rrbracket: \\ \lambda e. \text{DEAD}(\text{him})(e) \wedge \exists e' [\tau(e) \circ \tau(e') \wedge \text{OFF}(\text{him})(\text{his horse})(e')]$$

The next stage of analysis is the introduction of v , which introduces causative semantics, and is further modified by the verbal root, which serves to specify the manner in which the causing event is carried out. Drawing on Kratzer’s (2005) semantics for causation, we may represent this complex v head in (20). This then composes with the PredP in (19), establishing a causal relation between the shooting event and the state argument of the function denoted by PredP in (21).

$$(20) \quad \llbracket [\sqrt{\text{SHOOT}} v_{\text{CAUSE}}] \rrbracket: \lambda P_{v,t}. \lambda e. \exists e'' [\text{SHOOT}(e) \wedge \text{CAUSE}(e, e'') \wedge P(e'')]$$

⁷ Runtimes, or temporal traces, of eventualities are assumed to be temporal intervals, which are dense, convex sets of points of time. Temporal overlap is defined as follows:

(i) $T \circ T'$ iff $T \cap T' \neq \emptyset$

In other words, two temporal intervals overlap if there are points of time that are elements of both intervals.

- (21) $[[\nu P]: \lambda e. \exists e'' [\text{SHOOT}(e) \wedge \text{CAUSE}(e, e'') \wedge \text{DEAD}(\text{him})(e'') \wedge \exists e' [\tau(e'') \circ \tau(e') \wedge \text{OFF}(\text{him})(\text{his horse})(e')]]]$

At this point, we note an important consequence of this analysis: because no causal relationship is required to hold between the state introduced by the putative depictive (the state of being *off the horse*), and the other eventualities in the formula at the root node of the tree in (21), there are no constraints on when the state of being *off the horse* begins, *contra* what Ausensi & Bigolin claim. Consequently, the analysis predicts that the individual shot can already be off his horse at the time of the shooting event. This is indeed a possible reading of (16), as (22) explicitly shows.⁸

- (22) CONTEXT: After riding into town, the bandit hopped off his horse for a few beers at the local saloon. The sheriff spotted the bandit and quickly shot him dead ...
The sheriff shot the bandit dead off his horse.

However, the availability of this reading is subject to a confound: *off his horse* has an independently available locative meaning, which need not be due to a low depictive analysis. We can control for this confound in two ways. First, we can set up the context in such a way that the locative interpretation of the PP is excluded. For example, in (23), the bandit is not off his horse at the time of the shooting or his death, but the sentence is nevertheless felicitous in the provided context. The PP thus cannot have its purely locative reading in this context.

- (23) CONTEXT: The sheriff fired at the bandit, who was escaping on his horse after robbing the local store. The shot hit the bandit's heart, and he died on his horse immediately. His body went limp, and slowly slipped off the horse ...
OK The sheriff shot the bandit dead off his horse.

Having ruled out the locative reading of the PP, we can show that there are contexts in which the sentence in (23) is infelicitous despite the fact that the state of being *dead* and the state of being *off the horse* temporally overlap. The following example in (24) is such a case: here, temporal overlap is satisfied, but a significant amount of time separates the bandit's death and his falling off his horse, rendering the sentence markedly infelicitous.

- (24) CONTEXT: The sheriff fired at the bandit who was escaping on his horse after robbing the local store. The shot hit the bandit's heart and he died on his horse immediately. The horse continued galloping, and the bandit's body was knocked off later when it hit a tree branch ...
#The sheriff shot the bandit dead off his horse.

Another way to control for the locative reading of the PP is by making use of a clearly directional preposition, such as *into*, which lacks a locative reading altogether.⁹ If we were nonetheless to

⁸ We thank an anonymous reviewer for pointing the availability of this reading out to us. In what follows, we will be careful to control for this independently available reading.

⁹ That directional prepositions like *into* lack a locative reading can be seen in simple examples like *John is in(*to) the park*, where *into* cannot be used to express John's location.

apply Ausensi & Bigolin’s analysis to an example like *The policeman knocked the fugitive senseless into the boat*, giving it a locative analysis, contrary to fact, we would derive the truth conditions in (25).

$$(25) \quad \llbracket \nu P \rrbracket: \lambda e. \exists e'' [\text{KNOCK}(e) \wedge \text{CAUSE}(e, e'') \wedge \text{SENSELESS}(\text{the.fugitive})(e'') \wedge \exists e' [\tau(e'') \circ \tau(e') \wedge \text{IN}(\text{the.fugitive})(\text{the.boat})(e')]]$$

Here, if *into the boat* is treated as a depictive modifier of the result state with Pylkkänen’s (2008) semantics, we expect that the fugitive’s state of being *senseless* merely has to overlap with his being in the boat. Because overlap is satisfied when the temporal trace of the senseless state is included in the runtime of the state of being *in the boat*, we would expect the sentence in (25) to be felicitous in the provided context. This prediction is *not* borne out, as shown in (26)

$$(26) \quad \text{CONTEXT: A policeman chased a fugitive to the dock where his boat was docked. The fugitive jumped into the boat and sat down, attempting to hide. The policeman found the fugitive and knocked him on the head with an oar so hard that he was dizzy, so ...}$$

#The policeman knocked the fugitive senseless into the boat.

The problem, of course, is that *into the boat* really requires as part of its truth conditional content a change, and thus a depictive analysis is not appropriate. One might alternatively argue that the problem lies not specifically in a depictive analysis of multiple resultatives, but rather in assuming, following Pylkkänen (2008) and Acedo-Matellán et al. (to appear), that *temporal overlap*, as represented by \circ in (17), is the relevant relation in the semantics of depictives. Indeed, one may counter that this relation is simply too weak to provide an adequate semantics for the depictive, and that a reasonable alternative to this weak semantics is the stronger relation of *temporal inclusion*, represented by \leq in (27).¹⁰ On this approach, the depictive requires that *the runtime of the first eventuality completely includes the runtime of the second*.

$$(27) \quad \llbracket \text{Dep} \rrbracket: \lambda P_{e, \nu'} . \lambda x. \lambda e. \exists e' [\tau(e) \leq \tau(e') \wedge P(x)(e')]$$

A revised analysis of (21) replacing temporal overlap with temporal inclusion is provided in (28), and requires that the state of being *off the horse* be temporally included in the state of being *dead*.

$$(28) \quad \llbracket \nu P \rrbracket: \lambda e. \exists e'' [\text{SHOOT}(e) \wedge \text{cause}(e, e'') \wedge \text{DEAD}(\text{him})(e'') \wedge \exists e' [\tau(e'') \leq \tau(e') \wedge \text{OFF}(\text{him})(\text{his horse})(e')]]$$

This analysis does correctly predict (24) to be infelicitous, since the runtime of the bandit’s *dead* state is not included in his state of being *off the horse*. However, it incorrectly rules out (23),

¹⁰ Temporal inclusion is, like temporal overlap, defined over intervals of time points.

(i) $T \leq T'$ iff $T \subset T'$

where the bandit's death precedes his falling off his horse, meaning that there is a time point where the bandit is dead but is not off his horse. Furthermore, the analysis faces the same problem with (26) as the temporal overlap analysis; because it places no constraints on the relationship between the state of being *in the boat* and the knocking event, and permits the runtime of the knocking to be included in the state of being *in the boat*, the analysis predicts (26) to be felicitous, contrary to fact.

Finally, one could adopt a semantics where the second eventuality is included in the first, as in the minimal modification of (27) given in (29), where \leq is replaced with \geq .

$$(29) \quad \llbracket \text{Dep} \rrbracket: \lambda P_{e,vt} \lambda x \lambda e. \exists e' [\tau(e) \geq \tau(e') \wedge P(x)(e')]$$

This move suffices to rule out contexts such as (26); because the state introduced by the PP is constrained to hold only once the state introduced by the AP does, and the latter holds only when the causing event culminates, the analysis no longer predicts that the state introduced by the PP may hold prior to the causing event. This also explains the acceptability of (23), as we now expect the runtime of the bandit's state of being *off the horse* to be included in that of his state of being *dead*. Unfortunately, there are two problems with this analytical move. First, it reverses the typical relationship between eventualities in a depictive. In ordinary depictives, it is the *first* eventuality whose temporal trace is included in that of the second, not the reverse. This can be seen in the garden variety depictive in (30), where it is the eating event that occurs during the state of being *raw*, rather than *vice versa*. On this analysis, then, a low depictive would not behave like other depictives.

- (30) The man ate the meat raw.
 \rightsquigarrow The man ate the meat while the meat was raw, and the rawness of the meat may have held prior to the onset of the eating event.

Second, because the semantics of the depictive only requires that the state introduced by the PP hold during the runtime of the state introduced by the AP, the analysis predicts that multiple resultatives should be felicitous in scenarios where the temporal inclusion requirement is satisfied, but a significant amount of time passes between the onset of the first result state and that of the second. But this is exactly the problem that arises for the temporal overlap analysis in (24) above: the sentence is infelicitous despite the fact that the bandit's state of being *off the horse* is temporally included in his state of being *dead* in the provided context.

We thus find that no approach to the semantics of depictives, whether defined in terms of temporal overlap or either form of temporal inclusion, is able to account for the interpretative

properties of multiple resultatives. We therefore conclude that a low depictive analysis of multiple resultatives along the lines of Ausensi & Bigolin (2021) is untenable.¹¹

3.2 Multiple Resultatives as True Resultatives

In the previous section, we showed that Ausensi & Bigolin’s analysis of multiple resultatives fails to capture the basic temporal relationship between the eventualities at play in a multiple resultative. In this section, we provide clear evidence for a *resultative* relationship holding between the eventualities. For one, recall that the two result states need to be fairly close together in time, as shown by the infelicity of (24) above. This is a hallmark example of a constraint on resultatives; as noted by Goldberg (1995), a resultative construction like *Chris shot Pat dead* “cannot be used to mean that Chris shot Pat and Pat later died in the hospital. Instead it must mean that Pat died immediately from the shot” (Goldberg 1995: 195). Moreover, contexts in which another, intervening event causes the state introduced by the second result phrase render sentences with multiple resultatives infelicitous. In this respect, consider first (31). Here, the bandit’s falling off his horse is caused by the horse running into a tree, and the sentence is thus infelicitous in the provided context.

- (31) CONTEXT: The sheriff fired at the bandit, who was escaping on his horse after robbing the local store. The shot hit the bandit’s heart, and he died on his horse immediately. At the same time the bandit was shot, his horse ran into a tree and the bandit’s body was knocked off the horse, so ...
#The sheriff shot the bandit dead off his horse.

However, once a causal relationship between the two result phrases is established, the sentence is rendered acceptable. We can see this in (23), repeated in (32): we observe that our running example sentence is felicitous in a context where, although the bandit’s being off the horse does not immediately follow his being shot, it *does* follow his death.

¹¹ An anonymous reviewer wonders whether we are being unfair to Ausensi & Bigolin (2021), given that they provide no semantics for the Depictive head themselves. Ausensi & Bigolin, the reviewer suggests, could simply reply that the term “depictive” is simply the wrong term, and that what matters for their approach is rather the attachment site of the PP. We have two responses to this. First, given that Ausensi & Bigolin are following the low depictive analysis of Acedo-Matellán et al. (to appear), which does explicitly adopt a depictive semantics for the phrases at issue, and they speak informally of the fact that “the state denoted by the path PP temporally overlaps with the result state denoted by the AP” (Ausensi & Bigolin 2021: 591), we believe it is reasonable to conclude that they have the same depictive analysis in mind for their approach to multiple resultatives. Second, given Ausensi & Bigolin’s (admittedly stipulative) idea that it is only the *complement* of *v* that can be interpreted as providing a description of a result state, and given that their low depictives are *adjuncts* to the result phrase, we do not see that they could adopt anything other than a depictive analysis without contradicting one of their other assumptions.

- (32) CONTEXT: The sheriff fired at the bandit, who was escaping on his horse after robbing the local store. The shot hit the bandit's heart, and he died on his horse immediately. His body went limp, and slowly slipped off the horse ...
 OK The sheriff shot the bandit dead off his horse.

We further illustrate the relationship between the two result phrases with another minimal pair involving a different manner verb and different result phrases. Here again, we see that the absence of a causal relationship between the first and second result phrase renders the example infelicitous (33-a), but establishing such a relationship between the two is sufficient to render it felicitous (33-b).

- (33) a. CONTEXT: A policeman chased a fugitive to the dock where his boat was docked. The policeman knocked the fugitive with the boat's oar so forcefully that he immediately lost his senses. At the same time, the policeman's partner kicked the fugitive into the boat, so ...
 #The policeman knocked the fugitive senseless into the boat.
- b. CONTEXT: A policeman chased a fugitive to the dock where his boat was docked. The policeman used the boat's oar to knock the fugitive with such force that he immediately lost his senses. The fugitive then stumbled and fell into the boat, so ...
 OK The policeman knocked the fugitive senseless into the boat.

The intuition here is clear: the first context in each of the above examples is infelicitous because *there is no causal relationship between the two result phrases*. On Ausensi & Bigolin's low depictive analysis, no difference in felicity between the two kinds of example is expected. This is because all that is required on their analysis is that the states introduced by each result phrase have overlapping runtimes, regardless of the existence of a causal relationship between them. This shows that the relationship between the two result phrases in a multiple resultative must be tighter than simple temporal overlap, and must instead be *causal* in nature.

4 Analysis: Composing Multiple Result Phrases

Given the key interpretative properties of multiple resultatives discussed above, we propose a different understanding of how the two stative components of such resultatives are related. Specifically, we propose the eventualities introduced by the two result phrases stand in a *causal relationship* with one another: the first result state is the cause of the second. The idea that multiple resultatives need to represent a single line of development can be traced back to the work of Matsumoto (2006), who proposes that multiple resultatives are well-formed as long as the result phrases "are a part of a single line of the development of a change" (Matsumoto 2006: 23), which Beavers & Koontz-Garboden (2017: 869) later interpret as one result leading to another. This idea thus parallels our appeal to a nested causal chain of eventualities that world knowledge tells us are able to cause one another. For instance, in our running example, the sheriff

shoots the bandit, which causes the bandit's death, which in turn causes him to fall off his horse. Matsumoto does not provide a formal analysis of multiple resultatives, and chooses to propose a SINGLE DEVELOPMENT CONSTRAINT meant to replace the UPC, rather than derive the properties of multiple resultatives by appealing to independent principles as we do here. Nevertheless, our proposal owes much to Matsumoto's insight, as well as to Beavers & Koontz-Garboden's, and in what follows, we develop an account that formalizes this shared intuition. Specifically, we propose that the relevant relation that explains the properties of multiple resultatives is direct causation, derived through a complex predicate formation operation used to build resultatives more generally.

The compositional core of the analysis is couched in a rule that we term CAUSATIVE FORMATION, building off of similar rules proposed throughout the literature (Rothstein 2004; Kratzer 2005; Williams 2015). This rule takes as input two functions of type $\langle e, vt \rangle$, and returns as output a new function of type $\langle e, vt \rangle$, which, when supplied with an individual argument, returns a predicate of eventualities with a description corresponding to the first function that causes an eventuality matching the description provided by the second. A definition of CAUSATIVE FORMATION that makes these ideas explicit is provided in (34).

(34) Causative Formation:

$$f_{e,vt} + g_{e,vt} \rightarrow \lambda x. \lambda e. f(x)(e) \wedge \exists e' [g(x)(e') \wedge \text{CAUSE}(e, e')]$$

The relevant notion of CAUSE here is that of *direct causation*, the same sort of causation that has been argued to be at issue in the semantics of lexical causatives, such as *kill*, *break*, and *open* (Fodor 1970; Katz 1970; Smith 1970; Ruwet 1972; Shibatani 1976; Levin & Rappaport Hovav 1995; Bittner 1999; Wolff 2003; Rappaport Hovav & Levin 2001; 2012), as well as in that of run-of-the-mill resultatives with just one result phrase, such as *hammer the metal flat* (Dowty 1979; Jackendoff 1990; Carrier & Randall 1992; Goldberg 1995; Rappaport Hovav & Levin 1998; Bittner 1999; Kratzer 2005; Levin 2020). This contrasts with periphrastic causatives, such as *make/cause the door to open/close*, which have been argued to involve *indirect causation* (cf. Wolff 2003; 2007; Neeleman & Van de Koot 2012; Martin 2018). The difference between direct and indirect causation can be seen in (35) and (36), where periphrastic causatives, but not lexical causatives or resultatives, permit a significant amount of time to elapse between the causing and caused eventualities, and for other events to intervene between the two.

- (35) a. John caused Bill to die on Sunday by stabbing him on Saturday.
b. #John killed Bill on Sunday by stabbing him on Saturday.

(Fodor 1970)

- (36) a. I caused the man to die on Sunday by shooting him on Saturday.
b. #I shot the man dead on Sunday: I shot him on Saturday and he died on Sunday.

Direct causation is also clearly at issue in multiple resultatives as well. We saw in section 3 that a multiple resultative becomes markedly infelicitous when a significant amount of time passes between the causing and caused eventualities (24) or when another potential cause event intervenes between the two (23), (33-a). It seems clear, then, that multiple resultatives are simply instances of more familiar resultatives with two applications of the CAUSATIVE FORMATION rule. This has the desirable consequence that the rule used to form multiple resultatives on our analysis is the same as the one used to form resultatives more generally.

The nature of the CAUSATIVE FORMATION rule places certain constraints on the syntactic structure of multiple resultatives and the semantics of their components. Beginning with the latter, we analyze the manner verb as a function from individuals to event predicates, such that the individual in question stands in the theme relation to the event argument, which in our running example is a shooting event.¹²

(37) *shoot* $\rightsquigarrow \lambda x.\lambda e.\text{SHOOT}(e) \wedge \text{THEME}(e) = x$

Likewise, each of the result state components denotes a function from individuals to eventualities, as in (38).

(38) a. *dead* $\rightsquigarrow \lambda x.\lambda e.\text{DEAD}(x)(e)$
 b. *off the horse* $\rightsquigarrow \lambda x.\lambda e.\text{OFF}(x)(\text{the.horse})(e)$

We provide the following syntactic structure for multiple resultatives (39).¹³ Here, the PP result phrase acts as the complement of the AP result, with the AP acting as complement to the verb. The DP argument of the verb is introduced in the specifier of the VP, with the agent argument introduced in the specifier of a higher projection, such as *vP* or *VoiceP* (not shown here).¹⁴

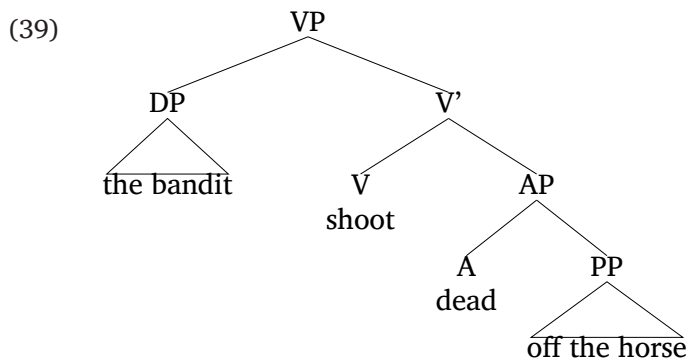
¹² Following Kratzer (1996) and much subsequent work, we sever the agent argument from transitive verbs, introducing it in a higher functional head, such as *Voice*.

¹³ We wish to underscore that the specific tree representation provided in (39) was chosen simply for illustrative purposes. Regardless of how the syntactic structure of these examples is elaborated, what is crucial for the present analysis is that the structural relationship of A and PP be maintained for compositional purposes. To this end, we do predict that the A + PP structure should be a constituent. In our judgment, while somewhat marked, the following examples, in which the A + PP constituent is fronted, do not sound very bad to us.

- (i) a. Dead off his horse the sheriff shot him.
 b. Flat between the books she pressed the leaflet.

This suggests to us that the syntax in (39) is broadly on the right track.

¹⁴ We assume that the surface word order is derived via head movement, or an equivalent process, that results in the correct VO word order. In general, this syntax is in line with *complex predicate* approaches to the analysis of resultatives (Dowty 1979; Williams 2015, among others).



We are now in a position to provide a compositional analysis of multiple resultatives. First, the two result phrases compose with one another by CAUSATIVE FORMATION (40-a). The result then composes further with the verb via the same rule (40-b). Finally, the individual argument is saturated, delivering (40-c). The result is a predicate of events of shooting the bandit, which causes the bandit's *death* state, which in turn causes the bandit's state of being *off the horse*.

- (40)
- a. $\llbracket \text{dead off his horse} \rrbracket: \lambda x. \lambda e'. \text{DEAD}(x)(e') \wedge \exists e'' [\text{OFF}(x)(\text{his horse})(e'') \wedge \text{CAUSE}(e', e'')]$
 - b. $\llbracket \text{shoot dead off his horse} \rrbracket: \lambda x. \lambda e. \text{SHOOT}(e) \wedge \text{THEME}(e) = x \wedge \exists e' [\text{DEAD}(x)(e') \wedge \text{CAUSE}(e, e') \wedge \exists e'' [\text{OFF}(x)(\text{his horse})(e'') \wedge \text{CAUSE}(e', e'')]]$
 - c. $\llbracket \text{shoot the bandit dead off his horse} \rrbracket: \lambda e. \text{SHOOT}(e) \wedge \text{THEME}(e) = \text{the bandit} \wedge \exists e' [\text{DEAD}(\text{the bandit})(e') \wedge \text{CAUSE}(e, e') \wedge \exists e'' [\text{OFF}(\text{the bandit})(\text{his horse})(e'') \wedge \text{CAUSE}(e', e'')]]$

Note now that causation must hold not only between the *shooting* event and the bandit's state of *death*, but also between the state of *death* and the state of being *off the horse*.¹⁵ This means that the only interpretation predicted to be possible is *that the state of being off the horse is directly caused by the bandit's death, which is in turn directly caused by the shooting event*. This captures the observed contrasts between (31) and (32) and between (33-a) and (33-b) above. In general, the analysis accounts for the temporal properties of multiple resultatives in a way that the low depictive analysis of Ausensi & Bigolin (2021) could not: by virtue of the chain of causal relationships encoded in the resultative, the sheriff's shot must precede the bandit's death, and the bandit's death must precede his falling off his horse. We thus avoid the problematic predictions of the depictive analysis, on which no temporal constraints existed between the shooting event and the event of being *off the horse* in our running example.

¹⁵ While the idea that states can cause other states is perhaps not common, other authors have independently argued that causation between states is possible (e.g., Ramchand 2008; Rothmayr 2009; Hirsch 2018).

4.1 Result Verbs with Result Phrases

While we have focused on one class of multiple resultatives, we have also seen another discussed by Ausensi & Bigolin, namely those with a result verb in manner position with a separate result phrase.

- (41) a. Think of Katika Lashore, and the way she heals up after **tearing** her skin open.
(COCA)
b. This time I didn't **melt** the chocolate into the custard mixture. (GloWbE)

These examples are also amenable to a treatment on the approach developed here. For example, if we follow Beavers & Koontz-Garboden (2020) in treating the roots of these verbs as predicates of states with an entailment of change, the analysis is exactly parallel to the approach above for two result phrases. Namely, the state contributed by the result verb causes the state provided by the result phrase (see Yu et al. 2023 for an alternative approach).¹⁶

- (42) $\lambda x.\lambda e'.\exists e[\text{CAUSE}(e,e') \wedge \text{MELT}(\textit{the chocolate})(e') \wedge$
 $\exists e''[\text{INTO}(\textit{chocolate})(\textit{the custard mixture})(e'') \wedge \text{CAUSE}(e',e'')]]$

4.2 The UPC as Emergent from Causal Structure

On our approach, multiple resultatives genuinely involve two result states predicated of the same entity in one clause, and are thus genuine violations of the UPC. Given this fact, on our analysis, a causal relationship exists between the two result states in such resultatives. We can take advantage of this fact to provide an account for examples that appear to motivate the UPC. In particular, we will argue that such examples, though having well-formed *logical forms*, are deviant due to *pragmatic factors* arising from clashes between the causal relationship between the result states and world knowledge concerning the causal powers of those result states, an idea found previously in Matsumoto (2006) and Beavers & Koontz-Garboden (2017) as well. In this respect, consider the example in (43-a) below, which, on our analysis, (43-a) has the logical form in (43-b).

- (43) a. *Sam kicked Bill **black and blue** out of the room. (Goldberg 1991: 368)
b. $\exists e[\text{KICK}(e) \wedge \text{AGENT}(e) = \textit{sam} \wedge \text{THEME}(e) = \textit{bill} \wedge \exists e'[\text{BLACK-AND-BLUE}(\textit{bill})(e')$
 $\wedge \text{CAUSE}(e,e') \wedge \exists e''[\text{OUT-OF}(\textit{bill})(\textit{the room})(e'') \wedge \text{CAUSE}(e',e'')]]]$

In this case, while (43-a) is assigned a logical form in (43-b), once we inspect (43-b), we see that it requires that a state of being *black and blue* causes Bill to be *out of the room*. We claim that this

¹⁶ In order to avoid confusion, we wish to mention here that we have simplified the original analysis in Beavers & Koontz-Garboden: on their analysis, the roots of verbs like *melt* also encode a change of state as an additional conjunct, and are thus represented as $\lambda s.\text{MELTED}(s) \wedge \exists e[\text{BECOME}(e,s)]$. As this additional change of state component is not crucial to our analysis, we have left it out in (42), and note that the non-logical constant MELT is to be seen as a placeholder for a more complex analysis along the lines of Beavers & Koontz-Garboden's.

is the source of the deviance of the example: states of being *heavily bruised* do not generally cause motion. Note that if we modify the PP to encode a result state that *can* be caused by a state of *heavy bodily damage*, the example is perfectly well-formed, as in the naturally occurring example in (44).

(44) In the end, Ei has to *beat him black and blue into unconsciousness*. (Web)

The putative effects of the UPC, then, arise from an interaction between the causal structure of such sentences and independent knowledge about what sorts of events and states are able to bring about what other sorts of states. There is thus no need to posit independent principles like the UPC to rule out certain classes of sentences, over and above the more basic relationship of causation and its interaction with world knowledge.

4.3 Resultatives with Two Result Phrases Jointly Describing a Result State

Recall that there is also a class of apparent multiple resultatives that are not a problem for the UPC, in which the second result phrase simply further specifies the state introduced by the first.

- (45) a. He pounded the dough **flat into a pancake-like state**.
 b. The liquid froze **solid into a crusty mass**.

(Goldberg 1991: 371)

A question on our approach is how such examples are derived, and why CAUSATIVE FORMATION apparently does not apply to them, despite the fact that they appear to be syntactically parallel to multiple resultatives like those considered above.

First, we propose that the “further specification” reading arises via a separate composition rule, a generalized version of PREDICATE MODIFICATION (Heim & Kratzer 1998), which conjoins the two state descriptions.¹⁷ This rule is independently motivated, for example, in the analysis of generalized conjunction and the analysis of adjectival modification, and thus does not constitute

¹⁷ An anonymous reviewer asks if using a separate composition rule for further specification readings amounts to just a way of reformulating the empirical generalization, and asks whether this approach makes any predictions. To begin, we note that the causative and further specification readings are distinct as a matter of empirical fact, and cannot be derived from each other, so their semantic analysis must be different in some way. Second, given the independent availability of PREDICATE MODIFICATION in other domains of the compositional apparatus of natural language, our use of it here is a mere extension to a new domain. In fact, in our view, it would require a stipulation to rule it out in these cases, where two expressions of the same type compose.

With regard to predictions, since both composition rules are freely available, we predict that both readings are possible to the extent that the result does not clash with other constraints, such as world knowledge. This theory could be falsified by showing that the generated readings are not freely available even after controlling for other constraints. One could also imagine other alternatives: for example a theory that does not posit the existence of a freely available PREDICATE MODIFICATION rule. While this theory would be more restrictive than our own approach, it would leave us without a straightforward means for deriving further specification readings.

an addition to the core compositional machinery assumed for the interpretation of natural language. The application of this rule to the analysis of these examples amounts to claiming that *flat* and *into a pancake-like state* both modify the result state component of the resultative, and are thus compatible descriptions of a single result state, in line with the general approach to such resultatives in the previous literature.

As for the absence of a causative reading in such examples, we appeal to the same explanation we proposed for ruling out deviant examples like **Sam kicked Bill black and blue out of the room*: *flat* states have limited causal powers, with the consequence that the *flat* state of the dough is incapable of causing the dough's state of being *in a pancake-like state*. Knowledge about the causal powers of states of being *flat* or *solid* thus regulates whether a causative reading is available. Note that examples with *flat* may appear with a causative reading where the flatness of the object in question plays a key role in permitting the result state encoded in the following PP, as can be seen in the following example.

(46) The librarian *pressed* the leaflet **flat** into the space between the books.

We can ask a related question for genuine multiple resultatives: why do such examples lack further specification readings? The reason for this is that *The sheriff shot the bandit dead off the horse* cannot be composed by PREDICATE MODIFICATION, because *dead* and *off the horse* cannot be predicated of one and the same state: the set of *dead* states and the set of states of being *off the horse* are disjoint, and thus predicating both of a single state is a contradiction. Thus, the range of possible readings of resultatives with a multiplicity of apparent result phrases is modulated by pragmatic constraints regardless of which rule is used to compose them.

5 Tying Up Loose Ends

We close with discussion of a gap in the data that has yet to be discussed, namely, the UPC violating examples in (7) above, repeated below in (47), and the lack of resultatives with two consecutive APs as result phrases. For example, even controlling for the causal requirement between two result phrases, the example in (48) is ungrammatical.

- (47) a. *She **carried** John giddy. (Simpson 1983: 147)
 b. *Bill **broke** the vase worthless. (Jackendoff 1990: 240)
 c. *The vase **fell** broken. (Rappaport Hovav 2014: 23)

(48) *Jonas beat the man **black and blue** unconscious.
 (cf. In the end, Ei has to *beat* him **black and blue** into unconsciousness.)

Nothing given in the account of resultatives with XP + XP results so far explains why these cases, of which judgments seem robust, are ruled out. That is, all else being equal, CAUSATIVE

FORMATION should be able to apply to these examples, on a par with *shoot the bandit dead off his horse*. Nonetheless, it is most likely that independent constraints rule out these cases.¹⁸ First, the examples in (47) can be explained by the scalar requirements placed on result phrases in resultatives discussed by Wechsler (2005). For instance, durative verbs like *carry* (cf. *She carried John for one hour/#in one hour*) preferably take maximal endpoint closed-scale result phrases, but *giddy* is open-scale, as shown by its oddness with maximality modifiers like *completely*, as in *??John is completely giddy* (Kennedy & McNally 2005). Likewise, *break* is a punctual verb (cf. *Bill broke the vase #for one hour/in one hour*), but *worthless* is a maximal endpoint closed-scale adjective (as shown by the acceptability of *the vase is completely worthless*), another incompatibility Wechsler (2005) discusses. Finally, *broken* is a deverbal adjective, which as a rule do not occur in resultatives, as Embick (2004) discusses (cf. *hammer the metal flat/*flattened*).

Turning now to cases with stacked APs, APs generally cannot be stacked in English, even outside of resultative contexts, such as in simple predicative contexts. When possible, the right-peripheral AP can only be interpreted as depictive; in simple predicative contexts, this is often facilitated by an intonational break between the two APs.

- (49) a. Kim is tired (*and) sleepy. \Rightarrow Kim is both tired and sleepy (coordination required)
 b. John is happy, naked. \Rightarrow John is happy when he is naked

This observation carries over directly to resultatives; to the extent that resultatives with AP + AP are interpretable, the second AP is most naturally construed as a depictive scoping over the manner event rather than the state introduced by the first AP as proposed by Acedo-Matellán et al. (to appear) and Ausensi & Bigolin (2021).

- (50) a. *Kim wiped the table clean dry. \Rightarrow as a result of wiping the table became clean, which led to it being dry
 b. Lucy wiped the table clean, dry. \Rightarrow Lucy wiped the table clean while it was dry (though it got wet after she finished wiping it)

While it is unclear what the exact constraint behind stacking of APs in any context is, our analysis does provide a possible syntactic rationale. Recall that on our analysis the second result phrase is the complement of the AP (39). One possibility, then, is that APs cannot serve as the complement of another AP. The ultimate source of such a categorial constraint appears to be syntactic in nature, as previously proposed by Matsumoto (2006), and is independent from the expression of resultativity and multiple results. The non-existence of stacked AP resultatives, then, does not invalidate the proposal advanced here that there are particular kinds of semantic relationships that hold between the multiple result phrases in resultative constructions.

¹⁸ As noted in section 4.2 above, see also Matsumoto (2006); Beavers & Koontz-Garboden (2017) for the idea that pragmatics also plays a role in the result combinations that are possible.

6 Conclusion

We have examined an understudied class of resultatives involving more than one result phrase, and proposed that these resultatives involve a nested causal chain of eventualities, in which the manner event causes the first result state, and the first result state in turn causes the second result state. We implemented this by adopting a rule of CAUSATIVE FORMATION, which relates the second result phrase to the first via the CAUSE relation. The approach developed here has the advantage of correctly predicting the interpretative properties of the resultatives at stake, in contrast to the approach developed by Ausensi & Bigolin (2021) which, in proposing that the second result phrase be analyzed as a low depictive, makes incorrect predictions about the temporal and causal relations that must hold between the eventualities at play in a multiple resultative.

Returning to the broader issue of the constraints that hold on the expression of resultativity, such as the UNIQUE PATH CONSTRAINT (Goldberg 1991), we agree with Ausensi & Bigolin that these constraints do not hold up empirically if they are taken to be semantic constraints. On the other hand, our approach suggests that multiple resultatives of the sort we have investigated in this paper are subject to interpretative constraints, namely that a causal relation must hold between the first and second result phrase. Cases cited previously as supporting the UPC can be explained on this approach by appealing to the interaction between the causal structure of these examples and real-world knowledge about what states are able to cause which other kinds of states. Overall, the present paper suggests a more nuanced view of constraints on the expression of resultativity. In particular, there are clear cases that pose problems for such constraints as previously formulated in the literature, and new insights can be derived by carefully considering the relationship between the two result phrases. Ultimately, this points us toward a better understanding of the constraints on the expression of resultativity.

Appendix

- (51) Resultatives with *manner verbs* and an **AP** and **PP** introducing two distinct result states.
- a. In the end, Ei has to *beat* him **black and blue** into unconsciousness. (Web)
 - b. They spotted a man waiting in ambush in a tree. J.B. was quick on the draw and *shot* him **dead** out of the tree! (Web, from Ausensi & Bigolin 2021)
 - c. Or I could just brute force things and *hammer* the nail **flat** into the wood. (GloWbE)
 - d. He had been *knocked* **senseless** into the bottom of his boat. (GloWbE)
 - e. Crispy or thin crust does not get a rising period or only a short one in a bowl before it is *rolled* **flat** into the pan. (Web)
 - f. They would dig these huge holes and tell our men to stand by them as they *shot* them **dead** into the grave. (Web, from Ausensi & Bigolin 2021)
 - g. He refused and the men punched him to the head, *knocking* him **unconscious** onto the footpath. (Web)
 - h. His mother would often be *beaten* **bloody** into unconsciousness by his drunken stepfather. (Web)
 - i. I'm just able to *kick* it **flat** into the space between the frame rails. (Web)
- (52) Resultatives with **result verbs** and a **result phrase** introducing an unrelated result.
- a. Your [...] cooked bacon might be overcooked and the cheese might **melt** out of the hamburger. (GloWbE)
 - b. Think of Katika Lashore, and the way she heals up after **tearing** her skin open. (COCA)
 - c. This time I didn't **melt** the chocolate into the custard mixture. (GloWbE)
 - d. Under water, he swims to Lexi, who is apparently losing oxygen fast, and fires his eye lasers at the ropes binding her, successfully **burning** them loose. (Web)
 - e. The methods of obtaining blocks involve first isolating them by cutting narrow trenches then **splitting** them free from the bed. (Web)

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The authors have no competing interests to declare.

Author contributions

All authors contributed equally to the paper and they should be considered co-first authors.

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